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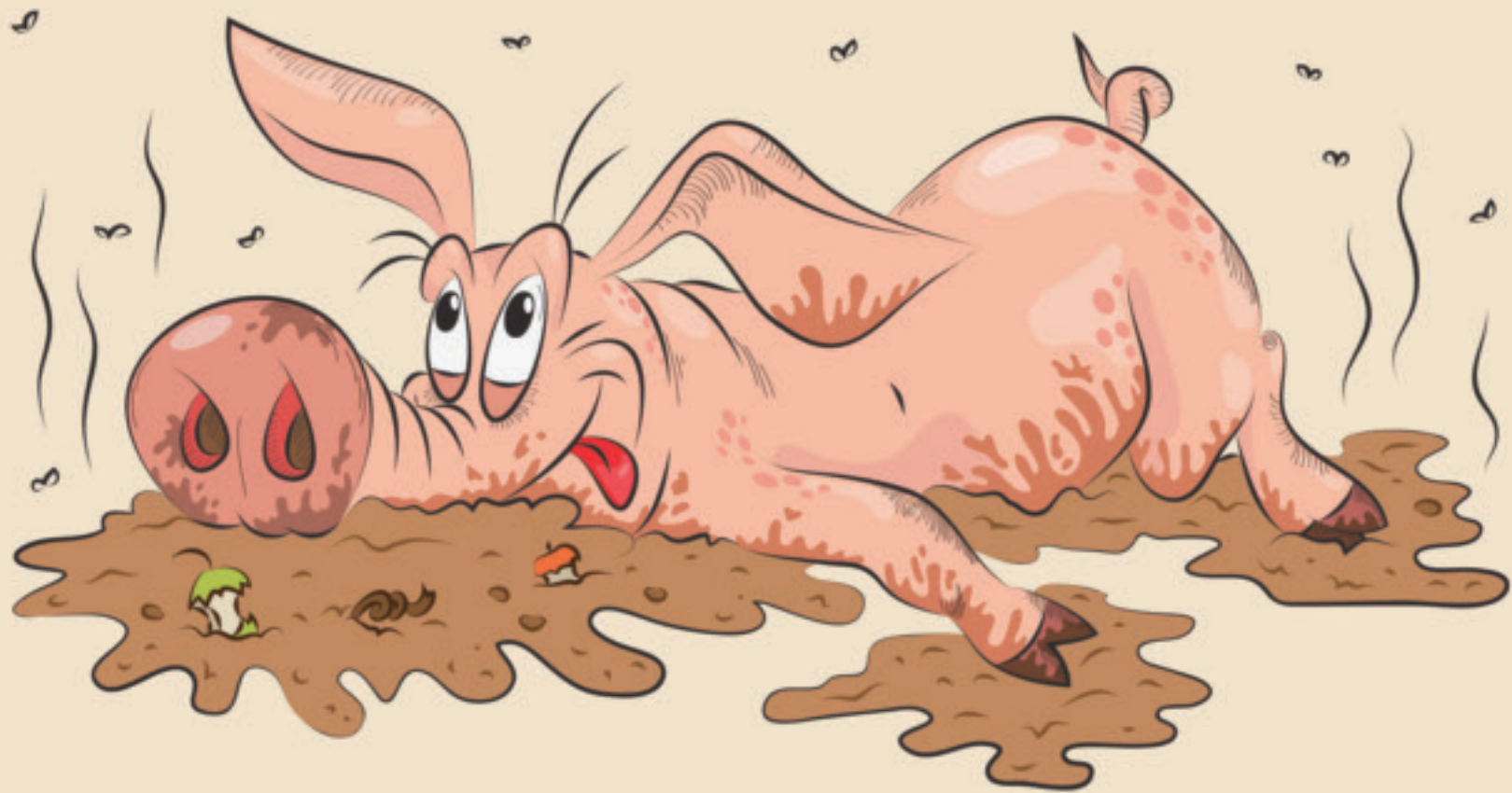
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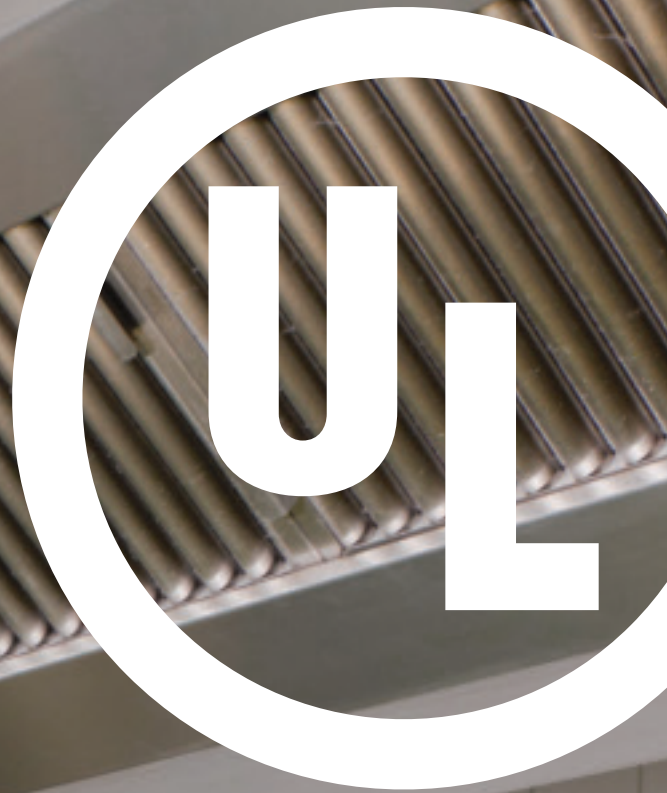
Volume 75, No. 9 May 2013

HEALTH IMPACT?

Analyzing Complaints Associated With
Animal Feeding Facilities to Determine the Risk



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ABOUT THE COVER



In this month's cover article, "Complaints Associated With Animal Feeding Facilities as Reported to Ohio Local Health Departments, 2006–2008,"

the authors describe a retrospective survey they conducted to investigate reported odor, nuisance, or health-related complaints about animal feeding facilities in Ohio. Although swine operations generated the most complaints, the authors found that in general, animal feeding facilities were not a major source of complaints, despite their controversial nature and concerns from nearby residents about the health and nuisance implications of these facilities.

See page 8.

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ADVERTISERS INDEX

American Public University	7
Comark.....	45
Decade Software	79
HealthSpace USA	80
Mitchell Humphrey	7
Olympus NDT	5
Ozark River/Integrity Distribution.....	41
Sweeps Software, Inc.	33
Taylor Technologies, Inc.	45
Underwriters Laboratories	2

ADVANCEMENT OF THE SCIENCE

Complaints Associated With Animal Feeding Facilities as Reported to Ohio Local Health Departments, 2006–2008.....	8
A Community-Based Participatory Research Partnership to Reduce Vehicle Idling Near Public Schools	14
Lead-Based Paint Awareness, Work Practices, and Compliance During Residential Construction and Renovation	20
International Perspectives: <i>An Outbreak of Cryptosporidium at a Recreational Water Park in Niagara Region, Canada</i>	28

ADVANCEMENT OF THE PRACTICE

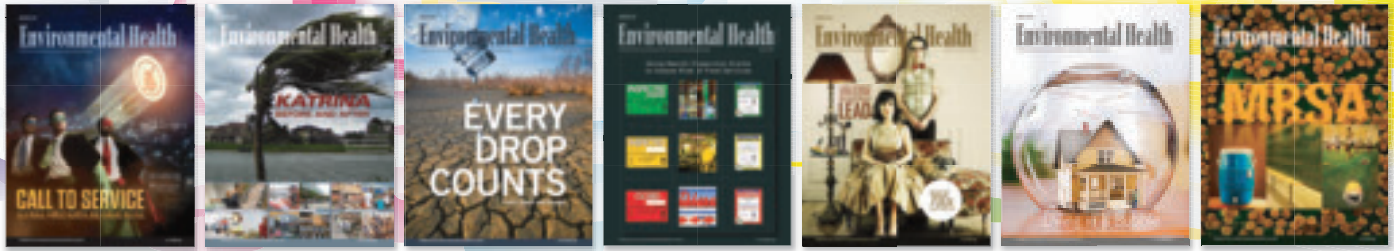
NEW Across the Country: <i>What's Happening in Environmental Health</i>	34
Direct From ATSDR: <i>Community Exposures to Chemicals Through Vapor Intrusion: A Review of Past Agency for Toxic Substances and Disease Registry Public Health Evaluations</i>	36
Direct From CDC: <i>Healthy and Safe Swimming: Pool Chemical-Associated Health Events</i>	42

ADVANCEMENT OF THE PRACTITIONER

Demystifying the Future: <i>Four Unexpected Macro Trends for 2013 and Beyond: The Last Two</i>	46
Career Opportunities	48
EH Calendar	48
Resource Corner.....	50
JEH Quiz #6.....	51

YOUR ASSOCIATION

President's Message: <i>See You At The AEC! C U P2P @ AEC #77!</i>	6
Special NEHA Members	53
Special Listing	54
NEHA Technical Advisors' Corner	56
NEHA News	58
NEHA 2013 AEC.....	61
Managing Editor's Desk: <i>An Exciting NEHA Grant Initiative and History Is Bunk!</i>	78

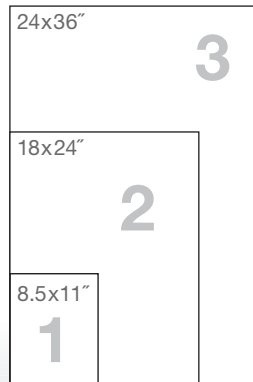


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► PRESIDENT'S MESSAGE



Brian Collins,
MS, REHS, DAAS

See You At The AEC!: C U P2P @ AEC #77!

In my October column I stated, “Your success is contingent upon your ability to interact and relate to others.” I further mused that “success comes not only with whom you know, but also, with who knows you!” I believe there is no better opportunity for environmental health professionals to advance this “get connected, stay connected” agenda than by attending the NEHA Annual Educational Conference (AEC) & Exhibition.

As environmental health professionals we are expected to competently and scientifically anticipate, recognize, evaluate, and mitigate risks that pose threats to humans and the environment. (Wow—that could be a new definition for environmental health!) NEHA’s AEC is a unique opportunity for you to gain the skills, expertise, and insights needed to solve these challenges. NEHA’s AEC is also the most concentrated, value-driven training and educational investment your organization can make. The *real* return on investment, though, comes with your investment in you! It’s what you make of it!

This year’s AEC at the Hyatt Regency Crystal City (at a great room rate for the Washington, DC, area!) is an excellent opportunity for you to connect vertically and horizontally with 1,000+ like-minded practitioners, students, academics, policy makers, and environmental health professionals. The key here is to engage a tool in which all of us have capacity, but few actually optimize: person-to-person (P2P) communication.

NEHA’s 77th AEC (AEC #77) will afford you the opportunity to establish connections, to reconnect with previous acquaintances, and to build P2P relationships and networks with

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contemporary professionals who can not only help you to build and sustain a career but also help you to succeed in your career.

At the conference and in addition to the DC-area venue, which is an educational opportunity in itself, you will have access to relevant people addressing timely topics related to policy development, facilitation, and implementation with the bonus of finding out with whom to talk and when. Sessions will address environmental justice, hazardous materials, leadership, sustainability, water quality, onsite wastewater, and children’s environmental health. Other presentations will cover air quality, food protection and defense, healthy homes and communities, land use and design, vector control and zoonotic disease, recreational water, technology, and international environmental health. You truly have the ability to create a point-of-contact for practically every environmental health challenge you may encounter if you engage!

And if that isn’t enough, Dr. Graham Allison, our keynote speaker, will address apocalyptic decision making as it relates to the environment and quite literally the lives of hundreds of thousands of people in his key-

note, “What do the Cuban missile crisis and environmental health have in common?”

This conference will be special to me for many reasons. One of those reasons is that my wife and daughter will be able to attend briefly. This will be my wife’s first conference. More important than that, it will be special because she managed to put up with me this year while managing her career and everything else in our lives. She’ll get a glimpse of what we do and why we do it! I think too of the education my daughter will get just visiting iconic DC venues such as the memorials, the Smithsonian, and the White House! I did not have that opportunity until I was well into my adult years! Nelson promises I’ll have a pretty cool room and I am jazzed about that but I am most excited about learning something new and connecting with you! At the conference end, it will be bittersweet as I pass the gavel of the presidency to President Elect Alicia Enriquez Collins (no relation), whom I expect will keep the passion and fire for NEHA and what we do burning bright!

...And by the way, if for some reason you cannot make the AEC, NEHA has provided a tool by which you can attend “virtually.” Learn how to access the Virtual AEC for sessions, networking, and real-time feedback by going to neha2013aec.org/virtual_experience.html.

Perhaps you can tell, I am very excited about our conference this year and I hope to C U P2P @ AEC #77! 🐼

A handwritten signature in black ink that reads "Brian Collins".

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Complaints Associated With Animal Feeding Facilities as Reported to Ohio Local Health Departments, 2006–2008

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Abstract Confined animal feeding facilities of all sizes have long been targeted as a source of human health and quality of life concerns. In order to describe and quantify these concerns in Ohio, a retrospective survey of local health departments was conducted focusing on reported complaints associated with animal feeding facilities. During 2006–2008, the most common complaints pertaining to any type of animal feeding facility were air quality and odor outside the home, followed by manure storage and application issues. The study described here showed that larger permitted livestock feeding facilities were not a major source of health and nuisance complaints associated with animal feeding facilities as reported to Ohio local health departments. Local health departments received few health complaints associated with any animal feeding facility. None were validated or confirmed by a physician in 2008.

Introduction

Agriculture is an important industry in Ohio, contributing more than \$73 billion and comprising 13% of the state's economy. Although the amount of land devoted to agriculture has decreased 3.7% in just five years (U.S. Department of Agriculture-National Agriculture Statistics Survey [USDA-NASS], 2009), the number of animals on Ohio farms has increased by 948,820 animals, nearly a 2% increase (USDA-NASS, 2009). Two types of animal feeding facilities (AFFs) are required to be permitted in Ohio: concentrated animal

feeding facilities (CAFFs) and concentrated animal feeding operations (CAFOs).

CAFFs are regulated by the Ohio Department of Agriculture (ODA) due to the confinement of animals for 45 or more consecutive days and are defined by the number, i.e., mega, large, medium, and small, and type of animals housed. All mega and large facilities must obtain permits to install as well as permits to operate. Medium and small facilities could also require a permit if they have been found to discharge pollutants directly into U.S. waters (Ohio Department of Agriculture

[ODA], 2007). CAFFs are inspected no less than twice each year by ODA.

CAFOs are regulated by the Ohio Environmental Protection Agency (OEPA). They are similar to CAFFs in that they confine animals for 45 or more days. They are also classified by size and species categories (U.S. Environmental Protection Agency [U.S. EPA], 2011). CAFOs, however, are considered significant contributors of pollutants and are required to obtain a National Pollutant Discharge Elimination Permit (Ohio Department of Natural Resources, ODA, OEPA, Ohio State University Extension, & Ohio Livestock Coalition, 2003). These facilities are inspected by OEPA no less than once every five years.

An AFF can be determined to be a CAFF and thus subject to ODA rules and regulations; a CAFO, which is subject to OEPA rules and regulation; or both a CAFF and a CAFO, which must abide by both ODA and OEPA's rules and regulations. At the time of our study in 2009, Ohio contained 176 ODA-permitted CAFFs, of which seven were also considered a CAFO. Eight additional AFFs were CAFOs only. According to estimates from the Livestock Environmental Permitting Program at ODA, permitted livestock facilities house about 90% of Ohio's layers (i.e., egg-producing poultry) (ODA, 2007). No more than 30% of dairy animals and less than 10% of all other poultry and livestock are housed in permitted facilities.

TABLE 1

Definitions Established for 2006–2008 Animal Feeding Facility Survey

Affirmation	Definition
Animal feeding facility (AFF)	Any operation that raises animals, regardless of size and means of confinement, for food or fiber
Concentrated animal feeding operation (CAFO)	AFF that is regulated by the Ohio Environmental Protection Agency and is required to have a National Pollutant Discharge Elimination Permit due to the discharge of pollutants into U.S. waters and the confinement of animals (Ohio Department of Agriculture [ODA], 2005)
Concentrated animal feeding facility (CAFF)	AFF that is regulated by the Ohio Department of Agriculture and is required to obtain a permit to install and operate due to the confinement of animals (ODA, 2005)
Nonpermitted concentrated animal feeding facility	AFF that confines 25 or more adult animals but that does not require a permit to operate due to not meeting the requirements for a CAFO or CAFF
Other animal feeding facility	AFF that houses fewer than 25 animals but that is not considered a recreational farming operation
Confined/confinement	Housing animals for 45 days or more in a 12-month period; the ground the animals are housed on is not used to grow any type of vegetation during the normal growing season (ODA, 2005)
Nuisance complaint	Any complaint against any AFF that does not immediately involve a threat to human health
Health complaint	Any complaint against any AFF that does immediately involve a threat to human health
Production type	Bovine-beef, bovine-dairy, poultry-broilers, poultry-layers, poultry-turkeys, sheep/goats, swine, kennel (dog, commercial), deer (farmed), ducks/geese, exotic/zoo, wildlife, other animal facility not listed, unknown

AFFs of any size can greatly benefit the surrounding community by adding revenue to the local economy and jobs. According to a 2002 survey, in two Ohio counties, Paulding and Van Wert, seven large dairies contributed 83 jobs and \$23 million to the local economy, purchased the majority of their corn and all of their silage from local farming operations, and signed tax increments to contribute to the local economy (Roe et al., 2004).

Although livestock production is important to the Ohio economy, AFFs are a controversial topic. Many nearby residents fear the health and nuisance implications of these facilities. One concern pertains to the increased potential for zoonotic disease (Cole, Todd, & Wing, 2000; Iowa State University, 2002; Saenz, Hethcote, & Grey, 2002). Another concern is water contamination. It has been shown that overflow from manure lagoons and manure runoff from fields can result in fish kills (Ohio History Central, 2005; U.S. EPA, 2009). Air contamination and odor are also potential issues. Residents who live near an AFF can be at increased risk for headaches, wheezing, coughing, and other

respiratory issues (Cole et al., 2000; Donham et al., 2007; Sigurdson & Kline, 2006; Villeneuve, Ali, Challacombe, & Hebert, 2009; Wing & Wolf, 2000). These symptoms were reported as being much more severe than those who did not live near an AFF (Wing & Wolf, 2000). Noise is also a common concern (Smith, 2004).

To determine if any factual basis exists for these concerns in the state, the Ohio Department of Health's Zoonotic Disease Program conducted a survey to identify the most common nuisance and health complaints reported to local health departments. Special attention was given to the characteristics of the complaints by size and type of operation, source of the complaint, and if the issue was resolved. In particular, we wanted to determine if any adverse health events were associated with a resident living near an AFF. To provide a broader perspective, information was collected not just about permitted and nonpermitted livestock feeding facilities, but about nonlivestock AFF complaints as well.

Materials and Methods

Survey Development

A questionnaire was developed to quantify and qualify the complaints regarding AFFs for the years 2006–2008. The survey instrument was developed with the assistance of the Ohio Department of Health, ODA, OEPA, and The Ohio State University's Veterinary Public Health Program. The 52-item questionnaire queried the local health departments about complaints for the aforementioned years and collected more specific details associated with complaints that occurred during 2008 only. Definitions specific to this survey were also developed for various types of AFFs and types of complaints. The definitions can be found in Table 1.

Survey Dissemination

The questions were entered into the online survey Web site Survey Monkey. An e-mail explaining the objectives and purpose of our study was sent to the health commissioner of all 130 local health departments in Ohio as of April 20, 2009. Attached to the e-mail were the survey definitions and instructions, a link to the survey, and a printable copy of the questionnaire. The health commissioner was asked to either complete the questionnaire or forward it to the appropriate person within their department. Data collection took place between April 20, 2009, and June 15, 2009.

Data Collection and Analysis

All data were imported into a Microsoft Excel spreadsheet. Information was organized based on item, response, and local health department to allow comparisons between counties. Information from other sources, such as county and farm demographics, were also entered into the spreadsheet. Four local health departments were contacted to obtain further information about health complaints they received to ascertain if they appeared to be valid or were medically confirmed.

A formal statistical analysis was not conducted because the data were primarily descriptive and a statistical model such as ANOVA would not be particularly informative. In addition, accurate denominators for the number of nonpermitted AFFs in Ohio were not available.

TABLE 2

Number of Complaints Per Year and Ease of Resolution of Complaints Regarding Any Animal Feeding Facility as Reported by 38 Ohio Local Health Departments for 2006–2008

Complaint	Average Number of Complaints Per Year			Ease of Resolution					
	≥10	1–9	None	Very Easy	Easy	Neutral	Difficult	Very Difficult	N/A
Odors	7.9% (3)	78.9% (30)	13.2% (5)	0% (0)	15.8% (6)	15.8% (6)	39.5% (15)	13.2% (5)	15.8% (6)
Manure application/ storage	7.9% (3)	76.3% (29)	15.8% (6)	0% (0)	28.9% (11)	23.7% (9)	23.7% (9)	7.9% (3)	15.8% (6)
Dead animals	0% (0)	76.3% (29)	23.7% (9)	0% (0)	47.4% (18)	23.7% (9)	5.3% (2)	0% (0)	23.7% (9)
Surface water pollution	0% (0)	71.1% (27)	28.9% (11)	0% (0)	23.7% (9)	31.6% (12)	10.5% (4)	5.3% (2)	28.9% (11)
Increase in fly and insect population	2.6% (1)	65.8% (25)	31.6% (12)	0% (0)	18.4% (7)	23.7% (9)	21.2% (8)	5.3% (2)	31.6% (12)
Air quality	0% (0)	52.6% (20)	47.4% (18)	0% (0)	7.9% (3)	18.4% (7)	18.4% (7)	10.5% (4)	44.7% (17)
Well water contamination	0% (0)	44.7% (17)	55.3% (21)	0% (0)	18.4% (7)	10.5% (4)	10.5% (4)	2.6% (1)	57.9% (22)
Respiratory illness in humans	0% (0)	15.8% (6)	84.2% (32)	5.3% (2)	0% (0)	7.9% (3)	2.6% (1)	5.3% (2)	78.9% (30)
Nonrespiratory illness in humans	0% (0)	13.2% (5)	86.8% (33)	5.3% (2)	0% (0)	5.3% (2)	5.3% (2)	5.3% (2)	78.9% (30)

Results

General Information From 2006 to 2008

A response rate of 96.9% was achieved. Among the local health departments who did not respond, all were city health departments and none had CAFFs or CAFOs in their jurisdiction.

The local health departments were asked if they had received any nuisance or health complaints for 2006–2008. Most local health departments (67% [84/125]) reported that they received no complaints about AFFs during 2006–2008. Many of these local health departments were those located in cities or urban areas. No further information was obtained from these 84 local health departments.

Almost 30% (37/125) of local health departments reported having received at least one nuisance or health complaint and 3.2% (4/125) reported having received both a nuisance and health complaint. Local health departments were also asked to report whether or not the health complaints they had received could be validated. The definition of “valid” was left to the discretion of the local health department. The majority of local health departments, 81% (33/41), reported that they had not received valid health complaints for the years 2006–2008.

Two local health departments (4.9%, 2/41) reported having received at least one valid health complaint during 2006–2008 and the remaining six local health departments (15%, 6/41) indicated that they were not aware if their local health department received any valid health complaints.

To determine which complaints were most common, local health departments that received complaints were asked to estimate the average number of complaints received each year for the period 2006–2008 (Table 2). Thirty-eight local health departments responded to this section of the questionnaire. The most common complaints reported were odors, with 79% (30/38) of local health departments having received between one and nine odor complaints and 7.9% (3/38) of local health departments having 10 or more odor complaints each year. Complaints relating to manure storage and field application were also common, with 76% (29/38) of local health departments reporting having received between one and nine complaints. Eight percent (3/38) received 10 or more complaints per year.

According to almost half of the local health departments (47%, 18/38), dead animal complaints were the easiest to resolve, with only 5.3% (2/38) of local health departments reporting that these complaints were difficult to

resolve. Odor complaints were the most difficult complaints to resolve with 53% (20/38) of local health departments choosing this option.

The local health departments who reported a complaint were asked if the complaints were from residents who recently moved near an existing AFF. Thirty-six percent (15/41) reported that the complaints were from residents who had lived near a facility for at least two years while 20% (8/41) reported that most complaints were from residents who lived near an existing facility for less than two years.

Detailed Complaints for 2008

Local health departments were asked to report detailed information about each complaint that was received by their office for 2008 only. They were asked to report the month of the complaint, the complaint source, the production type and facility type of the AFF involved, the cause or nature of the complaint, the issue or impact of the complaint, and the outcome of the complaint. In total, 70 complaints were received by 18 local health departments in 2008.

The most common month for receipt of a complaint was April, accounting for 21% (15/70) of the complaints, followed by August, with 11% (8/70) of the complaints. Residents living adjacent to an AFF accounted for over

half (53% [37/70]) of the complaints, followed by other community members who reported 19% (13/70) of the complaints.

The facility type that garnered the most complaints were other animal feeding facilities (OAFFs), with 34% (24/70) of the total. This was followed by nonpermitted CAFFs (13%, 9/70), permitted CAFFs (8.6%, 6/70), and pastured, nonconfined animals (4.3%, 3/70). CAFOs were not the target of any complaints reported to local health departments. The facility type was unknown in 40% (28/70) of the complaints. Of the six complaints about permitted CAFFs in 2008, 33% (2/6) were found not to be a nuisance or health risk. Similarly, 33% (2/6) were corrected after local health department intervention. One out of six (1.7%) of the complaints were corrected when referred to another agency and another 1.7% (1/6) resolved complaints on their own without any local health department intervention.

The production types that received the most complaints were swine facilities with 14% (10/70) of complaints and commercial dog kennels with 8.6% (6/70) of complaints. These were followed by bovine-dairy and poultry-layer (7.1% each, 5/70), poultry-broiler (5.7%, 4/70), bovine-beef and sheep and goats (2.9% each, 2/70), and zoo animals (1.4%, 1/70). Unknown production types accounted for 10% (7/70) of complaints. In 40% (28/70) of the complaints, the production type was not assessed or provided by the local health department.

When evaluating the most common cause of a complaint, live animals and solid manure were cited most often with each receiving 14% (10/70) of complaints. These were followed by complaints about liquid manure and dead animals with 12% (8/70) of complaints each, flies (7.1%, 5/70), unknown causes (4.3%, 3/70), other causes not listed (2.9%, 2/70), and barns and buildings (1.4%, 1/70). Pastured animals, processing and rendering, other vectors, rodents, and vehicles were not reported by any local health departments.

The most common reason for a complaint was air quality or odor outside the home, accounting for 57% (40/70) of complaints. Surface water contamination was the second most common issue, generating 11% (8/70) of the complaints, followed by nonspecific pollution (7.1%, 5/70), air quality and odor inside the home, unknown reasons (4.3%

each, 3/70), and quality of life and other reasons not listed (2.9% each, 2/70). Human illness, animal illness, animal neglect, noise, property value, soil contamination, and groundwater contamination were each mentioned once (1.4%). Community illness, property damage, and wildlife issues were not deemed by any local health departments as a reason for a complaint.

Because odor was the most common complaint, this was examined in more detail. Forty-three local health departments reported that odor complaints occurred during 2008. Of these, swine facilities were most often identified as the source (14%, 6/43), followed by commercial dog kennels (9.3%, 4/43). "Other" production types not listed were the subject of 42% (18/43) of the complaints.

Regarding facility types, OAFFs received the most odor complaints with 28% (12/43) of the complaints, followed by nonpermitted facilities with 16% (7/43) of the complaints. Permitted CAFFs and pastured animals accounted for 4.7% (2/43) of the complaints each. The most common month for odor complaints was August with 19% (8/43) of the complaints, followed by April (16% [7/43]).

Four of the complaints were about an adverse health event. On further investigation of the health complaint, two local health departments reported that the health complaints were not valid and one local health department reported that the complaints were against a proposed but not an existing facility. The fourth local health department reported in error as on review no health complaints associated with an AFF were logged for 2008. Therefore no complaints about adverse health events were associated with an AFF validated by local health departments in 2008 as reported in our study.

The most common outcome was that the targeted facility corrected the reason for the complaint following local health department investigation. This occurred for 41% (29/70) of the complaints. The second most common outcome was that the situation was determined to not be a nuisance or health complaint and therefore required no local health department intervention (29%, 20/70). Seven complaints (10%, 7/70) were referred to another agency such as the Soil and Water Conservation District, the local extension office, or other applicable agen-

cies and were then resolved. In five instances each (7.1%) the situation resolved without local health department intervention or the outcome was unknown. The situation continued to be an ongoing issue in four instances (5.7%).

Discussion

A multitude of studies have been conducted about environmental and health issues associated with AFFs (Cole et al., 2000; Donham et al., 2007; Sigurdarson & Kline, 2006; Villeneuve et al., 2009). Public concerns about adverse health and environmental hazards have heightened as farms have become larger and animals more concentrated. Our survey was the first in Ohio to identify and quantify nuisance and health complaints associated with AFFs. All sizes and species of animal facilities were included so a comparison could be made to determine if larger livestock confinement operations generate more health and nuisance complaints than other facilities. Local health departments were chosen because their jurisdictions cover the entire state and they are mandated to address all types of nuisance complaints. Local health departments are frequently contacted by residents with environmental or health complaints. They also have trained and registered sanitarians who have the expertise to investigate and validate health and environmental impacts. Ohio is an ideal state to perform such a survey since it is diverse, containing both highly urban and agricultural areas with many areas of overlap.

An important finding from the survey was that during 2006 to 2008 local health departments reported few valid adverse human health events associated with any AFF. Environmental nuisance events, though, were reported. Complaints about odors, manure storage and application, and dead animals were most frequently reported to local health departments. This was followed by surface water pollution and increased fly and insect populations. All such events do have the potential to result in an adverse human health event. To prevent a nuisance from becoming an adverse health event or environmental hazard, a mechanism for investigation and abatement actions, when necessary, will continue to be warranted.

The survey also showed that permitted facilities (either CAFFs or CAFOs) in Ohio were not the major contributors of health or nuisance complaints received by local health departments. More complaints were associated with nonpermitted or nonlivestock AFFs. By contrast, only 184 permitted CAFFs and CAFOs are present in Ohio and they house only a fraction of Ohio's total livestock population other than poultry layers. Therefore, it is difficult to compare the relative proportion of complaints between permitted and nonpermitted AFFs without having denominators for the number of facilities and animals in nonpermitted facilities. Also, absolute numbers do not take into account the impact of an event. CAFOs and CAFFs by virtue of size may have a greater potential to negatively impact the health and quality of life of residents living around them. This is well recognized by the agriculture industry. Permitted facilities are required to have plans to minimize environmental nuisance issues and they are inspected regularly to ensure that plans are being followed. Voluntary standards, recommendations, and planning tools to address manure, vectors, and air quality have been suggested for nonpermitted production facilities (Iowa State University, 2007) as well.

Our survey also challenged a commonly held belief that the people who were most likely to complain were people who recently moved into agricultural areas. The findings of our survey suggest that this was not the case as residents who lived near a facility more than two years registered twice as many complaints as those who lived there less than two years. The more detailed survey of complaints in 2008 found that residents living adjacent or within one-half mile of the facility were more likely to register a complaint than any outside entity.

Although the ranking of complaint by issue was slightly different in the 2008 survey than the three-year survey, air quality and odor, water contamination, and manure continued to be primary concerns. Swine operations generated the most complaints, followed closely by commercial dog kennels, and less frequently, by dairy and poultry-layer operations. That the number of complaints from commercial dog kennels was second only to swine operations was a novel

observation. It suggests that focusing only on complaints associated with livestock feeding facilities may lack perspective as OAFFs may also be responsible for causing nuisance and health complaints in Ohio. A seasonal peak of complaints occurred in April followed by August, which were likely associated with key months for land application of livestock manure and other agricultural activities.

Our study had several limitations. This was a retrospective survey and many local health departments did not keep information on all aspects of nuisance complaints and their information was not organized for easy retrieval. As a result, many "unknown" and "other" responses were encountered. In particular, in the 2008 survey, 40% of the nuisances were listed as "other" under species-based production types. A more exhaustive listing is needed to identify what production facilities were missed. In particular, equine facilities should have been an option. Also, a prospective study would have yielded much better information because local health departments would have known what data to collect.

Although the local health department response rate was high, it was found that other agencies, such as the Soil and Water Conservation District, the local extension office, or Department of Agriculture also receive and respond to complaints about AFFs. It was noted in the analysis that many local health departments automatically refer agricultural complaints to another agency (or other applicable agencies) and thus did not include the complaint in their nuisance logs. Therefore, the number of actual complaints received throughout Ohio is probably much higher than reported here. A more comprehensive picture of the quantification of nuisance and health complaints would require merging local health department complaints with reports from other agencies. To improve response, identify trends, and avoid duplication of efforts, Ohio could create and maintain a centralized database reporting system. Although such a database would be valuable for all involved parties, the costs of the program may be prohibitive.

Conclusion

Overall, the results of this survey show that local health departments do receive health and nuisance complaints regarding AFFs. Our study

showed that larger permitted facilities, often referred to as "mega farms," are not responsible for the majority of these complaints. Local health departments could not confirm adverse human health events associated with living near an AFF in 2008. Most nuisance complaints are resolved with local health department or some other agency intervention. A future prospective survey of local health departments, with modifications of the survey tool, could better compare health and nuisance complaints between permitted and nonpermitted livestock facilities and compare complaints between livestock and nonlivestock facilities. 🐷

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May is Clean Air Month.



North American
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and Health Week is
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Recreational Water Illness
and Injury Prevention Week
is May 20–26, 2013.

References

- Cole, D., Todd, L., & Wing, S. (2000). Concentrated swine feeding operations and public health: A review of occupational and community health effects. *Environmental Health Perspectives*, 108(8), 685–699.
- Donham, K., Wing, S., Osterberg, D., Flora, J.L., Hodne, C., & Thu, K.M. (2007). Community health and socioeconomic issues surrounding concentrated animal feeding operations. *Environmental Health Perspectives*, 115(2), 317–320.
- Iowa State University. (2007). *Air management practices assessment tool*. Retrieved from <http://www.extension.iastate.edu/airquality/practices/homepage.html>
- Ohio Department of Agriculture. (2005). *Fact sheet: Concentrated animal feeding facility size changed from animal unit definition to small, medium, large, and major*. Reynoldsburg, Ohio: Author.
- Ohio Department of Agriculture. (2007). *Fact sheet: Livestock environmental permitting program*. Reynoldsburg, Ohio: Author.
- Ohio Department of Natural Resources, Ohio Department of Agriculture, Ohio Environmental Protection Agency, Ohio State University Extension, & Ohio Livestock Coalition (Eds.). (2003). *Guidelines for livestock operations*. Reynoldsburg, Ohio: Ohio Department of Agriculture.
- Ohio History Central, Ohio Historical Society. (2005). *Buckeye egg farm*. Retrieved from <http://www.ohiohistorycentral.org/entry.php?rec=1672>
- Roe, B.E., Bowen, N., Kleinschmidt, A., Heffelfinger, K., Davis, G.A., Fleming, R.D., Langham, T., Lopshire, J.N., & Stockman, M. (2004). *Economic and fiscal impacts: A case study of seven recently constructed dairies in Van Wert County and Paulding County, Ohio, 2004*. Retrieved from http://www.agrisk.umn.edu/TriennialConference/TriennialPubs/16_8AM/B_ROE1.pdf
- Saenz, R.A., Hethcote, H.W., & Grey, G.C. (2006). Confined animal feeding operations as amplifiers of influenza. *Vector Borne Zoonotic Diseases*, 6(4), 338–346.
- Sigurdarson, S.T., & Kline, J.N. (2006). School proximity to concentrated animal feeding operations and prevalence of asthma in students. *Chest—Official Publication of the American College of Chest Physicians*, 129(6), 1486–1491.
- Smith, D. (2004). Hearing loss protection for agricultural workers. *AgriLife Extension, Texas A&M System*. Retrieved from <http://agsafety-tamu-edu.wpengine.netdna-cdn.com/files/2011/06/HEARING-LOSS-PROTECTION3.pdf>
- U.S. Department of Agriculture-National Agriculture Statistics Survey. (2009). *2007 census of agriculture (Vol. 1)*. Retrieved from http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Ohio/index.asp
- U.S. Environmental Protection Agency. (2009). *Potential environmental impacts of animal feeding operations*. Retrieved from <http://www.epa.gov/agriculture/ag101/impacts.html>
- U.S. Environmental Protection Agency. (2011). *Regulatory definitions of large CAFOs, medium CAFOs, and small CAFOs*. Retrieved from http://ndep.nv.gov/bwpc/docs/cafo_flow3.pdf
- Villeneuve, P., Ali, A., Challacombe, L., & Hebert, S. (2009). Intensive hog farming operations and self-reported health among nearby rural residents in Ottawa, Canada. *BMC Public Health*, 9, 330.
- Wing, S., & Wolf, S. (2000). Intensive livestock operations, health, and quality of life among eastern North Carolina residents. *Environmental Health Perspectives*, 108(3), 233–238.

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A Community-Based Participatory Research Partnership to Reduce Vehicle Idling Near Public Schools

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Abstract The authors implemented and assessed the effectiveness of a public health initiative aimed at reducing traffic-related air pollution exposure of the school community at four Cincinnati public schools. A partnership was fostered with academic environmental health researchers and community members. Anti-idling campaign materials were developed and education and training were provided to school bus drivers, students, parents, and school staff. Pledge drives and pre- and posteducation assessments were documented to measure the effectiveness of the program. After completing the educational component of the public health initiative, bus drivers ($n = 397$), community members ($n = 53$), and staff ($n = 214$) demonstrated significantly increased knowledge about the health effects of idling ($p < .05$). More than 30% of parents signed the pledge to reduce idling after the public health intervention. A community-driven public health initiative can be effective in both 1) enhancing community awareness about the benefits of reducing idling vehicles and 2) increasing active participation in idling reduction. The partnership initially developed has continued to develop toward a sustainable and growing process.

Introduction

Asthma is the most common chronic disease of childhood affecting almost 9% of children in the U.S. (Akinbami, 2006). The etiology of asthma is complex and includes a combination of genetic, demographic, social, and environmental factors. Exacerbation of existing asthma has been consistently demonstrated to be associated with traffic-related air pollution (TRAP) exposure (Delfino et al., 2004;

McConnell et al., 2003; Trenga et al., 2006). Recent research suggests that exposure to TRAP is also associated with new-onset asthma (Carlsten, Dybuncio, Becker, Chan-Yeung, & Brauer, 2011; Jerrett et al., 2008).

Recently, childhood exposure to air pollutants during the school day has received increased attention and community concern (Heath, 2011; Heath & Morrison, 2008). Moreover, a nationwide survey found that

more than 30% of public schools in the U.S. are located within 400 m of a major roadway (Appatova, Ryan, LeMasters, & Grinshpun, 2008). Diesel-powered school buses at schools represent a significant source of TRAP, particularly ultrafine particles (UFP) with an aerodynamic diameter less than 100 nanometers. Diesel idling has also been identified as a significant factor in levels of elemental carbon near schools (Richmond-Bryant, Saganich, Bukieqicz, & Kalin, 2009). A recent case study demonstrated that school bus traffic significantly increases the total particle concentration and the concentration of diesel-associated elements, including manganese and iron, in the outdoor air near schools (Li et al., 2009).

In recognition of the potential health impact of idling buses and exposure to TRAP at schools, the U.S. Environmental Protection Agency (U.S. EPA) and many communities support efforts to reduce childhood exposure to diesel exhaust particles through anti-idling efforts, retrofitting of school buses with diesel oxidation catalysts, and the implementation of alternative fuels including low-sulfur diesel fuel (Hochstetler, Yermakov, Reponen, Ryan, & Grinshpun, 2011). The impact of these efforts on air quality and the health of asthmatic children while attending school remains unknown. In order to help quantify these effects, a Partnership in Environmental Public Health (PEPH) project between the University of Cincinnati

nati (UC), the Cincinnati Public Schools (CPS), and the Cincinnati Health Department (CHD) was formed and the Cincinnati Anti-Idling Campaign (CAIC) was created. The goals of CAIC are to 1) determine if children are exposed to increased levels of TRAP, including UFP and diesel-related elements at schools; 2) develop and implement a community-driven anti-idling campaign to reduce exposure to TRAP at schools; and 3) evaluate the effectiveness of the research partnership and anti-idling campaign by assessing the reduction of exposure in schools and the impact on the health of children with asthma who attend these schools.

The overall CAIC involved two components: research and intervention. The research component was designed to generate air quality and health data to support the effectiveness of the intervention component. The intervention component was designed to educate the community through curriculum-based training and outreach. We have previously reported that idling buses are significantly associated with an increase in UFP concentration outside schools and result in outdoor to indoor movement of particles and elemental carbon (Hochstetler et al., 2011). The objective of this article is to describe the formation of a successful research partnership between academic environmental health researchers and community members that resulted in the development and implementation of a public health initiative to reduce TRAP exposure at schools.

Methods

Formation and Description of Partnership

The overall objective of CAIC was to develop and promote an effective anti-idling educational message aimed at decreasing children's exposure to TRAP and reduce asthma morbidity. This common goal provided the impetus for the formation of an academic-community partnership, in which environmental health researchers and community partners were able to each provide specific expertise and resources to address a specific concern. The formation of the academic-community partnership was based upon the community-based participatory research principles of active collaboration, colearning, ensuring culturally appropriate research and intervention,

and the dissemination of results in a useful manner (O'Fallon & Deary, 2002). The partnership was initiated through the exchange of research findings about sources of TRAP at schools and its likely impact on the health of asthmatic children who attend those schools. In response, key community members provided feedback on realistic strategies to reduce exposure to TRAP at schools. The initial exchange of information, ideas, and expertise laid the foundation for CAIC with UC researchers offering to provide technical expertise about air sampling, health assessments, and epidemiologic methods. In exchange, CHD and CPS community partners were tasked to lead the intervention efforts (i.e., anti-idling campaign) and disseminate study findings.

Other key community partners included, but were not limited to, a school-specific campaign coordinator and school principal, First Student (the school bus service company), Hamilton County Department of Environmental Services, Growing Well Cincinnati (a local child health organization), WCET (a local public television station), and Alliance for Leadership and Interconnection (a nonprofit organization to develop and manage the production of a project-specific anti-idling training video).

CAIC Development and Implementation

The approach taken for CAIC focused on maximizing the use of existing resources and building upon them to produce a highly effective campaign. CAIC also aimed to empower the community with knowledge to support and promote the health initiatives while generating a sustainable campaign for future use. Activities for the public health intervention were divided into four components: 1) campaign research and development (August 2009–July 2010); 2) campaign implementation and completion (August 2010–July 2011); 3) online training video development (August 2010–July 2011); and 4) U.S. EPA's Tools for Schools review and implementation (August 2009–July 2011).

Campaign Research and Development

Four CPS schools were selected to participate in CAIC. These four schools were selected because of the prevalence of reported asthma among the student population and potential

exposure to TRAP from nearby major roads and idling school buses (Hochstetler et al., 2011). The long-term goal of CAIC was to establish anti-idling campaign methods effective at the four selected schools. This in turn would serve as a model and utilize the information gathered to further spur implementation of the intervention strategies throughout the CPS district.

Initial steps included developing key contacts with each participating school and with community partners. This group then strategized to develop campaign goals, activities, and desired outcomes, and existing resources available for use were identified. Augmentation of existing resources was done based on need along with the development of other project materials (campaign templates, curriculum revisions, administrative programs, communications, and training video, etc.).

One key component to the anti-idling campaign was an educational program that was presented to all CPS school bus drivers. In the summer prior to the campaign implementation (June 2010), footage of school bus exhaust was filmed and edited. From this material, CHD and First Student Group jointly developed an anti-idling video for the bus drivers' in-service training program. In addition, a presentation was created detailing the rationale behind the anti-idling campaign, which emphasized the increase in particulate exposure due to idling that may result in negative health effects on both children and adults. A scenario designed to simulate school buses arriving and idling in a "caravan" was created for air sampling by using a P-Trak particle counter. In the simulated scenarios two school buses were lined up and sampling was conducted near the driver's seat to capture potential exposure for the driver. The bus engines were turned off until the air particulate levels in the area of the bus driver's seat reached background concentrations. Once the background levels were reached in the area of the bus driver's seat, the engines were started and remained running in idle (Ohio Revised Code 3717.42) for six minutes. The concentration of ambient particles was measured near the driver's seat on the second bus at one-minute intervals during those six minutes. After six minutes the particulate level was measured again (outside the buses) to simulate a student walking through the exhaust towards the school.

Campaign Implementation

The campaign implementation took the form of school bus service educational presentations, schoolwide educational assemblies kicking off parental pledge drives, staff educational challenge (online video and survey), and a variety of community engagements.

A presentation for use during the school bus driver annual training was developed by CHD. This presentation reemphasized the information presented in the video and highlighted the impact of diesel particulates upon the driver's health. Drivers were asked to sign a pledge card to reduce idling. Knowledge gained by the drivers during the driver education program, video, and PowerPoint presentation was assessed by comparing knowledge based on a pre- and posteducation test. A paired *t*-test using SPSS software was used to analyze all pre- and posttest data.

Teachers at the participating schools were briefed on the program through an informational letter that clearly outlined the process and the goals of the program. The three classrooms at each school with the highest percentage of pledge cards completed by parents and returned to school earned a classroom incentive. Participating teachers in the classroom pledge drive received a gift, and those in the winning classrooms received a special thank you note. In addition to outreach efforts to students and parents, idling reduction signs were placed at the participating schools.

Parents of children at the participating schools received idling reduction packets that included a letter describing the program, a fact sheet, and pledge forms. The materials were sent home with the students at the same time that "air-quality assemblies" were offered at their schools. Parents were asked to read the idling reduction message and sign and return the pledge forms. Signed pledge forms by parents were considered essential by CAIC to assist with anti-idling activities within a five-day time period. Both the student and the parent were awarded incentive items in recognition of having turned in the signed pledge form.

Monitoring of vehicle idling duration during school drop off or pick up times was conducted for five days at one of the four participating schools, in order to establish idling practices pre- and post-anti-idling campaign activities.

FIGURE 1

Ambient Particle Number Concentration Inside School Buses During Idling

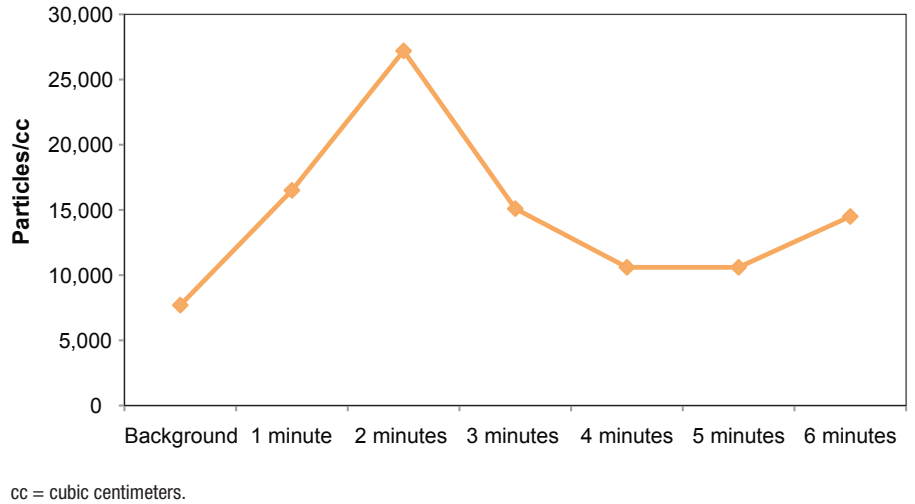
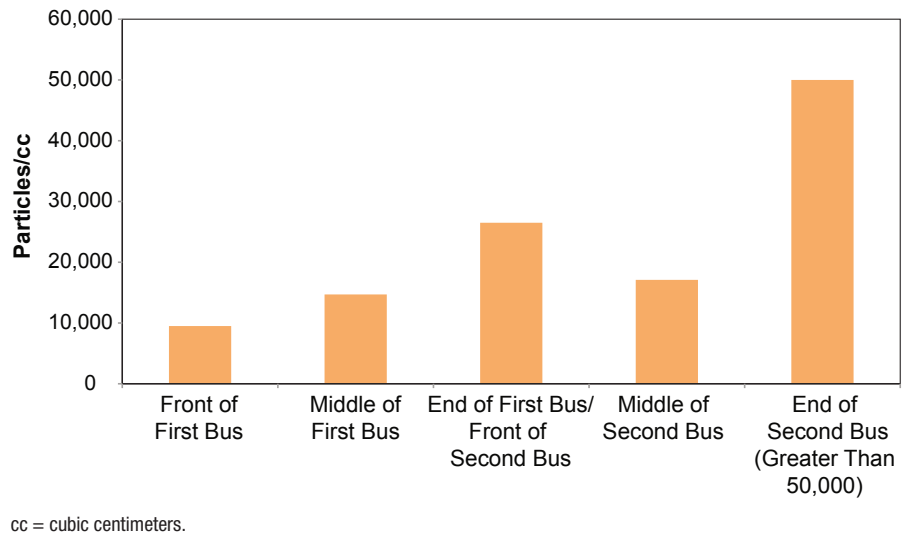


FIGURE 2

Ambient Particle Number Concentration Outside School Buses During Idling



Online Training Video Development

A nonprofit organization was contracted to develop and manage the production of a project-specific anti-idling training video. Additionally, a public service announcement and a storybook were developed with

narration from district students and other key individuals. This video is currently used across the CPS district as a promotional tool and is available online at www.cps-k12.org/.

TABLE 1

Results of Pre and Post Online Training Questions and Responses Completed by Cincinnati Public Schools (CPS) Staff and Administrators

Question	Correct Answer	Pretest Correct	Posttest Correct	Improvement
1. Does CPS have an anti-idling policy?	True	35%	97%	177%
2. Does the yellow bus service provider for CPS have an anti-idling policy?	True	35%	94%	169%
3. It is important to warm up the engine with an idling period of 5 minutes or more, especially in cold weather.	False	74%	97%	31%
4. It is better for an engine to run at low speed (idling) than to run at regular (i.e., 30 mph) speed	False	78%	93%	19%
5. Children and adults are equally sensitive to air pollution.	False	90%	97%	8%
6. It is better to leave the engine idling because a "cold start" produces more pollution.	False	54%	69%	28%

U.S. EPA Tools for Schools

An indoor environmental quality (IEQ) management program was developed based upon the U.S. EPA's Indoor Air Quality Tools for Schools kit with several key objectives: 1) reduce the levels of indoor air pollutants through preventive measures such as routine maintenance activities, periodic building evaluations and inspections, and IEQ-specific procedures; 2) provide and maintain adequate air exchanges by repairing and maintaining ventilation equipment, which will promote a comfortable and healthy learning and working environment; 3) provide response to IEQ-related concerns in a thorough and time-sensitive manner, and effectively communicate the progress of investigations and their resolution to all interested parties; and 4) provide information and training for staff and the community on environmental health and safety issues.

Results

The school bus idling demonstration utilized two school buses provided by First Student. The first bus was a new 2010 model and the second bus was an older model that was less than five years old. The sampling was conducted midmorning in July and it was 83°F and sunny with no wind. The background concentration for airborne particulate matter (without bus engines running) in the area

was found to be 7,700 particles/cc. Measurements were then taken inside the bus at the driver seat location. One minute after the buses were started and allowed to idle, the particle count increased to 16,500 particles/cc with subsequent elevation in particle concentration ranging from 10,600 particles/cc to 27,200 particles/cc over a six minute period of time (Figure 1). These values varied with specific activities performed by the driver during the sampling period including opening the side window and turning on the driver fan to increase ventilation.

Ambient particulate readings were also measured outside the buses after the buses idled for six minutes along a path the students would follow when exiting the bus and walking toward the school entrance to simulate students' exposure to diesel particulates. At the front door of the first bus the particulate level was 9,500 particles/cc, and midway past the first bus the particulate level was 14,700 particles/cc. The particulate level at the back of the first bus and front of the second bus was 26,500 particles/cc, the level at the mid-point of the second bus was 17,100 particles/cc, and the level at the rear of the second bus was >50,000 particles/cc (Figure 2).

In total, 397 bus drivers signed pledges to reduce idling. Pre- and posteducation assessments were completed by bus drivers with the posteducation assessment done at the

conclusion of the education program. A total of 324 drivers completed both tests and demonstrated a significant increase in idling knowledge (7.3/10 to 8.5/10 correct answers, $p < .05$). Three of the four schools actively participated in parent pledge drives, kicked off by schoolwide "air quality" assemblies that focused on idling reduction education. The percentage of pledge cards signed by parents was 42% at school #1 ($n = 496$), 21% at school #2 ($n = 698$), and 41% at school #3 ($n = 370$).

Study personnel from CHD and CPS attended open houses and other community and school assemblies to educate parents, teachers, and students on the importance of reducing vehicle idle time. A total of 53 pre- and posteducation tests were given in the three open houses. The mean of the pre- and posttest was 2.5/4 correct answers, which significantly increased to 3.6/4 after an educational intervention during open houses ($p < .05$). In addition, an online survey was completed over two and a half weeks by administrators and staff at CPS. Two hundred ninety people provided responses to all seven questions on the pretest. After a brief training video, 214 people completed the posttest. The questions and results of the posttest are presented in Table 1. Additionally, the final question (question 7) asked, "You feel you will, based on the information provided, try to idle as little as possible." The respondents chose to reduce idling 40% more than before the training, with $n = 210$ indicating their intention to reduce idling.

The results of vehicle idle time monitoring conducted by staff and students at one participating school before and after the education intervention are presented in Figure 3. Ten buses were monitored preintervention at pickup and drop off; nine buses were monitored postintervention at pickup and drop off. The buses idled an average of 289 seconds during arrival preintervention, which was reduced to 116 seconds following the anti-idling intervention. The mean number of vehicles preintervention at drop off was 61 and at pickup was 35; postintervention, the number of vehicles was 41 at drop off and 28 at pickup. The average amount of time that private vehicles idled during arrival preintervention was 29 seconds, compared to the postintervention average of 24 seconds. For departures, the buses idled an average of 397

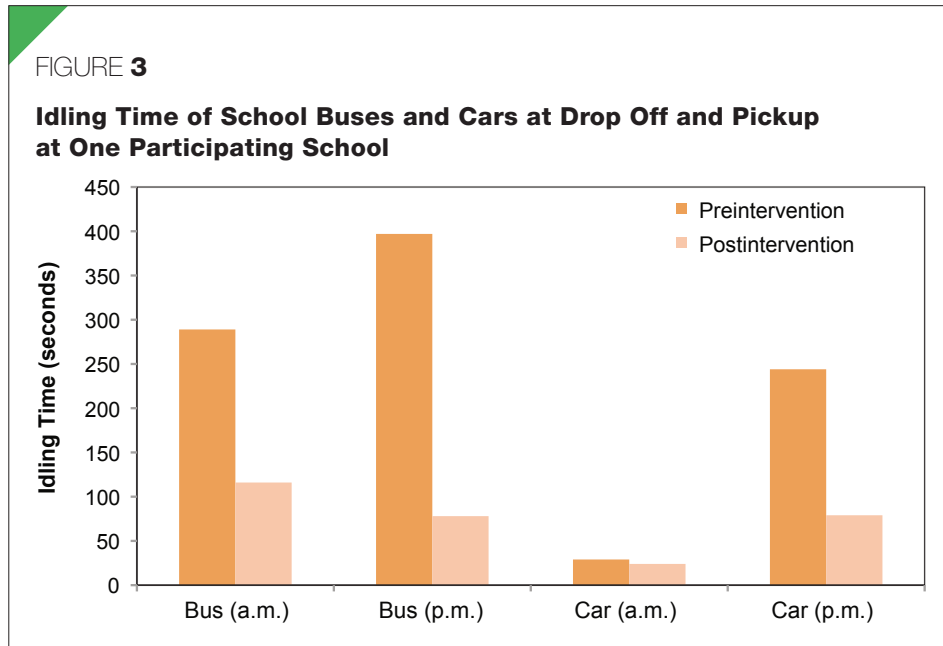
seconds preintervention and 78 seconds postintervention. Vehicles picking up children idled for 244 seconds preintervention and idled for 79 seconds post intervention.

Discussion

We sought to develop a bidirectional community-academic partnership and establish the CAIC by collaborating with community partners and stakeholders to integrate health education and healthy habits into the learning environment. The objective of the research team was to impart education to the community on ways to minimize air pollution by decreasing vehicle idling not only around the school environment, but throughout the community. The research partnership developed, implemented, and communicated an anti-idling campaign while simultaneously conducting air sampling and health assessments to determine its effectiveness. The rate of pledge cards returned, the increase in bus driver and community knowledge, and observed decrease in vehicle idling time demonstrate the effectiveness of the campaign and partnership.

We identified bus drivers as key stakeholders in our campaign and sought to involve them and their employer from the onset of the project. Working cooperatively with the bus drivers and company allowed us to provide education about the health effects of diesel exhaust. Our collaboration with the bus operators also provided us the opportunity to simulate a bus idling scenario and demonstrate, with supportive data, the impact of bus idling on particle concentrations and potential exposure to students and drivers (Figures 1 and 2). The rate of pledge cards returned by the bus drivers suggests bus drivers are willing participants in an anti-idling campaign, particularly when informed of the impact that idling has on ambient air quality.

The bus driver education was reinforced by vehicle idling monitoring by students and staff at one school. During morning drop off and afternoon pickup, students and staff reminded bus drivers of the importance of reducing vehicle idling by handing him or her a water bottle, and a postcard signed by the school staff thanking them for not idling along with a key chain and a fact sheet reminding them of school and company policy. For arrivals, a 60% reduction in bus idling time and a 15% reduction in private car idling



time occurred. For departures, an 80% reduction in bus idling time and a 68% reduction in private car idling time occurred.

Parents, students, administrators, and teachers at the participating schools were also involved in the successful implementation of the campaign. The return rate of the parent pledge cards to reduce idling demonstrated family participation and engagement in the campaign. A lack of time and not owning a vehicle, rather than lack of relevance, were the most frequently cited reasons for not participating in the parent pledge drive. The significant increase from the pre- to post-test scores indicated that the parents, teachers, and students understood the health effects of idling of vehicles. The online survey strongly supported the need to consistently educate school personnel on policies that impact students' health. After viewing the video on the impacts of idling and comparing those with the CPS anti-idling policies, CPS administrators and staff responses to the survey improved. Feedback on the survey was positive with improved awareness of a policy that had already been in existence.

Limitations to our study include the limited period of follow-up, the voluntary nature of participating in the assessments, and the limited observational data of idling at some schools. In addition, individual interpretation of pre- and posteducation assessments may result in biased results of the impact of

the campaign. Objective data, however, support the successful implementation of the campaign including the observed reduction in vehicle idling time. In addition, as part of CAIC, air quality data will be collected to assess the impact of the campaign on reducing air pollutant exposure at schools.

In order to maintain the success of CAIC, anti-idling signs were placed near the schools to serve as a messaging tool and reminder for parents and guardians to turn off their vehicle engines while dropping off and picking up students. An IEQ management program was also initiated to assist schools and individuals in getting involved at a local, school-based level in efforts to improve air quality. This IEQ team will be knowledgeable in using the information and training methods provided by the U.S. EPA Tools for Schools program that has been successfully utilized by other school districts.

The districtwide anti-idling policy was also reviewed in collaboration with partners and stakeholders. The research team reviewed the current Ohio law regarding school bus idle times in school loading zones (Ohio Administrative Code 3301-83-20) and compared these to legal idle restrictions effective in other states, the bus company's areawide effort to minimize idling in school loading zones, and the district's current "bus idle protocol." Revised policies and the protocols were incorporated into CPS board

policy in fall 2010 and included limiting bus idling times to no more than five minutes in school loading and unloading zones (in accordance with Ohio law).

A grant Web site was also developed to house grant-related resources in addition to information about the project status, to promote sustainability. This site (www.cps-k12.org/) was intended to help facilitate ongoing efforts of any public entity to initiate an anti-idling campaign by providing ease of access to resources including training materials, videos, campaign promotional templates, and links to other easy-to-use materials.

Conclusion

Our goal was to implement an effective public health initiative aimed at reducing traffic-related air pollution exposure within the school community. Based on our assessments, we have demonstrated that a community-

driven public health initiative can be effective in both 1) enhancing community awareness about the benefits of reducing idling vehicles; and 2) increasing active participation in idling reduction. Our partnership has continued to grow toward a sustainable process and other school communities are taking advantage of resources developed. Additional partner connections have developed whereby the curriculum and materials are being integrated into after-school and community mentoring and educational programs. Future research is planned to assess the impact of the anti-idling campaign on air quality at schools and on the health of asthmatic children who attend these schools. 🚗

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References

- Akinbami, L. (2006). The state of childhood asthma, United States, 1980–2005. *Advance Data*, 381, 1–24.
- Appatova, A.S., Ryan, P.H., Lemasters, G.K., & Grinshpun, S.A. (2008). Proximal exposure of public schools and students to major roadways: A nationwide U.S. survey. *Journal of Environmental Planning and Management*, 51(5), 631–646.
- Carlsten, C., Dybuncio, A., Becker, A., Chan-Yeung, M., & Brauer, M. (2011). Traffic-related air pollution and incident asthma in a high-risk birth cohort. *Occupational and Environmental Medicine*, 68(4), 291–295.
- Delfino, R.J., Quintana, P.J., Floro, J., Gastañaga, V.M., Samimi, B.S., Kleinman, M.T., Liu, L.J., Bufalino, C., Wu, C.F., & McLaren, C. (2004). Association of FEV₁ in asthmatic children with personal and microenvironmental exposure to airborne particulate matter. *Environmental Health Perspectives*, 112(8), 932–941.
- Heath, B. (2011, June 13). EPA's tests of air outside schools find problems. *USA Today*. Retrieved from http://www.usatoday.com/news/nation/environment/2011-06-09-air-pollution-schools_n.htm
- Heath, B., & Morrison, B. (2008, December 9). Air tests reveal elevated levels of toxics around schools. *USA Today*. Retrieved from <http://www.usatoday.com/news/nation/environment/school-air-monitoring1.htm>
- Hochstetler, H.A., Yermakov, M., Reponen, T., Ryan, P.H., & Grinshpun, S.A. (2011). Aerosol particles generated by diesel-powered school buses at urban schools as a source of children's exposure. *Atmospheric Environment*, 45(7), 1444–1453.
- Jerrett, M., Shankardass, K., Berhane, K., Gauderman, W.J., Künzli, N., Avol, E., Gilliland, F., Lurmann, F., Molitor, J.N., Molitor, J.T., Thomas, D.C., Peters, J., & McConnell, R. (2008). Traffic-related air pollution and asthma onset in children: A prospective cohort study with individual exposure measurement. *Environmental Health Perspectives*, 116(10), 1433–1438.
- Li, C., Nguyen, Q., Ryan, P.H., LeMasters, G.K., Spitz, H., Lobaugh, M., Glover, S., & Grinshpun, S.A. (2009). School bus pollution and changes in the air quality at schools: A case study. *Journal of Environmental Monitoring*, 11(5), 1037–1042.
- McConnell, R., Berhane, K., Gilliland, F., Molitor, J., Thomas, D., Lurmann, F., Avol, E., Gauderman, W.J., & Peters, J.M. (2003). Prospective study of air pollution and bronchitic symptoms in children with asthma. *American Journal of Respiratory Critical Care Medicine*, 168(7), 790–797.
- O'Fallon, L.R., & Dearly, A. (2002). Community-based participatory research as a tool to advance environmental health sciences. *Environmental Health Perspectives*, 110(Suppl. 2), 155–159.
- Richmond-Bryant, J., Saganich, C., Bukiewicz, L., & Kalin, R. (2009). Associations of PM_{2.5} and black carbon concentrations with traffic, idling, background pollution, and meteorology during school dismissals. *Science of the Total Environment*, 407(10), 3357–3364.
- Trenga, C.A., Sullivan, J.H., Schildcrout, J.S., & Shepherd, K.P., Shapiro, G.G., Liu, L.J., Kaufman, J.D., & Koenig, J.Q. (2006). Effect of particulate air pollution on lung function in adult and pediatric subjects in a Seattle panel study. *Chest*, 129(6), 1614–1622.

Lead-Based Paint Awareness, Work Practices, and Compliance During Residential Construction and Renovation

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Abstract The U.S. Environmental Protection Agency recently implemented the Renovation, Repair and Painting (RRP) rule that applies to pre-1978 residences because of the potential presence of lead-based paint. Enforcement of this rule may be difficult and therefore it is crucial to understand the awareness and beliefs of contractors and the general public because these will likely be major determinants of exposures resulting from residential renovation work. The study described in this article utilized two mailed surveys: one directed to the general public and the other directed to contractors. The surveys were conducted in New Jersey and Virginia. Field observations were also recorded for work sites in New Jersey. Results indicated a high awareness among the general public about the hazards of lead, a low level of screening by children's doctors for lead exposure, frequent use of work practices that generate lots of dust, poor hygiene among contractors, and the potential for low compliance of contractors with the RRP rule. In particular, contractors who do not believe lead is a serious health hazard are expected to have the lowest compliance with the RRP rule. These findings serve as targets for effective public health interventions through education and outreach.

Introduction

Exposure to lead is associated with adverse health effects among adults and children. Lead-based paint utilized on homes built prior to 1978 is currently the most common source of exposure among the general public in the U.S. According to a survey published by the Department of Housing and Urban Development in 2001, 24% of housing built between 1960 and 1977 contains lead-based paint, 69% of housing built between 1940

and 1959 contains lead-based paint, and 87% of housing built before 1940 contains lead-based paint (Clickner, Marker, Viet, Rogers, & Broene, 2001). They also found that housing in the Northeast and the Midwest had about twice the prevalence of lead-paint hazards compared with housing in the South and West (Clickner et al., 2001).

The abundance of paint with elevated levels of lead pigment makes contractors remodeling these homes as well as the residents at risk

of exposure to lead-based paint. Construction activity can result in the disturbance of lead-based paint creating a significant amount of dust and debris that contributes to both contractor and resident exposure. Many researchers have shown that lead can be released during residential remodeling work, and it can result in exposures among the workers and dissemination of lead-containing dusts throughout the house (Kiefer & Morley, 1996; Sussell, Elliott, Wild, & Freund, 1992; Sussell & Piacitelli, 2001, 2005; Sussell, Piacitelli, Chaudhre, & Ashley, 2002). In addition, it has also been documented that exposures can occur beyond the workers and residents of homes being renovated. For example, the children of construction workers can be exposed through "take-home" exposures (Clickner et al., 2001; Ewers, Piacitelli, & Whelan, 1995; Scholz, Materna, Harrington, & Uratsu, 2002; Sussell, Gittleman, & Singal, 1997; Whelan et al., 1997).

The National Institute for Occupational Safety and Health (NIOSH) Adult Blood Lead Epidemiologic Surveillance (ABLES) program has ranked construction work as the third most common job classification with workers having elevated blood lead levels (Alarcon, Graydon, & Calvert, 2011). NIOSH-funded state ABLES surveillance programs have found construction workers to be at particular risk of having elevated blood lead levels as a result of exposure to lead-based paint. For example, in New Jersey the construction and renovation business represents a significant number of adult blood lead

TABLE 1

Demographics of Contractor Survey Respondents and General Public Survey Respondents

Demographic	Contractor Survey (n = 24) (#)	General Public Survey (n = 49) (#)	
Age			
<30	2	>25	1
30–50	5	25–35	5
>50	16	36–55	22
No response	1	>55	20
		No response	1
Primary language			
English	24	48	
Other	0	0	
No response	0	1	
Family income^a			
Below average	2	10	
Average	13	17	
Above average	9	20	
No response	0	2	
Race			
African-American	5	9	
Caucasian	19	38	
Multiple	0	1	
No response	0	1	
Gender			
Female	2	28	
Male	22	20	
No response	0	1	
Location			
New Jersey	8	23	
Virginia	16	25	
No response	0	1	
^a Relative to average median of \$50,000/year.			

cases reported to the New Jersey adult lead registry, with a total of 975 persons and 2,455 blood tests recorded from 2001 through 2006 alone (Blando & Lefkowitz, 2010). The New Jersey registry data show that the relative proportion of cases in the lead registry from the construction and renovation trades with significant blood lead levels (>25 µg/dL) appears to be increasing over time in New Jersey, with a 12% increase since 2001 (Blando & Lefkowitz, 2010). This is most likely the result of the recent decrease in manufacturing and the increasing need to renovate older homes with lead paint and the subsequent exposure among this cohort of workers.

As a result of the risk from exposure to lead due to construction activity, the U.S. Environmental Protection Agency (U.S. EPA) recently promulgated the Renovation, Repair and Painting (RRP) rule that applies to all residential structures built before 1978 with few exceptions (Renovation, Repair and Painting Rule, 2011). This rule includes provisions for education and training, work practices, workplace controls, and awareness as an intervention strategy to reduce the hazard posed by lead-based paint in the residential setting. Materna and co-authors (2002) showed that the educational intervention painters received to reduce lead exposure was moderately effective

even one year after follow-up. Harrington and co-authors (2004) found some concerns about sustaining interest and compliance over the long term if incentives were not adequate to sustain compliance. Compliance with safe methods was much higher for work practices that were practical and not cost prohibitive (Harrington et al., 2004; Materna et al., 2002). Enforcement of the U.S. EPA RRP rule will be difficult, however, because of the very large number of jobs and the relatively small number of inspectors available to oversee work. Therefore, it becomes crucial to understand the motivation and incentives that would enhance compliance with this new regulation in the absence of strong enforcement capacity.

Many social, personal, psychological, cultural, economic, organizational, language, and job-related characteristics contribute to unsafe behaviors (Bust, Gibb, & Pink, 2008; Fung, Tam, Tung, & Man, 2005; Menzel & Gutierrez, 2010; Mohamed, Ali, & Tam, 2009; Robertson, Kerr, Garcia, & Halterman, 2007; Törner & Pousette, 2009; Village & Ostry, 2010). The health promotion and behavior-based safety literature demonstrates that personal beliefs and attitudes about health hazards and the seriousness of consequences can impact the action a person will or will not take to protect themselves. For example, Neitzel and co-authors (2008) showed that a training program developed and delivered around worker beliefs, knowledge, and use factors resulted in an effective educational intervention that nearly doubled hearing protection device use among construction workers. Lingard (2002) showed that first-aid training increased awareness among construction workers and this resulted in less tolerance for risk-taking behavior in work tasks when practical means were available to avoid risk. Behavior did not change at the work site for tasks where the worker perceived that behavior changes were not practical. Village and Ostry (2010) showed that workers who believed that interventions would be effective were more likely to take action in trying to reduce their rate of musculoskeletal injury. Arezes and Miguel (2006) found that the use of hearing protection was most effectively promoted when the workers believed the use of protectors would be effective in providing protection. The effect of the workers' belief was a stronger predictor of hearing protector use than a mandatory

or regulatory requirement to use the devices. They also found that workers were not very good at objectively judging their risk of hearing loss but rather based their use of hearing protection on faulty perceptions and beliefs about their risk. Interventions must address the target audience's beliefs and attitudes to motivate them to take action.

Our study aimed to further understand the awareness, attitudes, and beliefs about lead hazards among residential contractors and the general public. Contractors and the public were assessed through the use of a mailed written survey. In addition to the survey, contractors were also assessed through direct field observation of work performed during residential construction jobs.

Methods

Our study utilized two survey methods to collect data; the first was the use of two written surveys administered through the U.S. mail and the second method was direct observation of contractors conducting work on residential properties. The written surveys collected information about contractor and resident attitudes and beliefs about lead paint exposures and its associated health hazards. Our study investigated two hypotheses: 1) that contractor beliefs and attitudes would impact their behaviors and compliance with the new U.S. EPA regulations, and 2) that resident beliefs and attitudes would impact their awareness of lead hazards and U.S. EPA's regulations. A total of 1,000 written surveys were mailed to prospective survey respondents. The field observations involved contractors conducting work on residential properties and included an assessment of the work being performed and the methods being used on the job site.

Written Survey

Two separate written surveys were designed for our study. One was designed specifically for construction contractors and the other was designed specifically for residents who lived in properties at risk of containing lead-based paint. Both surveys were validated for face and content validity using standard methods and included both expert panel review and pilot testing. The contractor survey focused on their beliefs and attitudes about the new U.S. EPA rule, work practices, and their beliefs and experiences with the

TABLE 2
Odds Ratios Derived From Multiple Logistic Regression Model^a

Explanatory Variable	Odds Ratio Point Estimate	Odds Ratio Confidence Interval	p-Value
Familiar with U.S. EPA RRP ^b rule	1.30	0.09–19.55	.85
Rule will protect people	11.97	0.96–149.31	.05
Lead exposure bad for your health	23.90	1.37–417.15	.02

^aWhere explanatory variables predict the outcome that the contractor believes respirators and Tyvek suits are practical.
^bU.S. Environmental Protection Agency Renovation, Repair and Painting Rule.

TABLE 3
Odds Ratios Derived From Multiple Logistic Regression Model^a

Explanatory Variable	Odds Ratio Point Estimate	Odds Ratio Confidence Interval	p-Value
Familiar with U.S. EPA RRP ^b rule	2.16	0.16–29	.56
Rule will protect people	0.760	0.087–6.63	.80
Lead exposure bad for your health	17.48	1.84–165.85	.01

^aWhere explanatory variables predict the outcome that the contractor believes disposable drop clothes are practical.
^bU.S. Environmental Protection Agency Renovation, Repair and Painting Rule.

health hazards of lead. The survey questions about the U.S. EPA rule assessed the likelihood of compliance; questions about work practices assessed factors that have been associated with increased risk of exposure; and questions about the health hazards of lead assessed attitudes and beliefs about lead-based paint.

The survey of residents was primarily focused on awareness of the potential lead paint hazard in their home. Questions involved their awareness of factors that are associated with their risk of exposure to lead paint, questions about children living in the home, and questions about their awareness of the new U.S. EPA rule. In addition, the general public survey also asked residents, "Has your child's doctor ever asked you questions about lead paint or tested children living with you for lead poisoning?" Demographic questions were asked on both surveys.

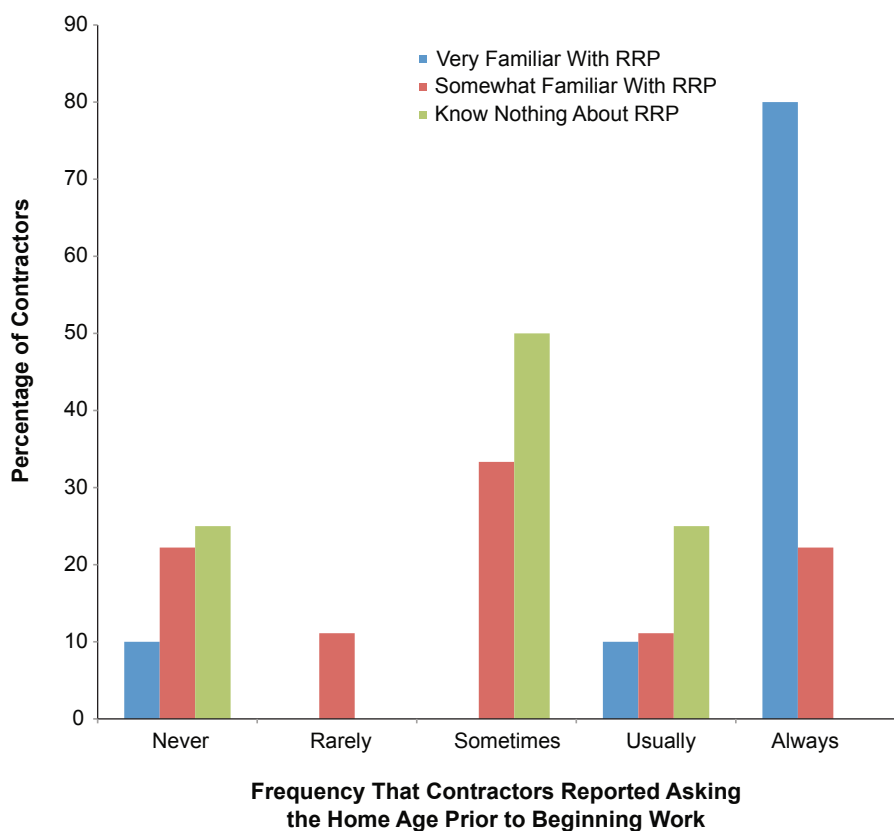
Each group of survey recipients was identified by separate methods. Construction contractors were identified through the use of the Selectory Database (Dun & Bradstreet, Short Hills, New Jersey). This database contained every registered business and was categorized

by Standardized Industrial Classification (SIC) codes. The database was searched for businesses registered with an SIC code of 1521 (general contractors–single family homes), 1522 (general contractors–other residential), 1721 (painters), 1751 (carpentry), and 1799 (special trade contractors–not otherwise classified). This search was limited to Mercer County, New Jersey, and Hampton Roads, Virginia. The purpose of this geographic limitation was that both of these areas were similar in their population demographics and the age distribution of their homes, but New Jersey has a NIOSH-funded ABLES program and Virginia does not have an ABLES program. These two areas are also similar to many other urban areas of the country that have older housing stock. A total of 863 companies were identified in Mercer County New Jersey, and 2,022 companies were identified in Hampton Roads, Virginia. A total of 250 companies in New Jersey and 250 companies in Virginia were randomly selected to receive a survey from those identified with the database.

Members of the general public who were sent the resident survey were identified through the use of public records and state

FIGURE 1

Percentage of Contractors Who Ask the Age of the Home Prior to Beginning Work Stratified by Familiarity With Renovation, Repair and Painting Rule (RRP)



health department data on childhood lead poisoning incidence. Resident surveys were limited to zip codes within Mercer County, New Jersey, and Hampton Roads, Virginia, which had been identified by their respective state health departments as high-risk areas for childhood lead poisoning. Residential addresses were identified through the use of online white pages, community maps, and elementary school locations within the high-risk zip codes. Residences within approximately one mile of an elementary school located within a high-risk zip code were eligible to receive a survey. This included both property owners and renters. A total of 851 and 853 residences were identified in New Jersey and Virginia, respectively. Of these identified residential addresses, 250 residents in each state were randomly selected to receive the resident survey.

Frequency distributions of responses by survey question were used to describe the data collected on both the contractor and resident surveys. Cross tabs and Fisher's exact tests were used to assess these distributions with SAS v. 9.2. Logistic regression was used to assess the impact of contractor awareness and beliefs on the contractors' perceptions about specific controls required by U.S. EPA's RRP rule. This assessment included whether contractors were familiar with U.S. EPA's RRP rule, their beliefs about whether the rule will protect people, and their beliefs about the adverse health effects of lead exposure. The outcomes assessed included whether contractors thought the specific requirement in the U.S. EPA RRP rule to use disposable drop clothes and the requirement to use personal protective equipment were practical.

Field Observations

Our study also utilized observation of contractors working on residential job sites to supplement the data collected through the mailed survey.

Study Population and Recruitment

Field observations were conducted in New Jersey. Contractors were identified through several methods that included the ABLES blood lead registry in New Jersey, the Selectory Database, notification by homeowners requesting observation, and the New Jersey licensed lead abatement contractor list. The SIC codes 1721 and 1799 used for the database search of New Jersey contractors to recruit for field observations were limited to residential painting contractors and lead paint removal companies and included 257 companies. The ABLES database contained 52 individual companies, one company referred by a homeowner requesting observation, and the New Jersey licensed lead paint abatement contractor listing of 27 individual companies. Therefore, a total of 337 companies were contacted for a site visit.

Job Site Observations

Site visits utilized a standardized checklist that covered categories such as observed work practices, personal protective equipment, tools, and observations about site cleanup. Video exposure monitoring was conducted by filming work and synchronizing the video footage with a real-time TSI SidePak aerosol monitor. A cyclone was also used (flow rate of 1.7 liters per minute), which allowed us to measure the respirable dust fraction. This technique served as a visual tool to demonstrate and allow workers to "see" their exposures on film. Paint chip samples were also collected to help characterize the lead content of paints encountered during these site observations. U.S. EPA method 200.9, Revision 2.2 was used for the analysis of paint samples.

All of the information collected through the mailed survey and during the site visits was used to better understand factors that impact intervention effectiveness among construction workers.

Results and Discussion

The response rate for the mailed general public resident survey was roughly 10%, with 49 surveys returned out of 500 sent. The

response rate for contractors returning the mailed survey was approximately 5%, with 24 surveys returned out of 500 sent. The response rate for contractors participating in site visits was approximately 2%, with only six contractors participating out of 337 contacted. These relatively low response rates and small sample size limited the statistical power of the quantitative analyses presented below and the representativeness of the data must be interpreted carefully.

The demographic characteristics of the respondents for both surveys are listed in Table 1. It should be noted that all survey respondents spoke English as their primary language at home. Contractors were predominately male whereas the general public respondents had more female respondents. The general public survey respondents consisted of a population that was middle aged or older, predominately white, educated, and of average or above average income levels.

Residential Construction Workers Mailed Survey

The results of the mailed survey demonstrated that personal beliefs impacted contractors' attitudes. The mailed survey found that contractor beliefs about lead exposure and the effectiveness of the U.S. EPA RRP standard impacted their opinions and likelihood of compliance with the U.S. EPA standard. The multiple logistic regression model demonstrated that a contractor who believed "lead exposure was definitely bad for your health" compared to contractors who had doubts were 23 times more likely to say using a respirator and Tyvek was practical ($p = .03$) and 17 times more likely to say using plastic disposable drop clothes was practical ($p = .01$) (Tables 2 and 3). In addition, contractors who believed that "the RRP would protect people" compared to contractors with doubts were 12 times more likely to say that using a respirator and Tyvek was practical ($p = .05$) (Table 2). Contractors who believed that personal protection was not practical were less likely to utilize safe practices.

The survey also revealed that residential construction contractors who were familiar with U.S. EPA's RRP rule were more likely to ask the age of a home prior to beginning work (Figure 1).

Awareness of the home's age prior to work is one of the key parameters that predicts the likelihood of lead-based paint being present at the work site. If a contractor does not ask

TABLE 4
Common Tasks and Work Practices Observed During Site Visits (N = 8)^a

Work Practice	Work Sites That Used Practice (#)	Work Sites That Used Practice (%)	Note
Dry scraping	6	75	
Wet scraping	4	50	
Manual sanding	6	75	
Power sanding	5	63	
Heat gun	2	25	
Paint remover chemicals	0	0	
Drilling or cutting	4	50	
Power/pressure washing	3	38	
Application of fresh new layers of paint	7	88	
Check for presence of lead paint	2	25	Only the lead abatement contractors checked by asking local health department. No general contractors checked.

^aThis included six general contractors and two site visits to a lead abatement contractor. These site visits were conducted prior to April 2010, when the U.S. Environmental Protection Agency's Renovation, Repair and Painting rule became effective.

TABLE 5
Hygiene Habits Observed During Site Visits

Poor Hygiene Habit	Worksites With Poor Hygiene Habit (#)	Worksites With Poor Hygiene Habit (%)	Note
Did NOT wash hands before eating, drinking, smoking	4	50	We observed that general contractors did not wash, but lead abatement workers did.
Ate/drank/smoked in the work area	3	38	
Washed work clothes at home	5	63	
Wore shoes home	6	75	
Dry swept dust	3	38	
Used Shop-Vac without HEPA ^a filter	5	63	
Reused and shook out drop clothes	5	63	

^aHigh-efficiency particulate air.

the age of the home they are less likely to be able to accurately predict the presence of lead paint. In addition, only 42% of contractors actually tested or got test results of the paint in the home prior to working. There-

fore, this lack of awareness regarding the lead content of the paint indicates that contractors are unlikely to be able to accurately predict their risk of lead exposure. During our field observations for example, a contrac-

TABLE 6

Survey Respondents Who Were Able to Answer Correctly Survey Questions About Lead Risk by Home Age and on Renter's Rights

Survey Question	High School Graduate Correct Answer % (#)	College Education Correct Answer % (#)	Fisher's Exact <i>p</i> -Value	Below Average Income Correct Answer % (#)	Average Income Correct Answer % (#)	Fisher's Exact <i>p</i> -Value
Type of home most likely to contain lead paint	84 (16)	90 (26)	.36	70 (7)	88 (15)	.24
Renters can insist landlord use lead safe practices	47 (9)	55 (16)	.65	70 (7)	47 (8)	.84

tor indicated that he could tell if lead paint was present simply by “looking at the paint.” This is unlikely to be an accurate method for determining the likelihood of paint containing lead pigment, especially if newer layers of paint are present on top of older layers.

Residential Construction Worker Field Observations

The work tasks of lead abatement contractors were very similar to the work tasks performed by remodeling contractors. Among general contractors, specialty historic preservation contractors were unique, as they undoubtedly work with lead paint, often with very high lead content. We found that the paint samples we collected on historic structures were often around 13% or higher lead pigment by weight. In addition, historic preservation contractors cannot alter a structure and cannot dispose of any pieces of a structure, as these pieces have to be restored. Restoring old pieces is difficult, requires considerable workmanship and effort, and can therefore result in very high exposures in the absence of proper workplace controls. In the field, general contractors did not respond to moral arguments about the need for careful work to prevent exposure. They responded to business needs and fear of lawsuits. It was also observed that contractors did not fully appreciate their exposures and how their work practices influence their exposures.

Eight site visits were conducted during our study: six with general remodeling contractors and two site visits with a lead abatement contractor. The population of contractors in the ABLES registry was distinct from the general contractor population because they had received some previous medical evaluation and as a result were much more educated about lead exposure and clearly understood

that this issue impacts them personally. They also had interacted with public health professionals previously. Of the six contractors we observed, two contractors also had children in their home with elevated blood lead values.

Many common themes were observed in the field. A summary of the techniques and work practices used by the contractors that we observed are listed in Table 4.

As demonstrated in Table 4, the work performed by these contractors involved mechanical tasks that required very close contact with paint and the associated dust. The field observations found that no general contractor checked the paint for the presence of lead prior to conducting their work. This observation is markedly different from the 42% of contractors who self-reported they tested the paint prior to beginning work on the mailed written survey. In addition, the field observations noted a very high prevalence of work tasks that generate considerable amounts of dust and hence are associated with potentially high exposures, such as power sanding (63%). By contrast, the written mailed survey of the contractors indicated that 42% rarely perform these tasks and 21% indicated they never perform these more hazardous work tasks. The marked difference between the survey results and the field observations may suggest that the contractors' perception of their risk does not match the reality of their risk.

The common hygiene habits observed in the field are listed in Table 5. The field observations demonstrated that many poor hygiene habits were frequent among the contractors. Highly variable and quickly changing work sites contributed to poor hygiene habits. This demonstrates that contractors need to become more aware of practical and simple solutions to improve basic hygiene at

work sites. A significant number of contractors (54%; $n = 13$) indicated on the mailed survey that contractor compliance with the new U.S. EPA RRP rule is unlikely. This finding and the results of the field observations presented in Table 5 demonstrated that considerable effort will be required to change the work habits of contractors to reduce exposure to lead-based paint.

General Public Mailed Survey

The survey of the general public revealed that greater than 95% ($n = 48$) of respondents were aware that exposure to lead-based paint is bad for their health and the awareness appeared to be relatively high among all educational and income strata, with no statistically significant differences among the groups (Table 6).

Particularly problematic was the lack of attention that the general public survey respondents reported regarding their health care provider asking them about potential lead exposure and conducting the required lead screening (Figure 2). The general public survey demonstrated that 32% of respondents have not been asked by their child's doctor the necessary questions to screen for potential lead exposure, and when respondents who do not have children in their home are removed from the analysis this percentage rises to 55%. This is of concern because the survey respondents in our sample were drawn from residences within zip codes identified as high risk for childhood lead poisoning.

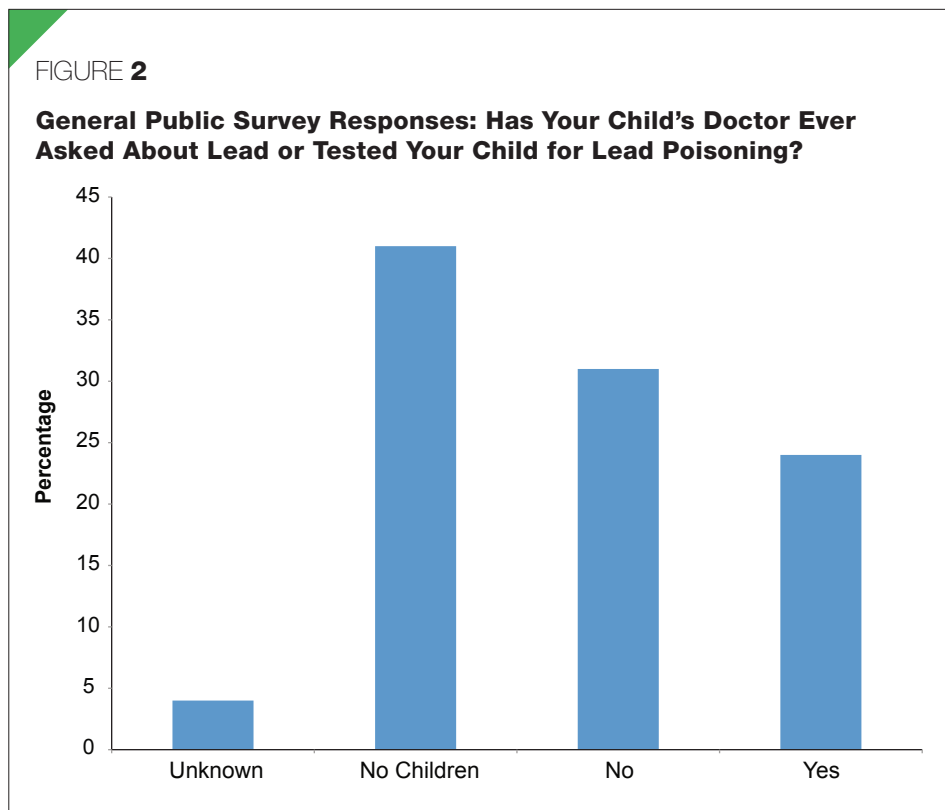
Overall, 39% of respondents did not know if renters could insist on lead safe practices. This has significant implications for communities where renters are prevalent. Some difference existed in awareness about renter's rights by income level but this was not statistically significant (Table 6).

Conclusion

Our study demonstrated that residential remodeling contractors utilize techniques that generate dust and hence create a lead exposure hazard and that their perception of this hazard is not accurate. Contractors' beliefs about the seriousness of the health hazards of lead impact their perception about the practicality of prevention methods and this likely will reduce their compliance with the new U.S. EPA RRP standard requirements. Therefore, educational interventions need to target any doubt contractors have about the hazards of lead to their health.

The general public seems to be aware of lead-based paint hazards but their child's health care providers do not appear to be conducting the required risk assessments for lead exposure. This has serious implications for gaps in lead screening among children in communities at high risk of lead poisoning. In addition, residents who rent their properties must be made aware of U.S. EPA's RRP rule and understand that compliance is required in most rental properties. 🐞

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References

Alarcon, W., Graydon, J., & Calvert, G. (2011). Adult blood lead epidemiology and surveillance—United States, 2008–2009. *Morbidity and Mortality Weekly Report*, 60(25), 841–845.

Arezes, P.M., & Miguel, A.S. (2006). Does risk recognition affect workers' hearing protection utilisation rate? *International Journal of Industrial Ergonomics*, 36(12), 1037–1043.

Blando, J.D., & Lefkowitz, D. (2010). *Model intervention to reduce lead paint exposure among residential renovation and remodeling workers: Final report*. Trenton, NJ: New Jersey Department of Health and Senior Services, Environmental and Occupational Health Surveillance Program.

Bust, P., Gibb, A., & Pink, S. (2008). Managing construction health and safety: Migrant workers and communicating safety messages. *Safety Science*, 46(4), 585–602.

Clickner, R., Marker, D., Viet, S., Rogers, J., & Broene, P. (2001). *National survey of lead and allergens in housing. Final report, Volume 1: Analysis of lead hazards*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Lead Hazard Control.

Ewers, L., Piacitelli, G., & Whelan, E. (1995). *Health hazard evaluation report 93-0502-2503: George Campbell Painting Company, Groton, Connecticut*. Cincinnati, OH: National Institute for Occupational Safety and Health.

Fung, I.W.H., Tam, C.M., Tung, K.C.F., & Man, A.S.K. (2005). Safety cultural divergences among management, supervisory and worker groups in Hong Kong construction industry. *International Journal of Project Management*, 23(7), 504–512.

Harrington, D., Scholz, P., Lomax, G., Stahlschmidt, H., Vannoy, J., & Materna, B. (2004). Can half-day trainings motivate small contractors to address lead safety? *Health Promotion Practice*, 5(3), 297–305.

Kiefer, M., & Morley, C. (1996). *Health hazard evaluation report 96-209: Cass Lake Indian Health Service Hospital, Cass Lake, Minnesota*. Cincinnati, OH: National Institute for Occupational Safety and Health.

References

- Lingard, H. (2002). The effect of first aid training on Australian construction workers' occupational health and safety motivation and risk control behavior. *Journal of Safety Research*, 33(2), 209–230.
- Materna, B., Harrington, D., Scholz, P., Payne, S., Stubbs, H., Hipkins, K., Merideth, E., Kirsch, L., Lomax, G., Coyle, P., & Uratsu, C. (2002). Results of an intervention to improve lead safety among painting contractors and their employees. *American Journal of Industrial Medicine*, 41(2), 119–130.
- Menzel, N.N., & Gutierrez, A.P. (2010). Latino worker perceptions of construction risks. *American Journal of Industrial Medicine*, 53(2), 179–187.
- Mohamed, S., Ali, T.H., & Tam, W.Y.V. (2009). National culture and safe work behaviour of construction workers in Pakistan. *Safety Science*, 47(1), 29–35.
- Neitzel, R., Meischke, H., Daniell, W.E., Trabeau, M., Somers, S., & Seixas, N.S. (2008). Development and pilot test of hearing conservation training for construction workers. *American Journal of Industrial Medicine*, 51(2), 120–129.
- Renovation, Repair and Painting Rule (U.S. Environmental Protection Agency), 40 C.F.R. 745 (2011).
- Robertson, C., Kerr, M., Garcia, C., & Halterman, E. (2007). Noise and hearing protection: Latino construction workers' experiences. *AAOHN Journal*, 55(4), 153–160.
- Scholz, P., Materna, B., Harrington, D., & Uratsu, C. (2002). Residential and commercial painters' exposure to lead during surface preparation. *AIHA Journal*, 63(1), 22–28.
- Sussell, A., Elliott, L., Wild, D., & Freund, E. (1992). *Health hazard evaluation report 90-070-2181: HUD lead-based paint abatement demonstration project*. Cincinnati, OH: National Institute for Occupational Safety and Health.
- Sussell, A., Gittleman, J., & Singal, M. (1997). *Health hazard evaluation report 93-0818-2646: People working cooperatively, Cincinnati, Ohio*. Cincinnati, OH: National Institute for Occupational Safety and Health.
- Sussell, A., & Piacitelli, G. (2001). *Health hazard evaluation report 99-0113-2853: University of California, Berkeley*. Cincinnati, OH: National Institute for Occupational Safety and Health.
- Sussell, A., & Piacitelli, G. (2005). *Health hazard evaluation report 98-0285-2989: Vermont housing & conservation board, Montpelier, Vermont*. Cincinnati, OH: National Institute for Occupational Safety and Health.
- Sussell, A., Piacitelli, G., Chaudhre, Z., & Ashley, K. (2002). *Health hazard evaluation report 99-0305-2878: Lead Safe Services, Inc., Neenah, Wisconsin*. Cincinnati, OH: National Institute for Occupational Safety and Health.
- Törner, M., & Pousette, A. (2009). Safety in construction—a comprehensive description of the characteristics of high safety standards in construction work, from the combined perspective of supervisors and experienced workers. *Journal of Safety Research*, 40(6), 399–409.
- Village, J., & Ostry, A. (2010). Assessing attitudes, beliefs and readiness for musculoskeletal injury prevention in the construction industry. *Applied Ergonomics*, 41(6), 771–778.
- Whelan, E., Piacitelli, G., Genvel, B., Schnorr, T., Mueller, C., Gittleman, J., & Matte, T. (1997). Elevated blood lead levels in children of construction workers. *American Journal of Public Health*, 87(8), 1352–1355.

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to outreach materials and
frequently asked questions.

▶ INTERNATIONAL PERSPECTIVES

An Outbreak of *Cryptosporidium* at a Recreational Water Park in Niagara Region, Canada

Although most of the information presented in the Journal refers to situations within the United States, environmental health and protection know no boundaries. The Journal periodically runs International Perspectives to ensure that issues relevant to our international membership, representing over 20 countries worldwide, are addressed. Our goal is to raise diverse issues of interest to all our readers, irrespective of origin.

Abstract *Cryptosporidium* is a parasitic protozoan found in water sources and spread through the fecal-oral route. Cryptosporidiosis is characterized by gastroenteritis and is increasingly associated with recreational water sources. On December 3, 2010, Niagara Region Public Health was informed of a laboratory-confirmed case of *Cryptosporidium*. Over the subsequent two weeks, a total of three additional laboratory-confirmed cases were reported. All cases had visited the same water park in Niagara Region, Canada, over November 14–16, 2010. A total of 12 cases associated with the outbreak ranged in age from 1 to 66 years. This article describes the outbreak, environmental investigation, and control measures. The environmental investigation revealed that the ultraviolet disinfection system was offline on November 14, 2010, which may have allowed for the transmission of *Cryptosporidium* to bathers. Further research into the detection of *Cryptosporidium* outbreaks and regulations and guidelines for water park operators may help to decrease future outbreaks.

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Introduction

Cryptosporidium is a parasitic protozoan found in water sources and spread through fecal-oral transmission (Centers for Disease Control and Prevention [CDC], 2011a; Heymann, 2008; Putignani & Menichella, 2010). Two species, *C. hominis* and *C. parvum*, are primarily responsible for human illness (CDC, 2011a; Heymann, 2008; Putignani & Menichella, 2010). Infection presents as gastroenteritis characterized by profuse watery diarrhea, although some may also have cramping, abdominal pain, malaise, fever, anorexia, nausea, and vomiting (CDC, 2011a; Ministry of Health and Long-Term Care, 2009; Putignani & Menichella, 2010). Asymptomatic infections are common and may be a source of transmission (CDC, 2011a; Heymann, 2008). *Cryptosporidium* has the ability to produce oocysts that are resistant to chlorine levels normally used to disinfect drinking water or swimming pools (Heymann, 2008; Putig-

nani & Menichella, 2010). Cryptosporidiosis outbreaks have been increasingly associated with exposure to recreational water sources, such as splash parks and swimming pools (Causer et al., 2006; CDC, 2011b; Coetzee, Edeghere, Orendi, Chalmers, & Morgan, 2008; Insulander, Lebbad, Stenstrom, & Svenungsson, 2005).

On December 3, 2010, a symptomatic laboratory-confirmed case of *Cryptosporidium* was reported to Niagara Region Public Health (NRPH). During the next two weeks, a total of three additional laboratory-confirmed cases were reported to NRPH. All cases had visited the same water park in Niagara Region over November 14–16, 2010. This article describes the outbreak investigation and interventions to prevent subsequent spread in the community. It also highlights the need for proactive interjurisdictional communication, as cases resided in other parts of Ontario and the U.S.

Methods

Outbreak Investigation

NRPH was informed of a laboratory-confirmed case of *Cryptosporidium* on December 3, 2010 (case 1), by Halton Public Health. The initial investigation by this health department demonstrated the major risk factor for the case was a visit to a water park in Niagara Region; NRPH was contacted to initiate an environmental investigation. For all cases, NRPH used a cryptosporidiosis questionnaire to determine potential risk factors, including exposure to swimming pools, splash pads, water parks, restaurants (including those at the water park), drinking water, other recreational water sources, and travel.

As further cases were reported, NRPH declared an outbreak and engaged in active surveillance and risk communication with local physicians and public health depart-

TABLE 1

Summary of Outbreak-Associated Cases

Case	Age	Sex	Health Unit of Residence	Onset of Symptoms	Date of Visit to Water Park	Laboratory Confirmed
1	10	M	Halton, ON	November 20, 2010	November 14, 2010	Yes
2	4	M	Wellington Dufferin Guelph, ON	November 22, 2010	November 14–15, 2010	Yes
3	6	M	Wellington Dufferin Guelph, ON	November 20, 2010	November 14–15, 2010	No, family member of case 2
4	12	M	Niagara, ON	November 30, 2010	November 15–16, 2010	Yes
5	5	M	Niagara, ON	November 29, 2010	November 15, 2010	No, family member of case 4
6	11	M	Niagara, ON	December 6, 2010	November 15, 2010	Yes
7	37	F	Niagara, ON	December 9, 2010	November 15, 2010	Yes
8	1	M	Erie County, U.S.	November 14, 2010	November 14, 2010	Yes
9	24	F	Erie County, U.S.	November 22, 2010	November 14, 2010	No, family member of case 8
10	26	M	Erie County, U.S.	November 22, 2010	November 14, 2010	No, family member of case 8
11	50	F	Erie County, U.S.	November 26, 2010	November 14, 2010	No, family member of case 8
12	66	M	Erie County, U.S.	November 27, 2010	November 14, 2010	No, family member of case 8

ments in Ontario and the U.S., provincial public health officials, and Canadian public health practitioners to encourage enhanced surveillance for cryptosporidiosis, appropriate testing, and reporting to local public health.

Environmental Investigation

Early in the outbreak investigation, a water park in Niagara Region was identified as a common source among cases. Public health inspectors conducted an environmental investigation of the water park to determine potential sources and risk for past and ongoing spread of *Cryptosporidium*.

Results

Case Definitions

A confirmed primary case was defined as laboratory confirmation of infection with symptoms of diarrhea with or without one or more of cramping, abdominal pain, fever, anorexia, vomiting, or malaise with exposure to a water park in Niagara Region in November 2010. A probable case had signs and symptoms consistent with a laboratory-confirmed case and with exposure to a water park in Niagara Region in November 2010. A secondary case may or may not have had lab confirmation, but had signs and symptoms consistent with a case and was epidemiologically linked to a confirmed or probable case.

Outbreak Investigation

On December 7, 2010, a referral was received from Wellington Dufferin Guelph Public Health for laboratory-confirmed (case 2) and probable (case 3) cases of cryptosporidiosis in a family whose main risk factor for disease was having visited a water park in Niagara Region. Table 1 provides a summary of the cases associated with the outbreak.

On December 9, 2010, a laboratory-confirmed case of cryptosporidiosis was reported to NRPH (case 4). This case and three family members (cases 5–7) had visited the same water park as cases 1–3 during the same time period of November 14–16, 2010. Clinical signs and symptoms included diarrhea, abdominal pain, nausea, and vomiting.

Concurrently, NRPH was receiving alerts through the emergency department syndromic surveillance system for gastrointestinal illness. From November 28 to December 6, 2010, the incidence of people with gastrointestinal complaints presenting to local emergency departments was higher than expected for the time period. When the alerts first began appearing, no mandatory reportable diseases exceeded baseline levels, and we initially suspected a viral gastroenteritis in the community. With three laboratory-confirmed cases of cryptosporidiosis linked to a water park in Niagara Region, however, we questioned whether the gastrointestinal illnesses may have been

related to the previous cryptosporidiosis cases. An outbreak was declared on December 8, 2010, and further investigations were undertaken. Cases were questioned about whether or not they visited the food service establishments at the water park; cases did not all eat at the restaurants.

Epidemiologic Investigation

From November 14 to December 9, 2010, four confirmed cases, six probable cases, and two secondary cases presented (Figure 1). As all cases attended the water park on November 14 or November 15, 2011, it was challenging to determine whether or not cases 9–12 were due to exposure at the water park or through person-to-person contact with case 8. Fifty percent ($n = 6$) attended only on November 14, 25% ($n = 3$) attended only on November 15, 17% ($n = 2$) attended on both days, and 8% ($n = 1$) on November 15 and 16. The average age of all cases was 21 years with a median of 12 and a range of 1 to 66 years. Figure 2 illustrates the percentage of cases that played in each of the water park areas.

Active Surveillance and Risk Communication

On December 10, 2010, a medical advisory was sent to all physicians, emergency departments, and walk-in clinics in Niagara Region encouraging heightened surveil-

lance and testing for *Cryptosporidium* in people with exposure to local water parks during November 2010. A summary of the investigation was posted to national and provincial infectious diseases message boards. Given the proximity of Niagara Region to the U.S. and resultant cross-border tourist traffic, we contacted the relevant county health authorities in the U.S. This resulted in case 8 and his family (cases 9–12) coming to our attention.

Laboratory Investigation

Three specimens were identified as *Cryptosporidium* species using initial testing with auramine-rhodamine fluorescent stain and confirmatory testing with safranin stain or on formalin, either concentrate or on a direct wet prep, from a sodium acetate formalin container. Further speciation was not possible as the specimens had been discarded by the laboratory. Further speciation for research purposes was conducted on two secondary cases by Public Health Ontario; these demonstrated *C. hominis*. No water samples were obtained from the pools or backwash as the full volume of water for the water park had been changed prior to the investigation.

Environmental Investigation

The water park is a large complex of water features that is a popular tourist destination. It is comprised of seven distinct bodies of water, including a splash pad, a larger spray/splash pad with water slides, a wave pool, two groups of water slides (“body” slides and “tube” slides), two spas, and an outdoor wading pool. The wading pool is open year-round and is a nonregulated recreational water facility due to its water depth (Ministry of Health and Long-Term Care, 2010).

The wave pool and the “body” slides share the same water and recirculation system (Figure 3). All others operate with their own separate water and recirculation system. The spas were emptied and refilled daily. Half the volume of water in the larger spray/splash pad with water slides was replaced daily. All other water features had water added daily in accordance with provincial regulations requiring a minimum of 20 L per bather per day.

All bodies of water were designed to utilize the oxidation-reduction potential (ORP) system. The sanitizer was a mixture of liquid chlorine and chlorine pucks. Alarms for the

FIGURE 1

Epidemic Curve for the Outbreak by Date of Symptom Onset

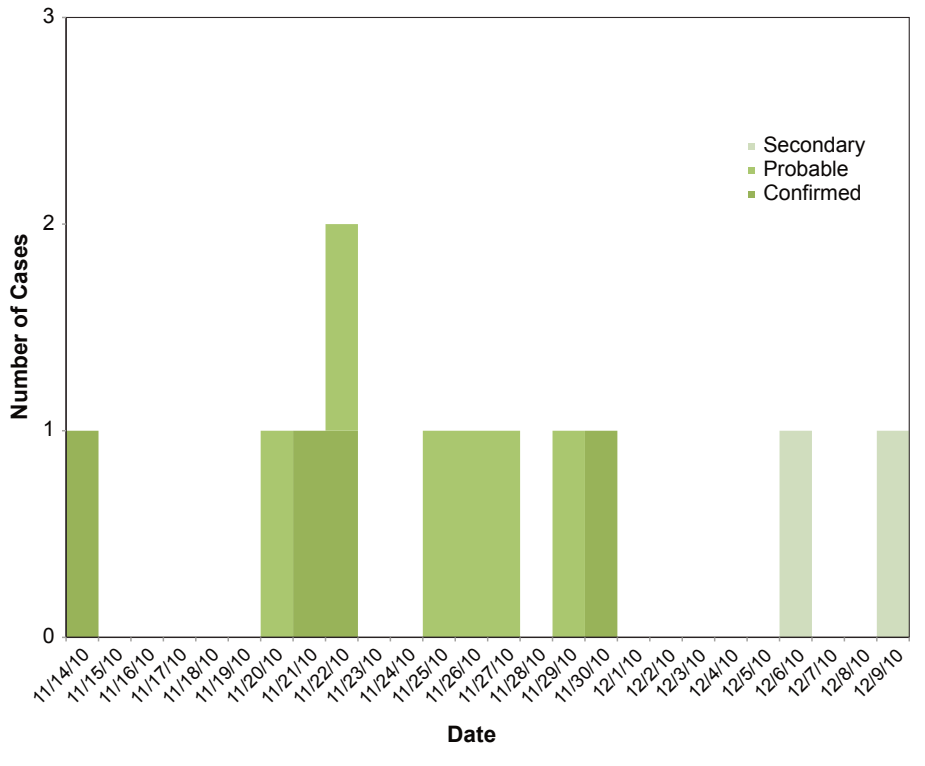


FIGURE 2

Percentage of Cases Who Played in Different Water Park Areas

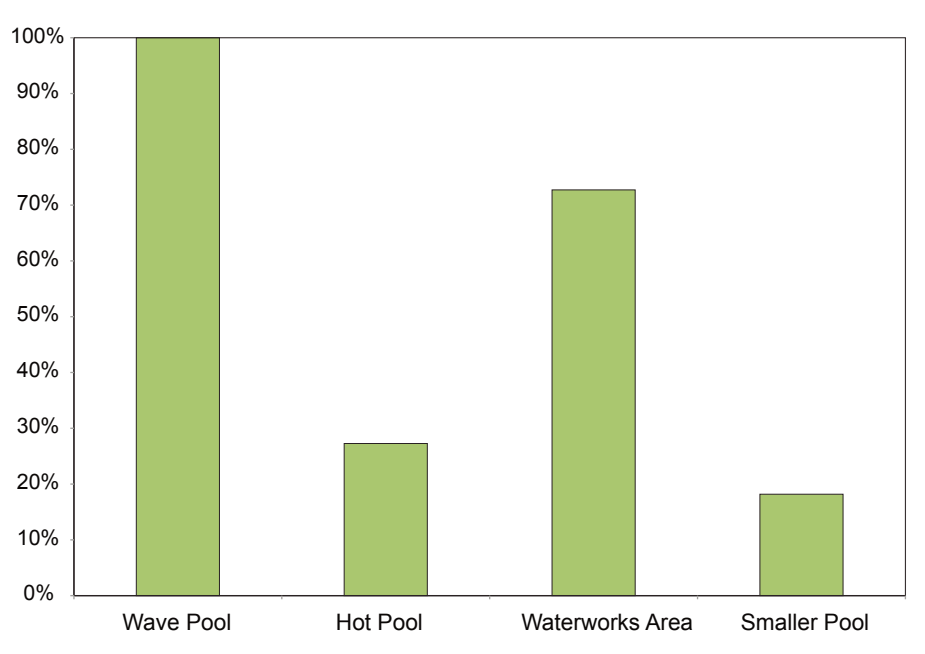
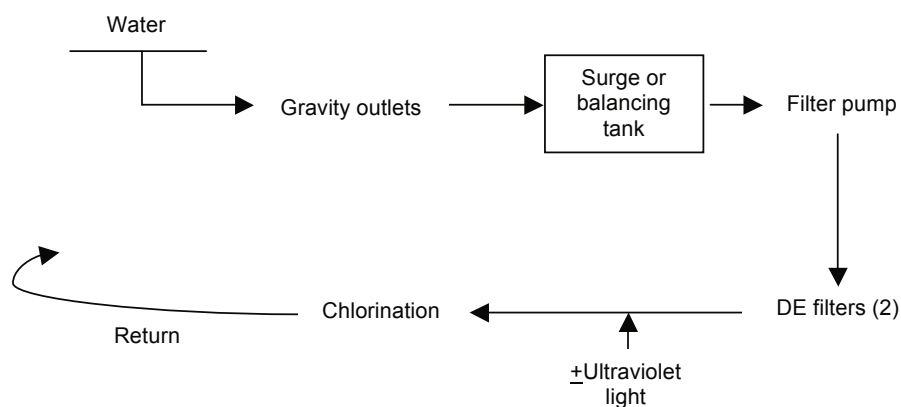


FIGURE 3

Recirculation Systems for the Water Features



DE = diatomaceous earth. Only the wave pool and body slides used ultraviolet light.

ORP, pH, filter, and pump were present and functioning. The recirculation systems in all bodies of water used diatomaceous earth (DE)-like filters, automatic chlorination, and automatic acid feed. With the exceptions of the two spas and outdoor wading pool, all were equipped with a surge or balancing tank.

A medium-pressure ultraviolet (UV) light system was incorporated into the recirculation system for the wave pool/body slides and was positioned prior to chlorination. The system consisted of a single bulb unit with a flow rate of 1,319 gallons per minute. The UV unit had a digital readout of the “percentage” of UV strength plus an alarm if it fell below a specified level. The bulb was replaced according to the sensor reading and the system had a built-in screen to capture glass from broken bulbs. This was the only body of water equipped with a UV light system and it had been in service for less than one year. Documentation and discussion with the operator demonstrated appropriate changing of the bulbs.

The water park had separate washrooms/change rooms and showers. Signage was present at the entrances to the washrooms/change rooms regarding showering and other related issues, such as diaper protocols. Swim diapers were available to patrons for a nominal fee. All other appropriate

safety signage as per legislation was present. Attendants or lifeguards were present throughout the facility and placed appropriately at the various water features. Other areas of the water park included a children’s play area and a fast food sit-down restaurant. Investigation of the food service establishments did not reveal any concerns.

A site inspection of the water park was conducted on December 3, 2010. Daily records showed no lapses in free available chlorine levels (documented minimums above 0.5 parts per million) or other parameters, such as pH (documented in the range of 7.2 to 7.8), on November 14, 2010. Approximately 200 persons used the water park that day, and no pool fouling was noted that day. A pool fouling episode was documented on November 12, 2010, however, at the wave pool; it was documented as a formed stool. The procedure for a pool fouling incident was documented in accordance with the pool fouling protocol for formed stool (CDC, 2010). The records indicated that the UV light system for the wave pool/body slides was shut down for maintenance from 8 a.m. to 4 p.m. on November 14, 2010.

Due to further cases of cryptosporidiosis, another inspection was conducted on December 8, 2010. Further information was gathered on engineering and maintenance. It was reported that the total volume

of water in the wave pool/body slides was wasted in order to repair a section of flooring at the beach front of the wave pool on December 5, 2010. Fresh water was being added at the time of the inspection (the water park was not open to the public on this day). The DE filters for the wave pool were backwashed and new filter media added. The water in all bodies of water had been replaced since November 14, 2010. Wasting and adding fresh make-up water was carried out daily and exceeded the minimum 20 L/bather/day required by Ontario regulations (Health Protection and Promotion Act, 2007). The total volume of water for the splash pad and the two spas was wasted daily. The larger splash pad wasted and replaced approximately three-fourths of the volume daily during times of high bather load. Water slides were regularly cleaned depending on usage.

The DE filter fabric or elements (a polyester synthetic fiber that held the filter media) were routinely checked every three months. Checks and replacement occurred more frequently if anything suggested tears in the fabric. The filters in the larger bodies of water (e.g., wave pool), were arranged in parallel so that if one filter malfunctioned, it was bypassed and a new filter was installed quickly.

Discussion

This outbreak of cryptosporidiosis resulted in four confirmed, six probable, and two secondary cases. Although it was not possible to confirm the water park as the source of *Cryptosporidium*, all cases had exposure to the water park on November 14 or 15, 2010. November 14, 2010, was also the day when the UV light system, which would have inactivated *Cryptosporidium* oocysts, was shut down for most of the day. *Cryptosporidium* is known to survive for days under normal chlorine levels found in recreational waters (Heymann, 2008). In Ontario, pools having a water depth of 0.75 m or less are exempt from the public pools regulation. In spite of the water park operators being highly compliant with recreational water guidelines and protocols, given the incubation period mean of seven days (range 1–12 days), we hypothesize that a pool-fouling incident, such as the one that occurred on November 12, 2010, led to this outbreak of cryptosporidiosis.

Outbreak Detection and Interjurisdictional Challenges

The detection of cryptosporidiosis outbreaks associated with water parks is challenging. Water parks are often tourist destinations, so people may travel distances or from out of the country to visit. In Ontario, provincial monitoring of mandatory reportable disease rates may allow detection of such events. Health units that border other provinces or the U.S., however, may not be aware of cases outside of their jurisdiction. Strong interjurisdictional communications are essential to remaining abreast of potential outbreaks.

Laboratory Methods

Laboratories play an important role in identifying organisms responsible for infectious disease outbreaks. In this outbreak, challenges arose around specimen management, including discarded specimens and specimens sitting too long in media for further analysis. Speciation is currently considered experimental. As further recreational water outbreaks of cryptosporidiosis occur, however, it will be helpful to develop policies and procedures so that health care practitioners; public health departments; and local, provincial, and national laboratories can collaborate to determine responsible species and advance research in this area.

Environmental Measures

Cryptosporidium is a hardy protozoan that withstands levels of chlorine commonly used in swimming pools. Previous studies have demonstrated that medium-pressure UV light is effective in inactivating *Cryptosporidium* oocysts (Bukhari, Hargy, Bolton, Dussert, & Clancy, 1999; Clancy et al., 2000; Craik, Weldon, Finch, Bolton, & Belosevic, 2001). Although this water park had a UV light system in one of its recirculation systems, it was off during the suspected exposure time. We believe it is of interest to public health to better understand the effectiveness of current legislation and regulations for public pools in preventing waterborne illness. This outbreak highlights the fact that even highly compliant facilities following current guidelines may serve as sources of recreational water illness. Further research should explore the effectiveness and cost effectiveness of UV light systems in preventing recreational water illness and processes that could minimize risk to swimmers when UV light systems are offline. Water parks should also be encouraged to ensure children in diapers wear only swim diapers while in water features. Parents may benefit from education around proper attire for young children and diaper change facilities to minimize pool soiling events. Although swim diapers are of minimal benefit in a diarrheal acci-

dent, they may prevent the release of formed stool, with the hope of decreasing the bacterial load released into the pool environment.

Limitations of the outbreak investigation included the lack of definitive laboratory evidence linking the water park to the cases and possible underestimation of the number of cases involved in the outbreak due to self-resolution of cases without seeing a physician, lack of testing of symptomatic cases, and failure to attribute cases to the outbreak in jurisdictions beyond Ontario and New York State.

Conclusion

This article described NRPH's experience of an outbreak of cryptosporidiosis associated with a water park. This outbreak investigation highlights the challenges encountered and the need for ongoing research into surveillance, laboratory testing, environmental control, and communications for the prevention of recreational water illness. 🌐

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References

Bukhari, Z., Hargy, T.M., Bolton, J.R., Dussert, B., & Clancy, J.L. (1999). Medium-pressure UV for oocyst inactivation. *Journal of the American Water Works Association*, 91(3), 86–94.

Causser, L.M., Handzel, T., Welch, P., Carr, M., Culp, D., Lucht, R., Mudahar, K., Robinson, D., Neavear, E., Fenton, S., Rose, C., Craig, L., Arrowood, M., Wahlquist, S., Xiao, L., Lee, Y.-M., Mirel, L., Levy, D., Beach, M.J., Poquette, G., & Dworkin, M.S. (2006). An outbreak of *Cryptosporidium hominis* infection at an Illinois recreational water park. *Epidemiology and Infection*, 134(1), 147–156.

Centers for Disease Control and Prevention. (2010). *Healthy swimming fecal incident response recommendations for pool staff*. Retrieved from www.cdc.gov/healthywater/pdf/swimming/pools/fecal-incident-response-recommendations.pdf

Centers for Disease Control and Prevention. (2011a). *Cryptosporidium*. Retrieved from <http://www.cdc.gov/parasites/cryptosporidium>

Centers for Disease Control and Prevention. (2011b). Surveillance for waterborne disease outbreaks and other health events associated with recreational water—United States, 2007–2008. *Morbidity and Mortality Weekly Report Surveillance Summaries*, 60(SS12), 1–32.

Clancy, J.L., Bukhari, Z., Hargy, T.M., Bolton, J.R., Dussert, B.W., & Marshall, M.M. (2000). Using UV to inactivate *Cryptosporidium*. *Journal of the American Water Works Association*, 92(9), 97–104.

Coetzee, N., Edeghere, O., Orendi, J.M., Chalmers, R., & Morgan, L. (2008). A swimming pool-associated outbreak of cryptosporidiosis in Staffordshire, England, October to December 2007. *Euro-surveillance*, 13(45), 1–3.

Craik, S.A., Weldon, D., Finch, G.R., Bolton, J.R., & Belosevic, M. (2001). Inactivation of *Cryptosporidium parvum* oocysts using medium- and low-pressure ultraviolet radiation. *Water Research*, 35(6), 1387–1398.

Health Protection and Promotion Act R.R.O. 1990, Regulation 565, Public Pools (2007). Retrieved from www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900565_e.htm

References

Heymann, D.L. (Ed.). (2008). *Cryptosporidiosis*. In *Control of communicable diseases manual* (19th ed., pp. 157–160). Washington, DC: American Public Health Association.

Insulander, M., Lebbad, M., Stenstrom, T.A., & Svenungsson, B. (2005). An outbreak of cryptosporidiosis associated with exposure to swimming pool water. *Scandinavian Journal of Infectious Disease*, 37(5), 354–360.

Ministry of Health and Long-Term Care. (2009). Appendix A: Disease specific chapters. *Cryptosporidiosis*. *Ontario Public Health*

Standards Infectious Diseases Protocol (pp. 81–86). Toronto, Ontario, Canada: Queen's Printer of Ontario.

Ministry of Health and Long-Term Care. (2010). *Operating procedures for non-regulated recreational water facilities guidance document*. Toronto, Ontario, Canada: Queen's Printer of Ontario.

Putignani, L., & Menichella, D. (2010). Global distribution, public health, and clinical impact of the protozoan pathogen cryptosporidium. *Interdisciplinary Perspectives on Infectious Diseases*, 2010, 1–39.

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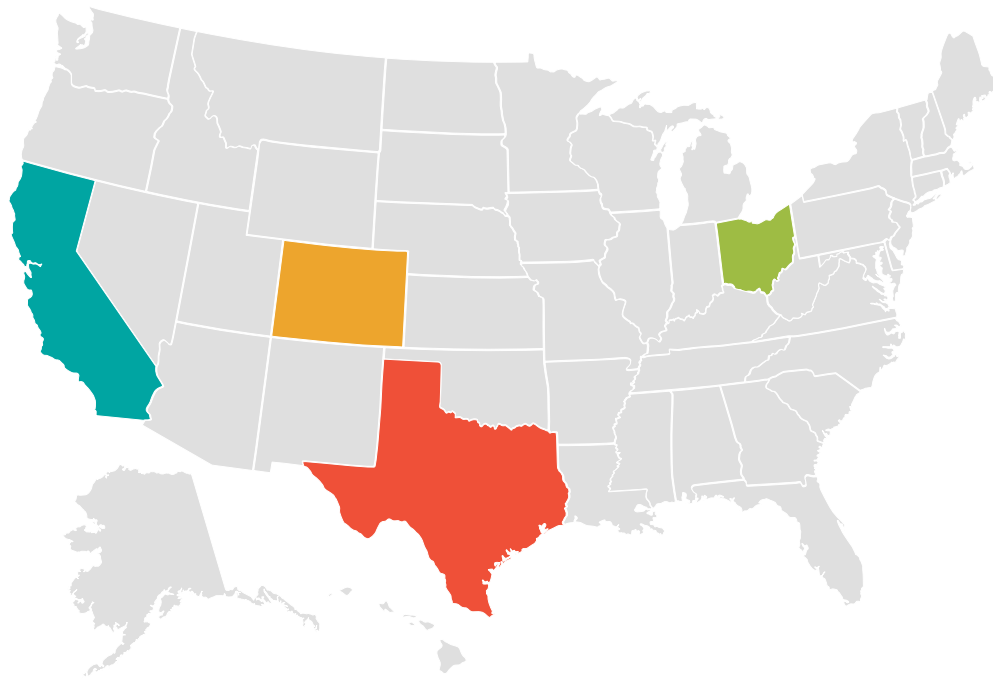
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▶ **ACROSS THE COUNTRY** WHAT'S HAPPENING IN ENVIRONMENTAL HEALTH



Editor's Note: This new feature in the *Journal* is intended to provide readers with interesting and novel stories of environmental health being practiced across the country that offer an avenue for story sharing and community building. It will be published periodically throughout the year. Do you have a story to share? Please contact Terry Osner at tosner@neha.org.

CALIFORNIA

Need to Know San Francisco Restaurant Health Scores? Just Yelp!

On January 17, 2013, San Francisco Mayor Ed Lee announced a partnership with Yelp to link the city's restaurant health score data with Yelp's restaurant review Web site. For Lee, working with Yelp is another significant step in the open data movement: "By making often hard-to-find government information more widely available to innovative companies like Yelp, we can make government more transparent and improve public health outcomes for our residents through the power of technology."

The center of the project is the creation of a new national open data standard called the Local Inspector Value-Entry Specification (LIVES), which would enable any city to voluntarily share restaurant inspections scores on Yelp or other Web sites and make that data more transparent.

Source: Rich, S., & Mulholland, J. (2013, January 18). *Yelp, San Francisco partner to publicize health inspection data*. Retrieved from http://www.governing.com/templates/gov_print_article?id=187448171

California Steaming—Lake County Geothermal Activity

Lake County is home to Clear Lake and 18 geothermal power plants generating about 725 megawatts of electricity. In a mixed residential and commercial neighborhood on the south shore of Clear Lake, natural geothermal activity results in the venting of different gases, including methane, hydrogen sulfide, and carbon dioxide.

What are the health risks for breathing these naturally vented gases for residents or visitors?

To answer this question, the Lake County Environmental Health Division (LCEHD) needed to do some research. Raymond Ruminski, REHS, director of the department, said that the environmental health staff worked closely with the Lake County Air Quality

Management District. Through the efforts of local health officer Dr. Karen Tait, other agencies such as the U.S. Environmental Protection Agency, the U.S. Geological Survey, the California Department of Public Health, and the California Air Resources Board also provided assistance in the project.

Ruminski stated that so far their findings indicate that venting of these gases is intermittent with variations in concentration, and more health risks exist for an individual in a confined space than in an open area. In a few cases LCEHD condemned buildings because of the associated health risks of high concentrations of these gases. He added that homes and buildings could use engineering controls similar to radon management to mitigate the risks.

CALIFORNIA

Campus Food Safety

Have you ever wondered how colleges and universities make sure that food served at a campus function is safe? For Everette Brooks, CP-FS, at the California Polytechnic State University, what began in 2005 as a part-time job has developed into a full-time student services profession seven years later.

In addition to student activities, Brooks trains the campus dining staff in food handling and inspects 22 permanent food facilities, two warehouses, and two facilities that prepare food for campus theater performances. Anytime an organization schedules an event involving food, Brooks' office receives a notice. Prior to an event,

food handlers attend a series of education sessions before receiving a food safety permit. In the first few years, Brooks rejected a number of vendors on the day of an event because he could not verify safe food preparation or handling methods for large batches of meat or chicken marinated off site.

Today, the Environmental Health and Safety Office at Cal Poly offers online training for food handlers. The results of the training are e-mailed to Brooks, who confirms the results, prior to issuing a food safety permit to the individual for the event. Using available technology allows Brooks to more easily manage a process to enhance food safety practices at campus events.

COLORADO

Increasing Meth Lab Cleanups

After a seven-year absence, methamphetamine labs are reappearing in a north suburban city in Colorado. According to Registered Environmental Health Specialist Michael Wallingford, the city of Broomfield experienced three lab cleanups between May and December 2012. Prior to these, the last meth lab cleanup was in 2005. He indicated that approximately 80% of the cleanups occurred in rental properties. Wallingford attributes the increase to the slow economy (e.g., people trying to make money) and increased due diligence by realtors.

The drug task force makes the initial intervention and removal of evidence. After a "do not occupy" permit is posted by the building department, the property owner is referred to the environmental health department, which advises the owner of the cleanup process. Wallingford stated that the cleanup team, which averages between two and six people, usually takes two to four weeks to adequately cleanup the site. He also said that cleanup teams are finding other drugs including psychedelic mushrooms and LSD. Neighbors of meth lab sites have demonstrated positive support for the cleanup teams.

OHIO

Columbus Public Health Environmental Health Division & The Ohio State University—Keeping Buckeye Fans Safe

The Ohio State University (OSU) football team was undefeated this past season, and while the Buckeyes were scoring touchdowns, sanitarians from the Columbus Public Health (CPH) Environmental Health Division (EHD) were scoring "food safety points."

Two years ago, following FEMA training, OSU approached Keith Krinn, MA, RS, DAAS, CPHA, the environmental health administrator of the CPH EHD, to work with existing entities before and during each OSU home game. During home games, a CPH sani-

tarian attends a pregame meeting with local police, fire, stadium officials, FBI, FAA, and other agencies to review safety issues and concerns. According to CPH employee Mike Theil, RS, the sanitarians become additional "eyes and ears" for potential security or safety issues.

Between six and eight CPH sanitarians work each game. In addition to special attire and credentials, they also use multi-agency radio communications (MARC) to communicate with each other, police, fire, or stadium officials. The MARCs offer sanitarians back-up support if an issue arises with a pushcart vendor or another safety concern. The program is a win-win-win for OSU, the CPH EHD, and Buckeye fans.

TEXAS

QR Codes and the Plano Environmental Health Department

Two years ago, the Plano Environmental Health Department began using QR codes on its health permits. When posted on doors or windows of restaurants, a person with a smartphone can scan the QR code, which redirects the person to the department's Web site for the most recent inspection report. The department's Web site, tied to Google Maps, also allows a person to find another restaurant in the area if desired.

Using the QR code has reduced the department's printing costs. Furthermore, the number of individuals accessing restaurant in-

spection has increased 70% since its implementation. In November, the Texas Municipal League presented the 2012 Municipal Award in Management Innovations to the Plano Environmental Health Department for its use of QR codes in health permits. In addition, the department received a 2012 "Promising Practice" designation by the National Association of County and City Health Officials for its use of QR codes.

If you would like more information on how the Plano Environmental Health Department uses QR codes, you can e-mail Geoffrey Heinicke, MPH, RS, environmental health manager, at geoffreyh@plano.gov.

▶ DIRECT FROM ATSDR



Tonia Burk,
PhD



Gregory Zarus,
MS

Community Exposures to Chemicals Through Vapor Intrusion: A Review of Past Agency for Toxic Substances and Disease Registry Public Health Evaluations

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

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

The conclusions of this article are those of the author(s) and do not necessarily represent the views of ATSDR, CDC, or the U.S. Department of Health and Human Services.

Since joining ATSDR in 2006, Tonia Burk has developed vapor intrusion tools, training materials, and professional presentations for the agency. She maintains an active role in interagency workgroups and provides technical assistance on vapor intrusion sites. Gregory Zarus has been an environmental health scientist with ATSDR since 1997 and currently leads the Atlanta-based team that assesses the health impact of environmental contamination for communities within the U.S. Environmental Protection Agency's Regions 7, 8, 9, and 10.

Introduction

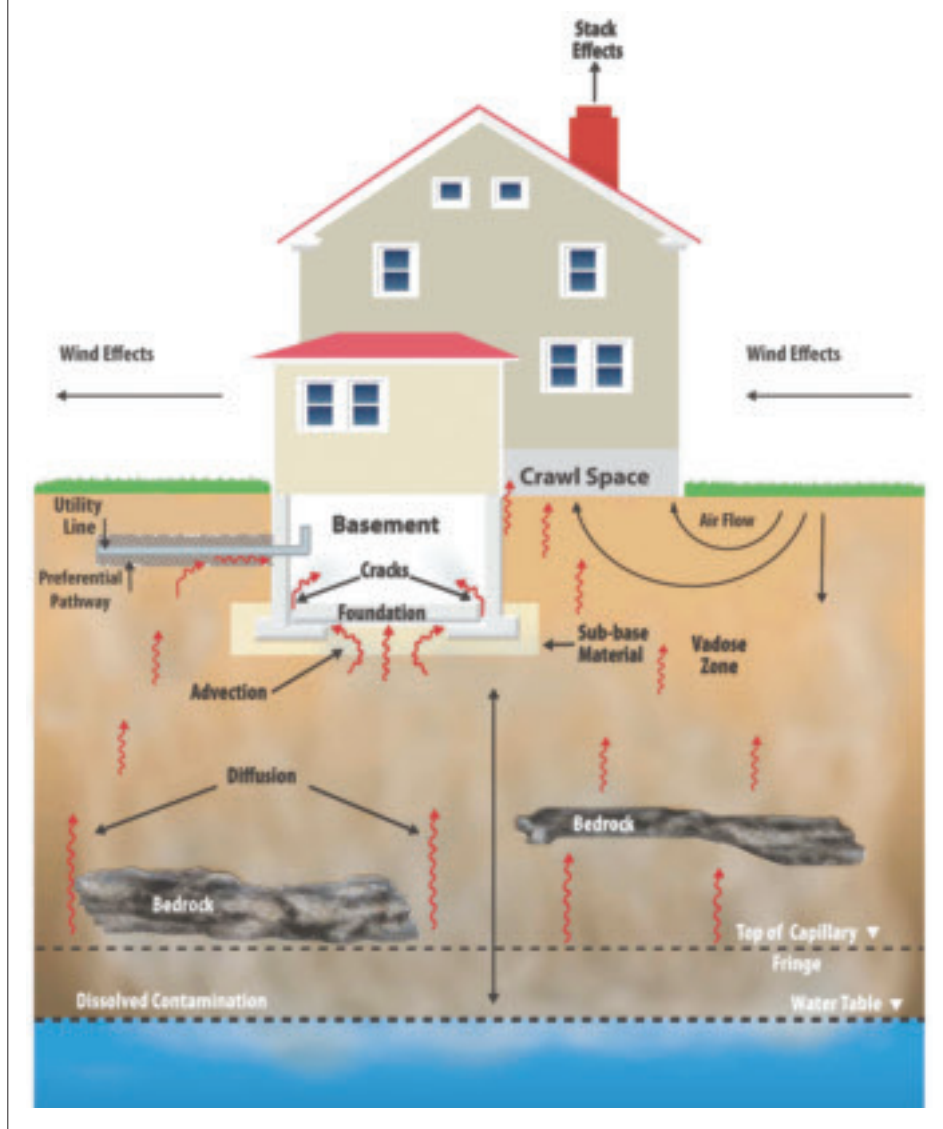
Volatile contaminants in subsurface soil or groundwater can migrate up into buildings—vapor intrusion—and present a unique inhalation exposure pathway. As U.S. Environmental Protection Agency (U.S. EPA) and Agency for Toxic Substances and Disease Registry (ATSDR) awareness of this phenomenon increases, the large number of historical solvent and petroleum releases is resulting in an ever-increasing number of sites with a vapor intrusion component. This column summarizes information showing which chemicals occur most frequently above screening values at sites ATSDR has reviewed and how many of the sites with these contaminants were classified as a public health hazard. The potential for vapor intrusion and possible adverse health effects to building occupants are important pieces of information for communities to be aware of, especially during redevelopment activities and land use decision making.

Background

Volatile organic chemicals (VOCs) are among the most common contaminants released into the environment from hazardous waste sites. In addition to contaminating groundwater and soil, these chemicals may off-gas from these two media and migrate up into the air of homes and commercial buildings. Figure 1 illustrates the potential vapor intrusion conduits into buildings. If vapors build up indoors levels may lead to the following health and safety issues: fire; explosion; and acute, intermediate, and chronic health effects (Agency for Toxic Substances and Disease Registry [ATSDR], 2008).

FIGURE 1

Vapor Intrusion Conceptual Site Model



Methods

In 2009, an ATSDR intern reviewed 135 vapor intrusion public health assessments and consultations on 121 sites published on ATSDR's Web site between 1994 and 2009. Here we report the following: contaminant(s), maximum indoor air concentration, and health hazard category. ATSDR assigns one of five health hazard categories to summarize the risks of particular chemical exposures at a site. The categories range from "urgent public health hazard" to "no public health hazard" (ATSDR, 2005). Information on the source of indoor air contamination was also

collected (e.g., groundwater, soil gas, crawl space gas, and outdoor air data).

We ranked chemicals detected in indoor air according to the frequency that they were found and the frequency in which they exceeded ATSDR comparison values (CVs). Our CVs are chemical and media-specific concentrations used by ATSDR health assessors and others to identify environmental contaminants at hazardous waste sites that require further evaluation. Evaluating chemicals present above CVs involves analysis of site-specific exposure factors and toxicologic studies (ATSDR, 2005). Lastly, we exam-

ined which chemicals resulted in sites being declared a health hazard.

Results

Of the 135 reports evaluated (121 sites), 119 (88%) were written after U.S. EPA's 2002 draft guidance for evaluating vapor intrusion was published (U.S. Environmental Protection Agency [U.S. EPA], 2002). Figure 2 shows the increasing number of vapor intrusion site reports published each year since 1994.

Figure 3 shows these site locations and highlights those where ATSDR determined a public health hazard existed. As with many other types of ATSDR evaluations, the locations are highly concentrated in densely populated cities and areas historically associated with heavy industry. In addition, vapor intrusion sites have historically been more focused in the colder northern regions where the stack effect is considered more pronounced. In the stack effect, heated building interiors and higher winds at rooftops draw air out near the roof creating negative pressure inside the building and drawing in subsurface vapors.

Our review identified 119 VOCs and semivolatile organic compounds in indoor air, groundwater, ambient air, and soil gas. Ninety-five (80%) of the chemicals were detected in indoor air. Fifteen of these exceeded a CV or combustible hazard criteria and only five were responsible for declaring public health hazards (Table 1). The five chemicals associated with hazards were categorized in two chemical families: nonchlorinated and chlorinated VOCs. Three chemicals, benzene, tetrachloroethylene (PCE), and/or trichloroethylene (TCE) were found in at least one medium (indoor air, groundwater, crawl space air, or soil gas) at 95% of the sites. Nonchlorinated VOCs primarily come from petroleum sources, whereas the chlorinated VOCs come from a wider variety of sources, such as dry cleaning and degreasing operations.

Additionally, Table 1 lists each contaminant's detection frequency in indoor air, the number of sites with the chemical above the CV, and the number of sites declared a health hazard due to the contaminants. Ten of the 15 contaminants found above CVs were not the basis for declaring health hazards. This could be because other more hazardous contaminants were of higher concern or because of site-specific exposure scenarios (e.g., two hours of exposure per week

compared with 24 hours of exposure per day, seven days per week).

Chlorinated ethylenes, PCE, and TCE resulted in the most health hazard conclusions (eight from indoor air measurements). Figures 4 and 5 compare maximum contaminant levels found with ATSDR CVs for non-chlorinated and chlorinated VOCs, respectively. Shaded symbols indicate contaminant concentrations exceeded the CVs. Both figures display several “new” CVs. As toxicology and epidemiology science evolves, new findings may result in lowering or raising a contaminant’s level of health concern. This may lead to changes in health conclusions. The presence of nonchlorinated VOCs (volatile petroleum products) resulted in health hazard conclusions due to benzene carcinogenicity or danger of fire and explosion.

Benzene, a carcinogen, is the more toxic constituent of the BTEX (benzene, toluene, ethylbenzene, xylene) petroleum chemical family (ATSDR, 2004). It was detected above CVs in indoor air at 28 sites and accounted for two sites with public health hazard conclusions. Confounding background sources are a concern at many benzene sites. The upper 95th percentile for benzene in indoor air, 29 $\mu\text{g}/\text{m}^3$ (U.S. EPA, 2011), exceeds U.S. EPA’s risk management range of 1 in 10,000 excess cancer cases. ATSDR provides health education on reducing background exposures to benzene and other indoor air contaminants when health based levels are exceeded (U.S. EPA, 2012).

Figure 4 illustrates that benzene exceeded its CV much more frequently (100%) than the remaining petroleum-related compounds (xylene = 20%, toluene = 14%, and ethylbenzene = 6%). Methane is not particularly toxic, but does pose a fire and explosion hazard if it accumulates to flammable or explosive levels. A public health hazard from methane was declared at one site because it was detected 1,000 times above the lower explosive limit. The petroleum VOCs were measured using a nonspecific photoionizing detector and therefore are estimates. Like methane, the levels present at the petroleum VOCs site were determined to be a fire and explosion hazard and possibly high enough to cause acute health effects.

As illustrated in Figure 5, of the chlorinated VOCs, the industrial solvent methylene chloride most often exceeded its CV.

FIGURE 2

Agency for Toxic Substances and Disease Registry Vapor Intrusion Health Evaluations by Year

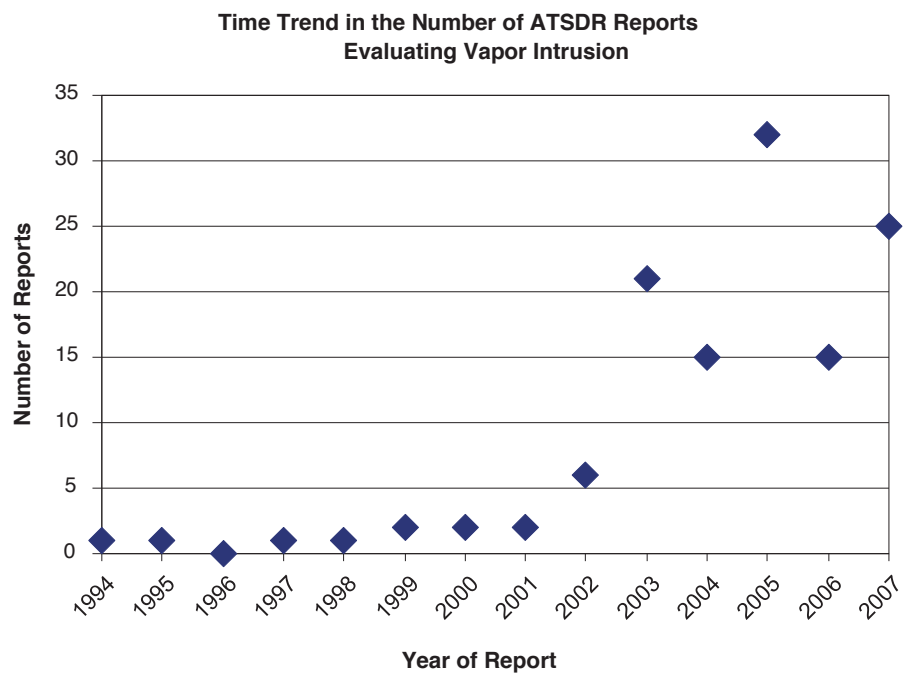


FIGURE 3

Locations Where Agency for Toxic Substances and Disease Registry Performed Vapor Intrusion Public Health Evaluations

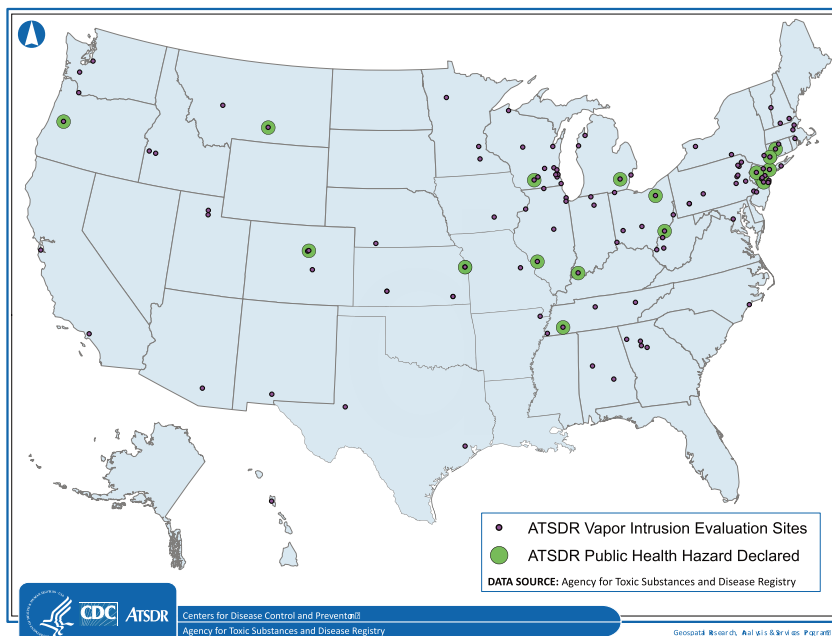


TABLE 1

Indoor Air Contaminants Found Above Comparison Values (CVs) From Vapor Intrusion

Contaminants		Sites ^a With Chemical Detected in Indoor Air	Lowest CV (Type of CV) in $\mu\text{g}/\text{m}^3$	Sites ^a With Chemical Above CV in Indoor Air	Sites Declared a Public Health Hazard Due to the Chemical in Indoor Air ^b
Nonchlorinated VOCs^c					
Benzene		28	0.1 (CREG) ^c	28 (100%)	2 (7%)
Toluene		21	300 (cEMEG) ^c	3 (14%)	0 (0%)
Ethylbenzene		17	1000 (cEMEG) [†]	1 (6%)	0 (0%)
Xylene		20	200 (cEMEG)	4 (20%)	0 (0%)
n-Hexane		9	2,100 (cEMEG)	1 (11%)	0 (0%)
1,3-butadiene		6	0.03 (CREG)	6 (100%)	0 (0%)
Combustibles	Methane	2	10% LEL ^{c‡}	1 (50%)	1 (50%)
	Petroleum VOCs	2	10% LEL [‡]	0 (0%)	1 (50%)
Chlorinated VOCs					
Tetrachloroethylene (PCE)		39	300 (cEMEG) [†]	5 (13%)	5 (13%)
Trichloroethylene (TCE)		21	500 (iEMEG) ^{c†}	1 (5%)	3 (14%)
Vinyl chloride		10	0.11 (CREG)	7 (70%)	0 (0%)
Methylene chloride		20	2 (CREG) [†]	16 (80%)	0 (0%)
Chloroform		10	0.04 (CREG)	9 (90%)	0 (0%)
Carbon tetrachloride		10	0.07 (CREG) [†]	9 (90%)	0 (0%)
1,4-dichlorobenzene		7	60 (cEMEG)	4 (57%)	0 (0%)

^aSome sites have more than one chemical of concern, i.e., the sites are not mutually exclusive.

^bHazard frequency = the number of sites (and %) where the chemical was declared a situation-specific health hazard.

^cVOCs = volatile organic compounds; CREG = cancer risk evaluation guides; cEMEG = noncancer chronic environmental media evaluation guides; LEL = lower explosive limit; iEMEG = noncancer intermediate environmental media evaluation guides.

[†]The following updated CVs have recently been released:

Ethylbenzene: cEMEG = 260 $\mu\text{g}/\text{m}^3$.

PCE: CREG = 3.8 $\mu\text{g}/\text{m}^3$.

TCE: CREG = 0.24 $\mu\text{g}/\text{m}^3$, reference concentration = 2 $\mu\text{g}/\text{m}^3$.

Methylene chloride: CREG = 100 $\mu\text{g}/\text{m}^3$, cEMEG = 1,000 $\mu\text{g}/\text{m}^3$.

Carbon tetrachloride: CREG = 0.17 $\mu\text{g}/\text{m}^3$.

[‡]No Agency for Toxic Substances and Disease Registry CV available. The National Institute for Occupational Safety and Health has developed the immediately dangerous to life and health (IDLH) values for methane and petroleum distillates that are 10% of the LEL. Methane: IDLH = 5,000 parts per billion (ppb) by volume; petroleum distillates: IDLH = 1,100,000 ppb.

Levels were above the cancer risk CV 80% of the time it was detected. Vinyl chloride, another carcinogen (ATSDR, 2006), also had many measurements (70%) exceeding its CV.

Of the 121 sites reviewed, 17 (14%) posed a “public health hazard,” 83 (69%) posed “no apparent public health hazard,” and 56 (46%) posed an “indeterminate public health hazard” (insufficient information precludes a conclusion). No sites posed an urgent public health hazard, ATSDR’s highest conclusion category. Twelve of the 17 sites were classified as a public health hazard because of high indoor air measurements (Table 1). The five other sites that

were deemed public health hazards exhibited relatively high soil gas, groundwater, or crawl space contamination.

Conclusion

Chlorinated ethylene pollutants and petroleum-related pollutants were the most frequently found chemicals at sites where the vapor intrusion pathway was investigated. Benzene, PCE, or TCE was found at 95% of the sites. Benzene most frequently exceeded its CV in indoor air for a chemical that resulted in health hazards. TCE, a chemical of increasing concern (Burk, Zarus, Grosse, Pugh, & Issacs, 2009), caused the high-

est percentage (14%) of health hazards due to toxicity when detected, though PCE was similar (13%). Petroleum VOCs and methane each resulted in one health hazard from the potential for fire or explosion. Vapor intrusion of a combined chloroform and carbon tetrachloride mixture also resulted in one public health hazard.

We encourage state, local, and federal stakeholders to increase awareness of historical sources of hazardous subsurface vapors in and near their communities. This issue is not just applicable to existing buildings—it should be considered in community revitalization and brownfields

efforts and before abandoned property redevelopment decisions. 🗣️

Acknowledgements: We thank the following ATSDR colleagues for their contributions, reviews, and suggestions: Arturo Rivera (intern), Janet Heitgerd, Ken Powell, Sarah Martin, Steve Bullard, Randall Young, and Arie Manangan.

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References

Agency for Toxic Substances and Disease Registry. (2004). *Interaction profile for benzene, toluene, ethylbenzene, and xylenes (BTEX)*. Atlanta: U.S. Department of Health and Human Services. Retrieved from <http://www.atsdr.cdc.gov/interactionprofiles/IP-btex/ip05.pdf>

Agency for Toxic Substances and Disease Registry. (2005). *Public health assessment guidance manual (updated)*. Atlanta: U.S. Department of Health and Human Services. Retrieved from <http://www.atsdr.cdc.gov/HAC/PHAmmanual/index.html>

Agency for Toxic Substances and Disease Registry. (2006). *Toxicological profile for vinyl chloride*. Atlanta: U.S. Department of Health and Human Services. Retrieved from <http://www.atsdr.cdc.gov/toxprofiles/tp20.pdf>

Agency for Toxic Substances and Disease Registry. (2008). *Evaluating vapor intrusion pathways at hazardous waste sites*. Atlanta: U.S. Department of Health and Human Services. Retrieved from http://www.atsdr.cdc.gov/document/evaluating_vapor_intrusion.pdf

Burk, T., Zarus, G., Grosse, C., Pugh, K., & Issacs, S. (2009, May). ATSDR health assessment of TCE exposure by vapor intrusion at military facilities. Paper presented at the *Environment, Energy & Sustainability Symposium*, Denver, CO.

continued on page 41

FIGURE 4

Maximum Concentrations of Nonchlorinated Volatile Organic Compounds Found in Indoor Air in Relation to Agency for Toxic Substances and Disease Registry's Comparison Values

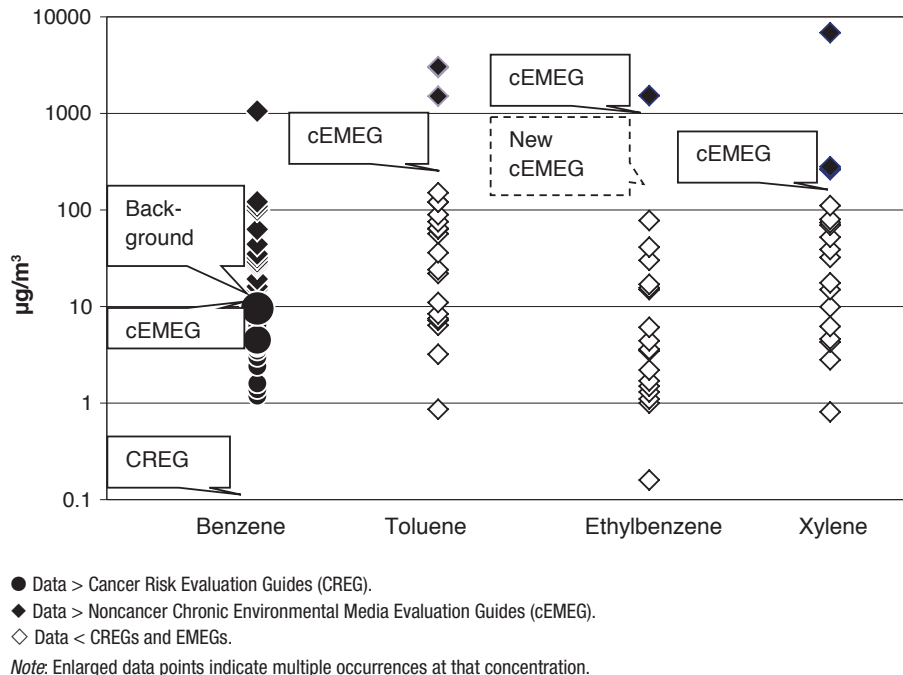
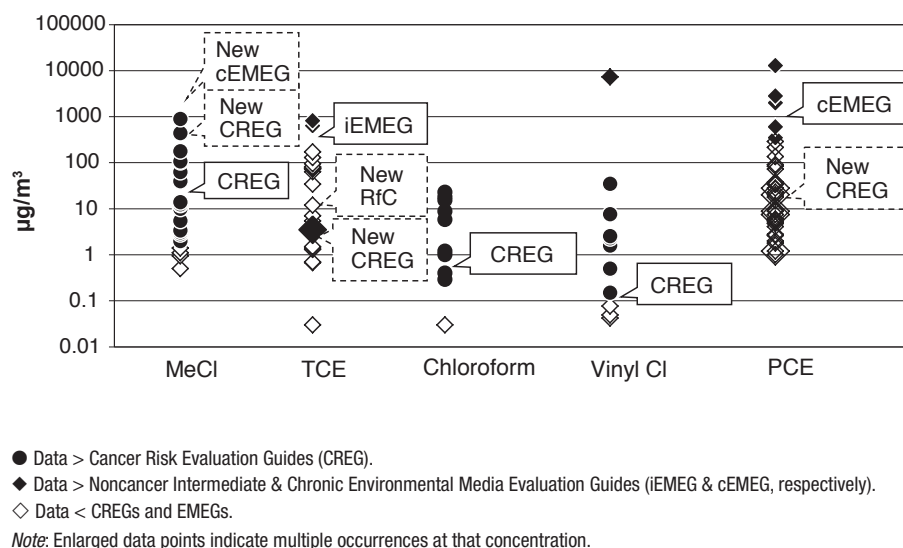


FIGURE 5

Maximum Concentrations of Chlorinated Volatile Organic Compounds Found in Indoor Air in Relation to Agency for Toxic Substances and Disease Registry's Comparison Values



References *continued from page 40*

- U.S. Environmental Protection Agency. (2002). *OSWER draft guidance for evaluating the vapor intrusion to indoor air pathway from groundwater and soils (subsurface vapor intrusion guidance)*. Retrieved from <http://www.epa.gov/epawaste/hazard/correctiveaction/eis/vapor.htm>
- U.S. Environmental Protection Agency. (2011). *Background indoor air concentrations of volatile organic compounds in North American residences (1990–2005): A compilation of statistics for assessing vapor intrusion*. Retrieved from <http://www.epa.gov/oswer/vaporintrusion/documents/oswer-vapor-intrusion-background-Report-062411.pdf>
- U.S. Environmental Protection Agency. (2012). *An introduction to indoor air quality (IAQ): Volatile organic compounds (VOCs)*. Retrieved from <http://www.epa.gov/iaq/voc.html>

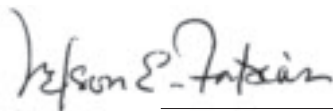
Managing Editor's Desk

continued from page 77

ourselves get in the way of an extraordinary opportunity to answer a calling for our profession and for the expertise that only we can lend to important contemporary issues like these.

No, history isn't bunk, Mr. Ford. As the wise saying goes, "those who fail to learn from history are doomed to repeat it."

But yes, Mr. Ford, I agree with you that we can't let traditions compromise our ability to live in the present and in the process "write" the history for tomorrow. Far better to be on that path than to try to relive the history that has been bequeathed to us but which no longer pertains to the world we live and work in. 🐼



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John F. Kennedy, 35th President of the United States



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▶ DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES BRANCH

Michele Hlavsa,
RN, MPHMichael Beach,
PhD

Healthy and Safe Swimming: Pool Chemical–Associated Health Events

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 CDC.

Michele Hlavsa is chief of CDC's Healthy Swimming Program. Michael Beach is CDC's associate director for Healthy Water.

Chemicals are added to the water in treated recreational water venues (e.g., pools, hot tubs/spas, and interactive fountains) to inactivate pathogens, maximize the efficacy of the disinfection process (e.g., pH control), improve water quality, stop corrosion and scaling of equipment, and protect against algal growth. Each year, however, pool chemical–associated health events lead to 3,000–5,000 visits to emergency departments across the U.S. (National Electronic Injury Surveillance System, 2013). The most common diagnoses are poisoning (i.e.,

ingestion of pool chemicals or inhalation of dust or fumes) and dermatitis or conjunctivitis, which result from chemical splashes onto skin or into the eyes. The injured include pool operators, other aquatics staff, and the general public; however, those under 18 years of age are disproportionately affected. Pool chemical–associated health events occur in both residential and public settings, and they most frequently occur during the summer and on the weekends.

State and local investigations into the factors leading to pool chemical–associ-

ated health events reveal common themes (Centers for Disease Control and Prevention [CDC], 2009; CDC, 2011; Hlavsa et al., 2011). The health events demonstrate the lack of use of personal protective equipment (PPE) (e.g., safety goggles or masks); they frequently occur when containers or packaging are opened, water is added to a chemical (i.e., instead of a chemical being added to water), equipment fails, or chemicals violently react. Violent chemical reactions can result from predissolving pool chemicals that should not be predissolved or mixing incompatible pool chemicals, particularly chlorine and acid. Pool chemical–associated health events that affect the most individuals and thus make national headlines frequently result from the following scenario: the recirculation pump shuts down while the chlorine and acid feed pumps continue to run; chlorine and acid mix within the static water return lines without dilution, generating toxic chlorine gas; and then when the recirculation pump is restarted, patrons and the aquatics staff are exposed to the toxic chlorine gas. Additionally, children frequently access chemical storage areas or are present while pool chemicals are being handled.

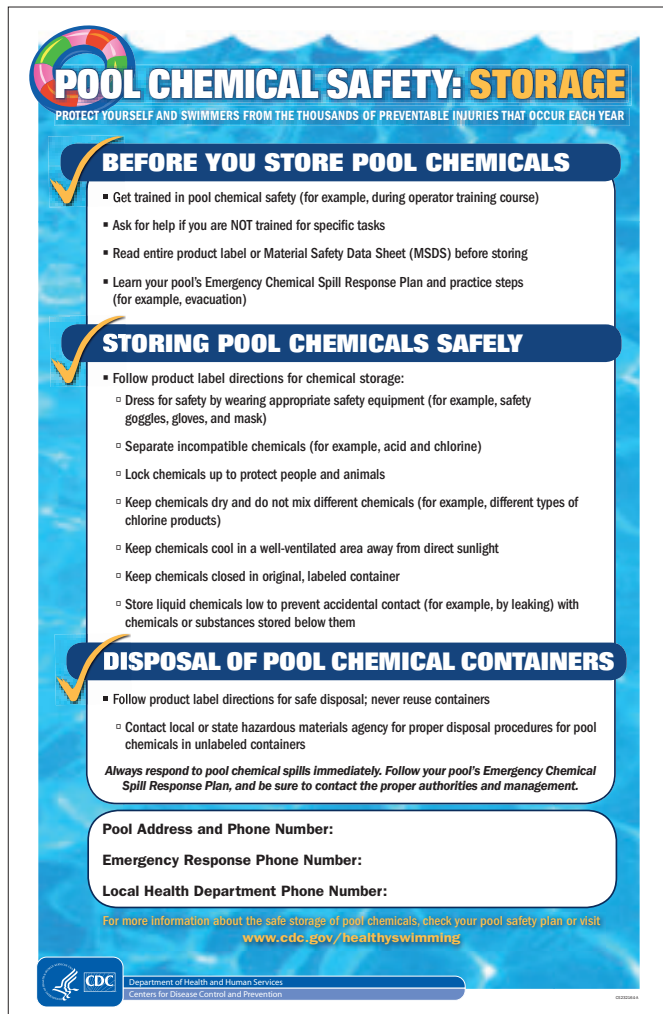
Prevention Through Education

Pool chemical–associated health events can be prevented through a combination of education, engineering, and environmental health policy. The Centers for Disease Control and Prevention's (CDC's) recommendations for preventing these health events, based on analysis of data collected during state and local investigations, can be found

FIGURE 1

Free Pool Chemical Safety Posters Available in English and Spanish

a



POOL CHEMICAL SAFETY: STORAGE
PROTECT YOURSELF AND SWIMMERS FROM THE THOUSANDS OF PREVENTABLE INJURIES THAT OCCUR EACH YEAR

BEFORE YOU STORE POOL CHEMICALS

- Get trained in pool chemical safety (for example, during operator training course)
- Ask for help if you are NOT trained for specific tasks
- Read entire product label or Material Safety Data Sheet (MSDS) before storing
- Learn your pool's Emergency Chemical Spill Response Plan and practice steps (for example, evacuation)

STORING POOL CHEMICALS SAFELY

- Follow product label directions for chemical storage:
 - Dress for safety by wearing appropriate safety equipment (for example, safety goggles, gloves, and mask)
 - Separate incompatible chemicals (for example, acid and chlorine)
 - Lock chemicals up to protect people and animals
 - Keep chemicals dry and do not mix different chemicals (for example, different types of chlorine products)
 - Keep chemicals cool in a well-ventilated area away from direct sunlight
 - Keep chemicals closed in original, labeled container
 - Store liquid chemicals low to prevent accidental contact (for example, by leaking) with chemicals or substances stored below them


DISPOSAL OF POOL CHEMICAL CONTAINERS

- Follow product label directions for safe disposal; never reuse containers
 - Contact local or state hazardous materials agency for proper disposal procedures for pool chemicals in unlabeled containers

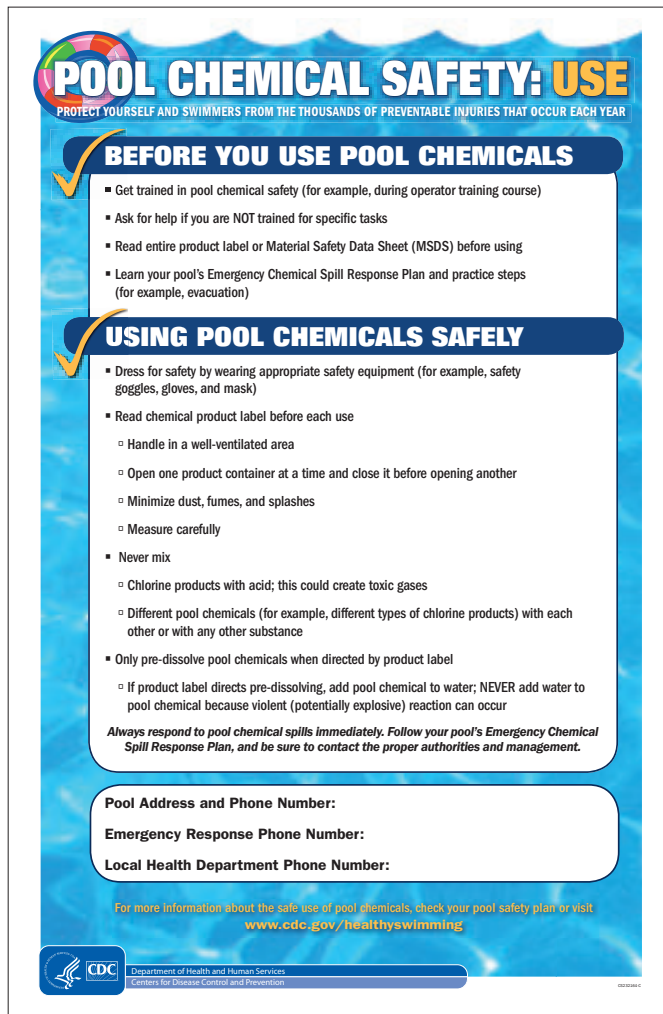
Always respond to pool chemical spills immediately. Follow your pool's Emergency Chemical Spill Response Plan, and be sure to contact the proper authorities and management.

Pool Address and Phone Number:
Emergency Response Phone Number:
Local Health Department Phone Number:

For more information about the safe storage of pool chemicals, check your pool safety plan or visit www.cdc.gov/healthyswimming

 Department of Health and Human Services
Centers for Disease Control and Prevention

b



POOL CHEMICAL SAFETY: USE
PROTECT YOURSELF AND SWIMMERS FROM THE THOUSANDS OF PREVENTABLE INJURIES THAT OCCUR EACH YEAR

BEFORE YOU USE POOL CHEMICALS

- Get trained in pool chemical safety (for example, during operator training course)
- Ask for help if you are NOT trained for specific tasks
- Read entire product label or Material Safety Data Sheet (MSDS) before using
- Learn your pool's Emergency Chemical Spill Response Plan and practice steps (for example, evacuation)


USING POOL CHEMICALS SAFELY

- Dress for safety by wearing appropriate safety equipment (for example, safety goggles, gloves, and mask)
- Read chemical product label before each use
 - Handle in a well-ventilated area
 - Open one product container at a time and close it before opening another
 - Minimize dust, fumes, and splashes
 - Measure carefully
- Never mix
 - Chlorine products with acid; this could create toxic gases
 - Different pool chemicals (for example, different types of chlorine products) with each other or with any other substance
- Only pre-dissolve pool chemicals when directed by product label
 - If product label directs pre-dissolving, add pool chemical to water; NEVER add water to pool chemical because violent (potentially explosive) reaction can occur

Always respond to pool chemical spills immediately. Follow your pool's Emergency Chemical Spill Response Plan, and be sure to contact the proper authorities and management.

Pool Address and Phone Number:
Emergency Response Phone Number:
Local Health Department Phone Number:

For more information about the safe use of pool chemicals, check your pool safety plan or visit www.cdc.gov/healthyswimming

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Print your own or order laminated copies at www.cdc.gov/healthywater/swimming/resources/posters.html#chemical.

at www.cdc.gov/healthywater/swimming/pools/preventing-pool-chemical-injuries.html. A public-private partnership has resulted in the development of health education resources that focus on prevention and target pool operators and residential pool owners. CDC's Healthy Swimming Program, the Agency for Toxic Substances and Disease Registry's National Toxic Substances Incidents Program (NTSIP), and the American Chemistry Council (ACC) collaborated on the evaluation of a CDC pool chemical safety poster. Based on the evaluation, two

new posters were developed, one on safe storage and the other on safe use; both are written in English and Spanish. Thanks to the generous financial support of ACC, CDC printed and laminated approximately 54,000 copies of the two posters (Figure 1). They can be ordered for free at www.cdc.gov/healthywater/swimming/resources/posters.html#chemical. At the state level, our colleagues in New York, an NTSIP site, have also created pool chemical safety fact sheets, which are available at www.health.ny.gov/environmental/chemicals/pool_chemicals/.

Prevention Through Engineering and Environmental Health Policy: The Model Aquatic Health Code (MAHC) in Action

Pool chemical-associated health events can also be prevented by combining engineering features with environmental health policy. Since 2007, CDC and New York State have spearheaded a national multistakeholder (e.g., the aquatics sector) effort to create the MAHC (www.cdc.gov/MAHC). The MAHC is intended to help local and state agencies incorporate science-based practices into pool

programs that regulate the design, construction, operation, and maintenance of public, treated recreational water venues, negating the need to “reinvent the wheel” in individual jurisdictions across the U.S. The MAHC will be a resource for local and state agencies looking to voluntarily adopt or revise public health laws related to preventing illness and injury associated with these venues, addressing the full scope of public health issues, including pool chemical-associated health events. For example, MAHC’s proposed design standards are intended to prevent the common chemical mixing incidents caused when recirculation pumps shut down and chemical feed pumps continue to run by requiring installation of electrical interlocks or flow sensors.

The proposed MAHC standards might also help prevent pool chemical-associated health events by requiring operator training on pool chemical safety and use of appropriate PPE when handling pool chemicals, and, for new construction, designing chemical rooms to

1) ventilate to the outside of the building and 2) minimize mixing and close storage of incompatible pool chemicals. The first edition of the MAHC should be completed following two rounds of public comment before the 2014 swim season so it is not too late for everyone to have input via the public comment process. Read the draft MAHC standards and learn more about the public comment process at www.cdc.gov/mahc. 🐼

Corresponding Author: Michele Hlavsa, National Center for Emerging and Zoonotic Infectious Diseases/Division of Foodborne, Waterborne, and Environmental Diseases, 1600 Clifton Rd., MS C-9, Atlanta, GA 30333. E-mail: acz3@cdc.gov.

References

Centers for Disease Control and Prevention. (2009). Pool chemical-associated health events in public and residential settings—United States, 1983–2007. *Morbidity and Mortality Weekly Report*, 58(18), 489–493.

Centers for Disease Control and Prevention. (2011). Acute illness and injury from swimming pool disinfectants and other chemicals—United States, 2002–2008. *Morbidity and Mortality Weekly Report*, 60(39), 1343–1347.

Hlavsa, M.C., Roberts, V.A., Anderson A.R., Hill, V.R., Kahler, A.M., Orr, M., Garrison, L.E., Hicks, L.A., Newton, A., Hilborn, E.D., Wade, T.J., Beach, M.J., & Yoder, J.S. (2011). Surveillance for waterborne disease outbreaks and other health events associated with recreational water—United States, 2007–2008. *Morbidity and Mortality Weekly Report Surveillance Summaries*, 60(SS12), 1–37.

National Electronic Injury Surveillance System. (2013). *Estimates query builder* (use pool chemical product code 938). Bethesda, MD: U.S. Consumer Product Safety Commission. Retrieved from www.cpsc.gov/cgi-bin/neissquery/home.aspx

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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
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Thomas Frey

Four Unexpected Macro Trends for 2013 and Beyond: The Last Two

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.

The April column covered the first two unexpected macro trends for 2013 and beyond. This month's column will cover the last two.

3.) Multidimensional Literacy—The Evolution of Consumable Information

Contrary to what most academics think, literacy is not just about reading and writing. It can be, but that becomes a very narrow-minded way of looking at the world.

People in the U.S. are consuming information 11.8 hours every day, and they are doing it in many different ways:

- **Photo literacy**—Currently over 250 million photos are uploaded onto Facebook every day.
- **Video literacy**—Google recently announced that videos are being uploaded to YouTube at a rate of 48 hours of video every minute.
- **Coding literacy**—With over 8,000 coding languages currently in existence and new ones coming into play faster than old ones

are going away, people who are “code literate” are in huge demand.

- **Game literacy**—The video game industry is expected to grow from \$67 billion in 2012 to \$82 billion in 2017 with game playing in 70% of all households.
- **App literacy**—Between Apple and Android, over 1.5 million apps are currently in existence and this number is climbing rapidly.
- **Device literacy**—The “Internet of Things” is growing exponentially, and Cisco estimates the number of devices connected to the Internet by 2020 will hit 50 billion.
- **Social media literacy**—One out of every five page views on the web is on Facebook. With over one billion registered users, Facebook is leading the pack, but there are many other brands of social media like Twitter, Pinterest, Google+, and LinkedIn nipping at Facebook's heels.

In addition to the ones listed above are streaming music, podcasts, audio books, movies, courseware, and many more.

Only a small percentage of the information we consume is the written word, and this percentage will continue to decline as we develop newer, faster, and better ways to package information.

Yes, we still need to know how to read and write, but trying to exist in a world without being able to create videos, edit photos, download music, operate devices, or write code will be increasingly difficult.

Competing for jobs in the future will require people to be broadly literate, with the advantage going to those who are the most multidimensional.

4.) The Legalized Marijuana Movement—Nudging the Snowflake That Started the Avalanche

People have been predicting the legalization of marijuana for decades. To say that legalization was highly anticipated is something of a gross understatement.

The problem is that everyone was predicting California would be first. In fact, most of the secret laboratories at the tobacco and pharmaceutical companies for testing and refining pot are based in California. But Colorado and Washington decided to go first.

Unbeknownst to most, these companies have already begun leasing space in Colorado and Washington to better position themselves for the first wave of business opportunities.

While both states are wrestling with an entirely new type of “controlled substance” legislation, lobbyists on both state and federal levels are being put into place to help “guide” people’s thinking.

What most people are missing is that marijuana is already one of the most researched substances in all history. There is already a proven market with proven demand.

Yes, other countries have had legal marijuana for years. But when the U.S. changes its mind, it generally creates an entire new global standard.

The legalization of marijuana will cause the U.S. to rethink its entire “war on drugs” policy, a war that has resulted in far more casualties than most wars. This will result in an abrupt shift in enforcement, legal and justice policies, incarceration rates, and related kinds of legislation.

Remember, any human act is only illegal if humans say it’s illegal. As history has shown, we often change our minds, and this is one of those times.

As Napa Valley is to the wine industry, Colorado and Washington will be to the emerging marijuana industry. While many will take a wait-and-see approach to how the industry develops, major fortunes will be won and lost starting with the early players in 2013.

Final Thoughts

Speaking about four macro trends is but a drop in our current ocean of change.

Discussions around these topics have been rather limited, however, and opening them up for a broader discussion seems very appropriate.

At the same time I’d love to hear your thoughts about these and other macro trends that we’ll be confronting in the future. We won’t be able to cover everything, but take a few moments to let me know what you’re thinking.

Very often the first discussion on a topic is the most important.

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

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EH CALENDAR

UPCOMING NEHA CONFERENCES

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

NEHA AFFILIATE AND REGIONAL LISTINGS

Colorado

September 25–27, 2013: 2013 Annual Education Conference & Exhibition, sponsored by the Colorado Environmental Health Association, Pueblo Convention Center, Pueblo, CO. For more information, visit www.cehaweb.com/aec.html.

Florida

September 5–6, 2013: Annual Education Conference, sponsored by the Florida Environmental Health Association, Hilton Sandestin Beach Golf Resort & Spa, Destin, FL. For more information, visit www.feha.org

Georgia

June 6–7, 2013: 2013 Annual Education Conference, sponsored by the Georgia Environmental Health Association. For more information, visit www.geha-online.org.

Minnesota

May 9–10, 2013: MEHA Spring Conference, sponsored by the Minnesota Environmental Health Association, Ruttger's Bay Lake Lodge, Deerwood, MN. For more information, visit www.meha-online.org/events.

Nevada

July 23–25, 2013: Annual Educational Conference, sponsored by the Nevada Environmental Health Association, Three Square, Las Vegas, NV. For more information, visit www.nveha.org/conf_reg_2013.html.

Rhode Island

September 25–26, 2013: 51st Annual Yankee Conference, hosted by the Rhode Island Environmental Health Association, Twelve Acres, Smithfield, RI. For more information, visit www.ehari.org.

Washington

May 6–7, 2013: 2013 Educational Conference, sponsored by the Washington State Environmental Health Association, Great Wolf Lodge, Grand Mound, WA. For more information, visit www.wseha.org/2013-aec.

TOPICAL LISTINGS

Nanotechnology

June 5–7, 2013: Nano-4-Rem Applications of Nanotechnology for Safe and Sustainable Environmental Remediations, sponsored by Southeastern Louisiana University in cooperation with other partners, Hammond, LA. For more information, visit www.selu.edu/acad_research/programs/nano_4_rem_anssers/. 🐾

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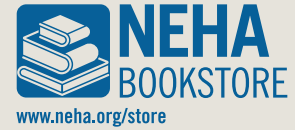
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Pool & Spa Operator™ Handbook

National Swimming Pool Foundation (2012)



This reference is a must for professionals who help protect those who use aquatic venues. It is the most current and comprehensive in the field. The *Handbook* features valuable information to help understand and prevent drowning, recreational water illness, suction entrapment, evisceration, diving accidents, electrocutions, chemical hazards, and slips and falls. Fresh information on regulatory guidelines and vital operation topics are

covered, including disinfection, water balance, water problems, troubleshooting, chemical testing, record keeping, chemical feed, and control technology. The *Handbook* serves as a textbook for the Certified Pool-Spa Operator® certification and is a study reference for NEHA's REHS/RS exam.

298 pages / Spiral-bound paperback / Catalog #1014
Member: \$55 / Nonmember: \$59

Certified Pool/Spa Inspector™ Online Training Program

National Swimming Pool Foundation® (NSPF) (2011)



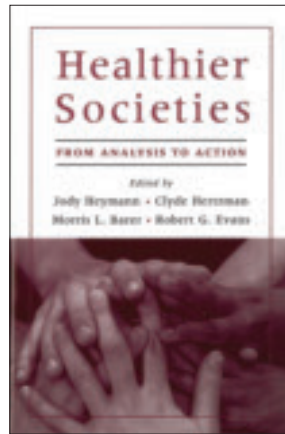
Jointly launched by the NSPF and NEHA, this online course expands upon and replaces the popular Certified Pool/Spa Inspector™ training CD introduced by both organizations in 2005. The program is designed to help environmental health specialists conduct effective pool and spa inspections and to minimize exposure to public health hazards. The interactive, self-paced course features narra-

tion, images, video, and exercises and can be completed in about two hours. In addition, online course registrants receive the accompanying handbook.

Online Course and Handbook (68 Pages / Paperback) / Catalog #1067
Member: \$50 / Nonmember: \$55

Healthier Societies: From Analysis to Action

Edited by Jody Heymann, Clyde Hertzman, Morris L. Barer, and Robert G. Evans (2006)



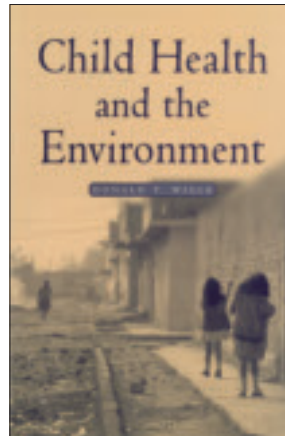
This book addresses the fundamental questions that need to be answered before countries should invest seriously in improving social conditions, as a way of improving the health of the whole population. The book is divided into three parts that address the extent to which health is determined by biological factors or by social factors, examine four case studies that demonstrate the ways in which social change can dramatically affect adults' health, and outline the challenge of translating into action the research,

taking a serious look at what would be involved in meeting this challenge.

417 pages / Hardback / Catalog #758
Member: \$59 / Nonmember: \$64

Child Health and the Environment

Donald T. Wigle (2003)



This is the first textbook to focus on environmental threats to child health. It will interest professionals and graduate students in public health, pediatrics, environmental health, epidemiology, and toxicology. It provides overviews of key children's environmental health issues, addresses the health effects of different environmental contaminants, summarizes associations between environmental exposures and child health outcomes, and calls for an improved science base

to guide public health decisions and protect child health.

396 pages / Hardback / Catalog #759
Member: \$59 / Nonmember: \$64

FEATURED ARTICLE QUIZ #6

Lead-Based Paint Awareness, Work Practices, and Compliance During Residential Construction and Renovation

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"),
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JEH Quiz, NEHA
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4. One CE credit will be applied to your account with an effective date of May 1, 2013 (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 _____

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JEH Quiz #4 Answers January/February 2013

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

→ Quiz deadline: August 1, 2013

1. The most common source of lead exposure among the general public in the U.S. is
 - a. industrial pollution.
 - b. from naturally occurring sources.
 - c. lead-based paint.
 - d. lead-contaminated food items.
2. The study in this article utilized the following survey methods to collect data:
 - a. A mailed written survey to contractors.
 - b. A mailed written survey to local residents.
 - c. Direct observation of contractors conducting work on residential properties.
 - d. All of the above.
 - e. Both a and b.
3. According to a survey published by the Department of Housing and Urban Development (HUD), ___ of housing built between 1960 and 1977 contains lead-based paint.
 - a. 24%
 - b. 48%
 - c. 69%
 - d. 87%
4. According to the HUD survey, which two regions of the U.S. have a greater prevalence of lead-paint hazards?
 - a. The Northeast and South.
 - b. The West and South.
 - c. The Northeast and Midwest.
 - d. The Midwest and West.
5. The study in this article aimed to understand the awareness, attitudes, and beliefs about lead hazards among residential contractors and local government regulators.
 - a. True.
 - b. False.
6. A total of ___ contractor companies in the study area were randomly selected to receive a survey.
 - a. 250
 - b. 500
 - c. 750
 - d. 863
7. The National Institute for Occupational Health and Safety has ranked construction work as the ___ most common job classification with workers having elevated blood lead levels.
 - a. second
 - b. third
 - c. fourth
 - d. fifth
8. In New Jersey, significant blood lead levels in the construction and renovation trade workers have increased ___ since 2001.
 - a. 8%
 - b. 10%
 - c. 12%
 - d. 25%
9. The survey response rate for contractors and local residents was ___ and ___, respectively.
 - a. 2%; 10%
 - b. 2%; 5%
 - c. 10%; 5%
 - d. 5%; 10%
10. The most common task/work practice observed during site visits was
 - a. the application of fresh new layers of paint.
 - b. dry scraping and manual sanding.
 - c. power sanding.
 - d. all of the above.
11. The most observed poor hygiene habit observed during site visits was
 - a. washing work clothes at home.
 - b. not washing hands before eating, drinking, or smoking.
 - c. using a Shop-Vac without the appropriate filter.
 - d. wearing work shoes home.
12. The difference between the survey results and the field observations may suggest that contractor perception of risk does not match the reality of risk.
 - a. True.
 - b. False.

*Due to an error in the article, either answer will be accepted. Option (a) is the correct answer.

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.

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| <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 _____

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

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Felix I. Zemel,
MCP, MPH, REHS/RS

Medical Marijuana: A Crossroads Between Land Use Planning and Environmental Health

Editor's Note: NEHA Technical Advisors are subject-matter experts who represent 28 different areas of environmental health expertise. These individuals are appointed by the NEHA president and are responsible for providing subject-matter expertise and counsel to NEHA's board of directors, staff, affiliates, and members. Within their areas of expertise, their specific duties include the following: staying abreast of the latest developments and educational needs of the profession; identifying and sharing trends and needs of importance; actively assisting in the development and implementation of the education offered at the NEHA AEC; assisting NEHA in responding to press inquiries, developing position papers, serving as an expert witness, and speaking on behalf of the association; and other activities requested and agreed upon by the NEHA board of directors. A complete listing of Technical Advisors can be found in the Special Listing section of the *Journal*.

The NEHA Technical Advisors' Corner was created to provide readers with relevant, timely, and useful information generated from the NEHA Technical Advisors. This feature will be printed occasionally throughout the year as content is made available to NEHA from the Technical Advisors.

Felix Zemel is a health administrator for the Cohasset Board of Health in Massachusetts. He co-serves as Technical Advisor to NEHA's Land Use Planning/Design section.

During the November 2011 election, voters in the commonwealth of Massachusetts decided to join 18 other states in legalizing a form of medical marijuana. The law, which was approved through referendum, permits for the siting of up to 35 medical marijuana dispensaries throughout the commonwealth (Galvin, 2012). The location of a medical marijuana dispensary can have significant impacts on the local economy and the land value of the residents of its host community, and can increase pub-

lic safety concerns. Many people do not realize the environmental health implications that may ensue. The trend toward permitting medical marijuana dispensaries, and deciding where to place them, is an excellent example of the interrelationship between fields of land use planning and environmental health.

The worlds of land use planning and environmental health are very intertwined, as has been seen at many points throughout history. The classic examples of this interrelationship are the London cholera outbreak of 1850,

which also started the field of epidemiology (Johnson, 2006), and the landmark zoning case of *Village of Euclid, Ohio v. Ambler Realty Co.* (272 U.S. 365 [1926]), in which the U.S. Supreme Court ruled that the act of zoning by a community was a lawful practice. More recently, laws related to the siting of solid waste/recycling facilities, along with other "noisome trades" (i.e., the Resource Conservation and Recovery Act and state solid waste facility/site assignment regulations), illustrate the continuous bond that the two fields have with one another. The most recent example is the conundrum of siting medical marijuana dispensaries and the public/environmental health implications that these locations may have.

The new Massachusetts law permits the siting of up to 35 medical marijuana dispensaries throughout the state. The new law also permits individuals to cultivate medical marijuana in their homes if they meet one of the hardships defined in the law. Multiple environmental health concerns must be addressed by regulators when devising rules and regulations aimed at these two land uses in particular. Regulators must ensure that dispensaries are not unevenly distributed in environmental justice communities or neighborhoods as defined by the U.S. Environmental Protection Agency (2013). According to a study by Mills (2011), the average marijuana plant consumes approximately one gallon of water per day. Regulators will have to calculate average daily water usage and implement a particular mechanism to ensure that onsite, centralized wastewater treatment, or sewer systems are designed to accept the additional capacity. Many state laws, including in Massachusetts, also appear to permit the preparation and sale of marijuana-containing foods (e.g., brownies,

cookies, cakes, and lollipops). Officials will need to address specific food safety concerns in order to ensure that food is being handled safely and that the risk of foodborne illness or potential side effects are minimized.

Many of these environmental health concerns can be controlled through careful zoning practices by regulatory authorities. Traditional zoning methods designate specific areas of the community that can be used for specific land use categories (residential, commercial, industrial, manufacturing, agricultural, etc.). A local planning board can then create what is called an “overlay district,” which further restricts land uses within a specific zoning area (e.g., adult entertainment district, historic preservation overlay district, and other character-specific overlay districts). In addition, Chapter 40A of Massachusetts General Laws allows municipalities to require specific land uses to obtain a special permits, which can be granted by a special permit granting authority (SPGA) (Brooks, 2010). As a condition of issuing a special permit, an SPGA may implement specific use limitations as well as fees associated with the specially permitted use in order to offset any costs incurred by the municipality.

An SPGA can require a wide variety of conditions prior to issuance of a special permit. Aquifers can be protected by imposing groundwater or municipal sewer discharge restrictions. Food safety can be achieved by requiring food handler or marijuana-specific awareness training for establishments wishing to use medical marijuana plants in food products. Other safety concerns can be mitigated through imposition of electrical service policies, like requiring

a separate electrical service for home growers and minimum amp ratings per circuit. Occupational human health exposure(s) to aflatoxins (from mold) can be minimized by requiring wall or ceiling finishes in cultivation areas to be made of mold-resistant materials, such as plaster or “green board.” These are in addition to the many requirements that can be imposed to protect public safety.

The environmental health implications associated with smoking of medical marijuana are already minimized in Massachusetts by the wording in the referendum, which states that the law does not supersede any other state or federal laws, nor does it allow for smoking in public places. Environmental exposure to members of the public entering one of the dispensaries in Massachusetts is minimized due to the existing smoke-free workplace law (M.G.L., Chapter 270, Section 22), which prohibits smoking in closed workplaces. A staff attorney for the Massachusetts Municipal Association recently published an article explaining the effects that the Massachusetts smoke-free workplace law has on the potential use and sale of medical marijuana in Massachusetts (Wilson, 2013). Wilson explains that medical marijuana is subject to the restrictions of the law due to the law’s definition of smoking, wherein it states, “the lighting of a cigar, cigarette, pipe, or other tobacco product or possessing a lighted cigar, cigarette, pipe, or other tobacco or nontobacco product designed to be combusted and inhaled.” More states can limit the environmental impact of incidental human exposure to marijuana smoke if they adopt similar language in their respective smoke-free workplace laws, if they exist.

Increased legalization of medical marijuana presents an additional example of the strong interrelationship between land use planning and environmental health. Furthermore, the field of land use planning is one of only a few that is truly crosscutting throughout all of the various technical areas that define the field of environmental health. Environmental health considerations must be taken into account when making land use decisions that may have significant environmental health outcomes, as in the case of medical marijuana. 🐧

References

- Brooks, T. (2010). *The zoning act: Massachusetts general laws chapter 40A*. Boston: Massachusetts Department of Housing and Community Development.
- Galvin, W.F. (2012). *Elections: 2012 information for voters*. Retrieved from http://www.sec.state.ma.us/ele/ele12/ballot_questions_12/quest_3.htm
- Johnson, S. (2006). *The ghost map*. New York: Penguin.
- Mills, E. (2011, April 5). *Energy up in smoke: The carbon footprint of indoor cannabis production*. Retrieved from http://evanmills.com/energy-associates/Indoor_files/Indoor-cannabis-energy-use.pdf
- U.S. Environmental Protection Agency. (2013, January 31). *Environmental justice*. Retrieved from <http://www.epa.gov/environmentaljustice/>
- Village of Euclid, Ohio v. Ambler Realty Co., 272 U.S. 365 (1926) (U.S. Supreme Court 1926).
- Wilson, D. (2013, January). Some tobacco rules may apply to marijuana. *The Beacon*, p. 6.

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NEHA NEWS

NEHA General Election 2013—Results

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

For more information about NEHA elections and the critical deadlines for nomination forms, eligibility dates to become a voting member, and ballot dates, please visit the election page on NEHA's Web site at neha.org/about/elections.html.

For the 2013 NEHA general elections, the results are as follows:

Regional Vice Presidents

The terms of three regional vice presidents (RVP) expired in 2013:

- Region 4—RVP Keith Johnson

- Region 6—RVP Adam London
- Region 9—RVP Edward Briggs

No candidates opposed these RVP positions and per board policy they retain their respective positions on the board. Board policy does not require an election if candidates are unopposed. Their terms will expire in 2016.

RVP David Riggs vacated his Region 1 position to seek the second vice president position. The board will fill this position in accordance with existing board policies.

Second Vice President

David Riggs was the only candidate for this position and will become the second vice president at the closing of NEHA's 2013 Annual Educational Conference & Exhibition in Washington, DC. 🌳

NEHA's**EXCELLENCE IN SUSTAINABILITY****Award Program**

The National Environmental Health Association's (NEHA) Excellence in Sustainability Award recognizes organizations, businesses, associations, and individuals who are solving environmental challenges by using innovative and environmentally sustainable practices.

Visit neha.org/sustainability to view NEHA's Sustainability Web site and to learn more about the Excellence in Sustainability Award Program and submission process.

Submission deadline is May 1, 2013.

For more information, please contact Jill Schnipke at jschnipke@neha.org.



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"Research on foodborne illness risk factors has indicated that most outbreaks associated with food service establishments can be attributed to food workers' improper food preparation practices...The findings from this study and others indicate that education is important for food safety."
CDC EHSB epidemiological study by Green/Selman, 2005

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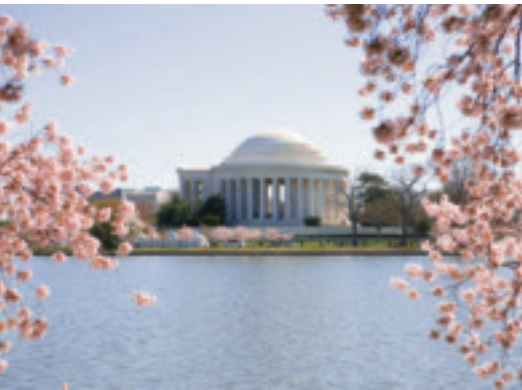
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Away from these celebrated federal sites, Washington, DC, unwinds into a fascinating network of neighborhoods where visitors discover trendy boutiques, hip bars and restaurants, plus art galleries, historic homes, and lush parks and gardens. Shoppers love the store-lined streets of Georgetown, while jazz music fans won't want to miss a trip to U Street, where Duke Ellington played his first notes. The city's international character shines through in its Adams Morgan and Dupont Circle neighborhoods, two prime destinations for eclectic dining and nightlife and the historic center of the city's embassy community.

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Stay at the designated AEC hotel—Hyatt Regency Crystal City—and receive a \$50 food voucher to use toward your meal purchases.

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NEHA 2013 AEC Preliminary Schedule



The AEC schedule, sessions, and events are subject to change at anytime without prior notification.

Sunday, July 7	Monday, July 8	Tuesday, July 9	Wednesday, July 10	Thursday, July 11
Pre-Conference Workshops	Pre-Conference Workshops	1st Time Attendee Workshop	Town Hall Assembly	Educational Sessions
Credential Review Courses	Credential Review Courses	Credential Exams	Exhibition Open	Networking Luncheon
	Community Volunteer Event	Educational Sessions	Poster Session	President's Banquet
	Annual UL Event	Awards Ceremony & Keynote Address	Silent Auction	
		Exhibition Grand Opening & Party	Student Research Presentations	
			Educational Sessions	

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Comprehensive registration information is available online. For personal assistance, contact Customer Service toll free at 866.956.2258 (303.756.9090 local), extension 0.

MEMBER/NONMEMBER

Thru May 24	After May 24
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REGISTRATION OPTIONS	Full Conference Registration Includes Tuesday–Thursday sessions, plus the Exhibition Grand Opening & Party, Networking Luncheon, and President's Banquet	\$565/\$725	\$665/\$825
	One-Day Registration Includes sessions for the day plus Exhibition Grand Opening & Party or Networking Luncheon if registering for that day. Does not include President's Banquet.	\$305/\$355	\$335/\$385
	NEHA Retired and Student Member Registration Includes Tuesday–Thursday sessions. Does not include food functions or special events. These must be purchased separately.	\$155/\$225	\$185/\$255
	Virtual AEC Includes access to 20–30 sessions, networking, and speaker materials as provided.	\$99/\$215	
	Virtual AEC Group Registration (Must register via the Registration Coordinator)	\$500 organization fee + \$19/person	
CREDENTIAL COURSES AND EXAMS	CP-FS Review Course Sunday & Monday, July 7 & 8. <i>Limit 45 people.</i> Includes CP-FS review course and CP-FS Study Package. <i>Additional application and fee required to sit for exam.</i>	\$299/\$399	
	REHS/RS Review Course Sunday & Monday, July 7 & 8. <i>Limit 50 people.</i> Includes REHS/RS review course and the REHS/RS Study Guide. <i>Additional application and fee required to sit for exam.</i>	\$429/\$529	
	HACCP Manager Certification Course Monday, July 8. <i>Limit 45 people.</i> Includes NEHA's HACCP: <i>Managing Food Safety Hazards at the Retail Level</i> and national HACCP Certification Exam.	\$249/\$299	
PRE-CONFERENCE WORKSHOPS	EHTER Awareness Level Course Sunday & Monday, July 7 & 8. <i>Limit 50 people.</i>	\$139/\$239	
	Industry-Foodborne Illness Investigation Training-Recall Response Sunday & Monday, July 7 & 8. <i>Limit 30 people.</i>	\$69	
	Can Justice Prevail? Where Outbreak Investigations and Lawsuits Collide Monday, July 8. <i>Space is limited.</i>	\$99/\$199	
	Conflict Analysis and Resolution in the Practice of Environmental and Occupational Health Monday, July 8. <i>Space is limited.</i>	\$99/\$199	
	How to Make Public Participation Work For You Monday, July 8. <i>Space is limited.</i>	\$39	
	National Environmental Health Aquatic Symposium Monday, July 8. <i>Space is limited.</i>	Free with full conference or one-day conference registration.	

neha2013aec.org/register.html

CUSTOMIZE YOUR LEARNING EXPERIENCE



The NEHA AEC offers so many different facets for you to choose from to customize your own learning experience. From the multitude of environmental health topics discussed to the different learning environments of the Lecture and Learning Lab to the option to attend in-person or virtually, the NEHA AEC offers a fresh, progressive, and modern approach to training and education.

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- The Virtual School Walk-Through: Identifying and Solving Common Indoor Air Quality Problems

ENVIRONMENTAL JUSTICE

- Advancing Environmental Justice at the U.S. Department of Health and Human Services

FOOD PROTECTION AND DEFENSE

- National Voluntary Environmental Assessment Information System: The Next Generation of Environmental Assessments
- Preventing Norovirus Outbreaks: Applying the Science to Food Safety Programs

HAZARDOUS MATERIALS AND TOXIC SUBSTANCES

- Revitalizing EPA's Integrated Risk Information System Program: Improving Assessment Products, Enhancing Transparency, and Meeting Stakeholder Needs

LAND USE DESIGN/PLANNING

- Public Health and Land Use/Redevelopment: Creating Community Health Indicators

LEADERSHIP/MANAGEMENT

- Essential Communication Strategies for Environmental Public Health Professionals Who Don't Have a Background in Communication

- Public Health Department Accreditation and Environmental Public Health: A Logical Collaboration

ONSITE WASTEWATER

- (Field Trip) Chesapeake Bay Total Maximum Daily Load

POLICY

- Capitol Hill Visits: How to Make the Case for Environmental Health

POLICY FOR AN INTEGRATED FOOD SAFETY SYSTEM

- Practical Advice and Materials to Help You Meet the FDA Voluntary National Retail Food Regulatory Program Standards

SUSTAINABILITY/CLIMATE CHANGE

- Building Capacity at Local Public Health Departments Around Climate Change and Human Health

TECHNOLOGY AND EH

- 90 Minutes for Nano: Will Emerging Technologies Redefine Roles for EH Professionals in the 21st Century?

WATER QUALITY

- Emerging Contaminants: Pharmaceuticals in the Environment

The sessions below are a special group of Learning Labs that are scheduled for several hours each day during the AEC that you can drop into. At any one time, there will be multiple sessions taking place. Like other Learning Labs, these sessions will have a presenter and will be highly interactive. However, you are in charge of when you want to attend and the pace at which you wish to learn about a particular topic.

CHILDREN'S EH/SCHOOLS

- Don't Mess With Mercury: A Social Media Tool Kit for Environmental Health Practitioners, School Administrators, and Youth

EMERGING EH ISSUES

- Electromagnetic Frequency Measurement & Mitigation in the Bedroom
- What's Hiding in Your Personal Care Products?

Be sure to also visit the Exhibition on Tuesday and Wednesday to learn about the latest products, services, and tools offered by exhibitors to help you be more productive in your job.

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LECTURE SESSIONS
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AIR QUALITY

- Designing a Successful Collaboration Between State and Local Partners to Assess and Cleanup Former Dry Cleaners
- The Dairy Air and the EH Response to Industrial Food Animal Production

CHILDREN'S EH/SCHOOLS

- Children and Environmental Chemicals: Are They More Vulnerable?
- Smog in the Classroom: Power Plant Emissions, Pediatric Asthma, and School Attendance—A New Strategy

EH HEALTH IMPACT ASSESSMENTS (HIA)

- A Critical Review of Health Impact Assessment Guidance Documents
- Health Impact Assessments and Exposure Monitoring From a Community Protection Standpoint During Bridge Demolition

EMERGING EH ISSUES

- Final Barrier: A New Global Approach to Water Treatment
- Hookahs: An Emerging Public Health Issue

ENVIRONMENTAL JUSTICE

- Human Rights and the Environmental Health Practice: The Lessons Learned From the Fukushima Nuclear Disaster

FOOD PROTECTION AND DEFENSE

- Building Partnerships with the Medical Community in Foodborne Illness Surveillance
- CIFOR Industry Foodborne Outbreak Investigation Guidelines and the CIFOR Law Project
- Collaboration Underlies the Success of the Outbreak Investigation Team in Contra Costa County, California
- Epidemiology, Sampling, and Traceback Working Synergistically

- Food Safety Knowledge and Attitudes: Hands-on Food Safety Training for Folklorama, a Temporary Food Service Event
- How the Corporate Board Room Uses YOUR Inspection Data: Ecolab ActiveView HDI—Trusted Health Department Intelligence
- Lessons From a Collaborative Effort: The 2012 Democratic National Convention
- Making It Stick: How to Prepare a Bulletproof Outbreak Report
- The FDA *Food Code* at 20 Years

HAZARDOUS MATERIALS AND TOXIC SUBSTANCES

- Superfund Sites, Community Education, and Population Migration: An Econometric Analysis

HEALTHY HOMES AND COMMUNITIES

- A Systems-Based Approach: Integrating Environmental Health in Healthy Homes Policies and Programs
- Healthy Housing: Status, Trends, and Opportunities
- How to Run an Effective Healthy Homes Program with Positive Environmental Health and Public Policy Outcomes
- Indoor Environmental Quality Complaints to State Health Departments: The Unrecognized Challenge
- The Healthy Home Rating System: A Proven Health and Safety Assessment Model to Achieve Prevention and Wellness Under the Affordable Care Act

INTERNATIONAL EH

- Environmental Health and the Prevalence of Parasites in Children: A Case-Control Study in Lima, Perú, South America
- Evaluation of the Quality of Drinking Water Sources and Obstacles to Potable Drinking Water in West Point and Suburban Monrovia, Liberia

LAND USE DESIGN/PLANNING

- People Active and Out in Nature: Roles for Environmental Health Professionals

LEADERSHIP/MANAGEMENT

- After Occupy L.A. Came The Skid Row Assistance Project: Innovations and Creative Interventions That Changed How Local Government Responded to an Environmental Health Crisis
- Integrating Health in All Policies Into Environmental Health Agency Work: Examples of Successful Cross-Sectoral Collaborations

ONSITE WASTEWATER

- An Approach for Protecting Unconfined Drinking Water Aquifers Against Effluent Contamination
- Potential for Campus Water Reuse in the United States
- Standardized Testing Methods for Aerated Wastewater Systems
- To Nitrogen and Beyond

PATHOGENS AND OUTBREAKS

- *Mycobacterium* Tattoo-Associated Outbreaks
- The Environmental Epidemiology of a Large Outbreak of *Clostridium perfringens* in a Correctional Facility
- Workers on the Front Line: Pathogen Exposures and Injuries in Swine Slaughter and Processing

POLICY

- Does Regulation Support Economic Growth or Is It Just Red Tape?
- Enforcement Case Studies Using California's Unified Approach of Administrative Enforcement
- The 2013 State Legislative Landscape: Political and Fiscal Implications for Environmental Health Policy Making

POLICY FOR AN INTEGRATED FOOD SAFETY SYSTEM

- Assessing Food Safety Trends Within Food Service and Retail Food Facilities
- (Food Safety Focus Series) The Food Safety Modernization Act: State of the Implementation of an Integrated Food Safety System
Session sponsored by Prometric and Skillsoft
- Making FSMA Real: Integrating Local, State, and Federal Food Emergency Response Capabilities

RECREATIONAL WATERS

- Beneath The Surface: The Hazards of Pool Chemicals
- How to Reduce Violations at Aquatic Venues by 50%
- I Get Funny Colors When I Test: Recognizing and Overcoming Interferences in Water Testing
- Rapid Indicator Methods: Same Day Results of Ocean Water Quality Testing

SUSTAINABILITY/CLIMATE CHANGE

- Climate Change and Sustainability: Where Environmental Health Practitioners Can Lead in Developing Solutions for Protecting the Public's Health
- Confronting Climate Change Heat-Health Risks in the Pacific Northwest
- Establishing Comprehensive American National Product Sustainability Standards for the Water Treatment and Distribution Industries

TECHNOLOGY AND EH

- Advancing the Business of EH: A Look Inside Los Angeles County Environmental Health's Project to Reengineer Its Business Services
- Developing Maps of Occupational Risk Factors for Heat-Related Illness in Alabama
- Environmental Health: There's an App for That!
- EPA's Toxics Release Inventory: A Public Database of Toxic Chemical Releases

TERRORISM/ALL-HAZARDS PREPAREDNESS

- Community-Based Water Resiliency and All-Hazards Preparedness
- Development of a Radiological and Chemical Emergency Preparedness Course: Agents of Opportunity
- Disaster Debris Management: Lessons Learned From the March 2011 Great East Japan Earthquake and Tsunami
- Emergency and Risk Communication: Ten Things You Should NEVER Say on Television
- Environmental Health Strike Teams: An All-Hazards Approach to Environmental Health Emergency Preparedness
- Plans and Planning: Why Both Matter
- Urban Wildfire: Devastation, EH Response, and Community Recovery
- USPHS Community Health and Service Missions: The Lakota Sioux Experience

VECTOR CONTROL AND ZOO NOTIC DISEASES

- A Regional Strategy to Address Bed Bugs: A Diverse Partnership Model for Addressing Emerging Public Health Issues
- Do You Want Flies with That?
- Integrated Pest Management: Creating Plans and Relationships That Work
- One-Health and All-Hazards: The New Environmental Health
- Pet Business Regulation and Education in Seattle & King County, Washington

WATER QUALITY

- A Rise in Chlorides: A Case For Reducing Road Salt Application
- Bioretention Media Modification for Heavy Metal Removal in Stormwater: A Field Study in North Carolina
- Ground Water Ammonia: A Minnesota Case Study

Be a voice.

NEHA gives you the opportunity to tell us what you'd like to experience each year at the AEC. We ask you to tell us topics you'd like to hear about and speakers you'd like to see. We also give you the opportunity to review abstracts and provide input to help NEHA develop a training and education experience that continues to advance the proficiency of the environmental health profession AND helps create bottom-line improvements for your organization!

Through our blog and market research surveys, you have told us some of the topics and sessions that you want at the NEHA 2013 AEC. NEHA listened and put some of the more popular sessions—as rated by you, the attendee—into this year's training and education program.

Making FSMA Real: Integrating Local, State, and Federal Food Emergency Response Capabilities

Climate Change and Sustainability: Where Environmental Health Practitioners Can Lead in Developing Solutions for Protecting the Public's Health

The Dairy Air and the EH Response to Industrial Food Animal Production

Assessing Food Safety Trends within Food Service and Retail Food Facilities

Emerging Contaminants: Pharmaceuticals in the Environment

Electromagnetic Frequency Measurement & Mitigation in the Bedroom

Smog in the Classroom: Power Plant Emissions, Pediatric Asthma, and School Attendance—A New Strategy

Mycobacterium Tattoo-Associated Outbreaks

Potential for Campus Water Reuse in the United States

Food Safety Knowledge and Attitudes: Hands-on Food Safety Training for Folklorama, a Temporary Food Service Event

Voice. Collaboration. Influence.

Policy Involvement



NEHA supports a robust program of policy involvement on behalf of both the cause of environmental health and of every person—like you—who practices in it.

At this year's NEHA AEC, there will be a focused exploration into the facet of Policy Involvement. Approximately 20% of this year's AEC training and educational sessions (highlighted below and on the following pages) will discuss the impacts of policy making and how it may affect environmental health around the country and in your community.

When you attend this year's policy-focused sessions you will:

- Be exposed to the rationale behind public policy decisions that impact the field of environmental health
- Discover fresh ways to build capacity, find authority, and leverage unconventional partnerships to advance environmental health and protect human health
- Hone your skills in communication, conflict resolution, and collaboration, and learn communication techniques to influence policy within your agency from the local to the national level
- Take home best practices and lessons learned from others to streamline and optimize the implementation of policy decisions within your workplace
- See how the Food Safety Modernization Act is being implemented on the ground floor and the implications it has for policy at the state and local level
- Be empowered to create policy that leverages resources efficiently and embraces the “newer frontiers” of environmental health

AIR QUALITY

The Dairy Air and the EH Response to Industrial Food Animal Production

Evidence continues to accumulate regarding environmental public health concerns associated with air and water pollution from industrial food animal production (IAFP). The first part of this session will provide a short recap of findings from a study on engagement and limitations of government agencies with environmental public health issues surrounding IAFP in eight states. Then the session will more deeply explore an exposure investigation of environmental monitoring for formaldehyde at Vermont Farm manure sites conducted by the Agency for Toxic Substances and Disease Registry, in cooperation with the Vermont Department of Health and the Vermont Agency for Agriculture, Food, and Markets. This investigation came at the request of residents who believed their illnesses were being caused by exposure to a formaldehyde-manure mixture being spread as fertilizer.

Possible health effects, lessons learned, and strategies for multi-agency collaboration with positive results will be highlighted in this session.

EH HEALTH IMPACT ASSESSMENTS (HIA)

A Critical Review of Health Impact Assessment Guidance Documents

Over the last 20 years, HIA has been developing as an analytical tool, typically as part of an environmental impact assessment process during the planning phase to evaluate proposed projects and policies. During this presentation, the presenters will provide a critical review of North American and select international HIA guidance documents. The documents will be compared as to methodology, range of options presented, applicability, and other key criteria. Suggestions will be offered to attendees as to which documents would be best referenced depending on the specific purpose of the HIA to be performed.

EMERGING EH ISSUES

Hookahs: An Emerging Public Health Issue

Waterpipes, also known as hookah, shisha, narghile, goza, or hubble bubble, have been used for centuries to smoke tobacco, particularly in North Africa, the eastern Mediterranean, and areas of southeast Asia. Recently, waterpipe smoking has emerged as a popular new trend among young adults worldwide. Learn the hazards associated with hookahs and explore some of the public health challenges faced by tobacco enforcement officers and public health units. A discussion of needed adaptations in legislation, policies, and practices will also be held during this session.

ENVIRONMENTAL JUSTICE

Advancing Environmental Justice at the U.S. Department of Health and Human Services

During this session, attendees will learn how the U.S. Department of Health and Human Services (HHS) is addressing the environmental justice concerns of low-income, minority, and tribal populations. The presenters will describe how this is being accomplished via new policies, training and education, new research and data, and more effective services. Attendees will also learn how stakeholder engagement is critical to defining the appropriate environmental justice actions to meet the needs of disadvantaged communities.

HEALTHY HOMES AND COMMUNITIES

Indoor Environmental Quality Complaints to State Health Departments: The Unrecognized Challenge

State health agencies often respond to requests for assistance from businesses, schools, the general public, and government agencies on a variety of issues related to poor indoor environmental quality (IEQ), often in the absence of authority and resources. During this session, the presenters will discuss the implications and need for authority, available federal and state resources, and strategies for state and local health departments to partner with other entities to respond to IEQ complaints.

The Healthy Home Rating System: A Proven Health and Safety Assessment Model to Achieve Prevention and Wellness Under the Affordable Care Act

The National Prevention Strategy, established by the Affordable Care Act, recommends that we design and promote affordable, accessible,

safe, and healthy housing. The Strategy noted that, "how homes are designed, constructed, and maintained, their physical characteristics, and the presence or absence of safety devices have many effects on injury, illness, and mental health," and that, "housing free of hazards, such as secondhand smoke, pests, carbon monoxide, allergens, lead, and toxic chemicals, helps prevent disease and other health problems." But how do we ensure that our homes are protecting and promoting health, and thereby reducing the costs of providing healthcare? This session will demonstrate that using the Healthy Home Rating System can reduce the incidence of housing-related health and safety injuries and subsequent health costs.

LAND USE DESIGN/PLANNING

Public Health and Land Use/Redevelopment: Creating Community Health Indicators

Because of real or perceived contamination, brownfields/land reuse sites can adversely impact community well-being. There is a need to measure community health in these areas and evaluate the benefits gained by redevelopment. In this session, attendees will practice using the grassroots ATSDR Brownfields/Land Revitalization Action Model, which employs a diverse development community comprised of residents, city planners, government, non-profits, public health, and environmental health stakeholders to help develop revitalization approaches to address community issues, identify corresponding health benefits, and create additional indicators to measure community health status over time.

LEADERSHIP/MANAGEMENT

Integrating Health in All Policies into Environmental Health Agency Work: Examples of Successful Cross-Sectoral Collaborations

Health in All Policies (HiAP) has recently emerged as a new way to describe a collaborative approach that integrates and articulates health considerations into policy making across sectors, and at all levels, to improve the health of all communities and people. This session will discuss some of the HiAP work occurring in state environmental health departments in the key topic areas of food, water, energy, housing, and transportation. The best practices presented will include examples of partnership building through program development, assessment and data sharing, program development, and policy approaches.

POLICY

Capitol Hill Visits: How to Make the Case for Environmental Health

Meeting with your members of Congress is one of the most important and high-impact ways of effecting policy change. For rookies or old pros, this session will prep you on EH issues, help sharpen your pitch, and get you ready for tough questions. During this session, you will practice how to prepare and be impactful when visiting Capitol Hill and meeting with lawmakers and staffers. (Note, a field trip to do a Hill visit is also pending and will be announced once confirmed. Registration will be required for the Hill visit field trip.)

Does Regulation Support Economic Growth or Is It Just Red Tape?

During this session, take an irreverent look at the relationship between central government policy making on regulation and the sensible delivery of regulation to protect the consumer and support compliant businesses. The experiences of someone who has spent time working with government and delivering services will illustrate how this agenda has developed over the last ten years and the survival strategies to keep environmental health on the map.

Enforcement Case Studies Using California's Unified Approach of Administrative Enforcement

California created a unique and successful approach to implementing six hazardous materials programs, which include the Hazardous Waste Generation program and the Community Right-to-Know EPCRA/Hazardous Materials Business Plan Program. In this session, you will learn how a unified, streamlined approach to enforcement is used to protect public health and safety, to restore and enhance environmental quality, and to sustain economic vitality by promoting coordination among other key agencies and keeping a level playing field among businesses within the regulated community. The application of the administrative enforcement process will also be discussed while reviewing actual enforcement case studies involving hazardous materials and waste violations.

The 2013 State Legislative Landscape: Political and Fiscal Implications for Environmental Health Policy Making

What changes to environmental health legislation has your state legislature

enacted in the last year? How will the 2012 election results impact prospects for state environmental health policy making in the coming year? Attend this session to explore how the current state political and budgetary landscape may affect environmental health policy making around the country and in your community.

POLICY FOR AN INTEGRATED FOOD SAFETY SYSTEM

(Food Safety Focus Series) The Food Safety Modernization Act: State of the Implementation of an Integrated Food Safety System

The Policy for an Integrated Food Safety System educational track is designed to focus on active implementation progress of the Food Safety Modernization Act (FSMA) from the national level to the local level. This kickoff session will begin with **FDA Deputy Commissioner for Foods Michael Taylor, JD**, giving an update on where the FDA is on objectives of FSMA. Then, **FDA Senior Director for Intergovernmental Affairs Dr. Jeff Farrar** will co-present with **Mr. Oscar Garrison, division director at the Georgia Department of Agriculture and AFDO past president**, on further details of implementation of FSMA objectives. To conclude this first session in the Policy for an Integrated Food Safety System educational track, a member of the NEHA's board of directors will facilitate a conversation/questions and answers. After attending this session, you will have a high-level understanding of the scope and progress of the FSMA implementation.

Be sure to attend the rest of the Policy for an Integrated Food Safety System educational track to see how environmental health officials and agencies nationwide are "Making FSMA Real" through pilot projects at the state level and partnerships with local health agencies. Follow the track through to see: 1) how risk is being assessed for risk-based inspections, 2) what you need to meet the FDA Voluntary National Retail Food Regulatory Program Standards, and 3) training and credentials being vetted and developed to support professionals working to implement an integrated food safety system.

Assessing Food Safety Trends Within Food Service and Retail Food Facilities

In 2013, FDA initiated its second 10-year study on the occurrence of foodborne illness risk factors within food service and retail food facilities. This session will provide industry and regulatory food safety professionals with information on specific food safety practices and procedures that are in most need of attention within the retail food segment of the industry. Attendees will be able to assess the underlying issues that impact employee behaviors and food safety practices, and to identify potential intervention strategies that are also being assessed as part of the study.

Making FSMA Real: Integrating Local, State, and Federal Food Emergency Response Capabilities

Our increasingly globalized food supply means that contamination problems originating in remote regions of the world can rapidly impact communities in the U.S. During this session, the presenter will summarize the lessons learned during the first year of a pilot project in Michigan that was funded by an FDA grant under the FSMA to further develop and better integrate local, state, and federal food emergency response capabilities.

Practical Advice and Materials to Help You Meet the FDA Voluntary National Retail Food Regulatory Program Standards

Attend this hands-on session to learn about how local health departments can work together to help each other achieve success with the FDA Voluntary National Retail Regulatory Program Standards. Following a brief presentation, participants will have the opportunity to sit down with mentorship participants to work on the self assessment and Program Standards 2, 4, 5, and 6. Each table will be led by a mentorship participant with firsthand experience working on meeting the standards.

SUSTAINABILITY/CLIMATE CHANGE

Building Capacity at Local Public Health Departments Around Climate Change and Human Health

Does climate change seem irrelevant to your daily work? Or, does it sound like another unfunded mandate that will add unwanted work to your already stretched department? Join us at this highly interactive session to explore how climate change may already be compromising health in your community, what you can do to address this emerging public health threat without compromising already stretched resources, and where to find (sometimes unlikely) allies.

TERRORISM/ALL-HAZARDS PREPAREDNESS

Emergency and Risk Communication: Ten Things You Should NEVER Say on Television

Whether for preparedness, safety and wellness, or response, engaging the public is a necessity and a challenge requiring well-defined objectives and a clear message. Even experienced professionals can defeat their own purpose by erecting barriers between themselves and their audiences. During this session, the presenter will help you identify essential considerations for effective message delivery, avoid common pitfalls and assumptions about risk perception, and discover how policy relates to risk communication strategies.

VECTOR CONTROL AND ZOOLOGICAL DISEASES

Pet Business Regulation and Education in Seattle & King County, Washington

Trends in pet ownership and an ever-expanding array of services available for pets bring new challenges to zoonotic disease control and prevention. Comprehensive pet business regulations were developed by Public Health—Seattle & King County and were codified by the King County Board of Health in early 2010 to address these trends. This session will identify the key elements of the regulation related to education. Attend this session to learn how an infection control plan can promote disease prevention and education through regulation within your community.

WATER QUALITY

Emerging Contaminants: Pharmaceuticals in the Environment

Pharmaceuticals are emerging contaminants in water and, to date, cannot be removed as part of wastewater treatment options. So, what can be done to mitigate their effects upon the environment, yet maintain their efficacy for human and animal use? In this session, the presenters examine this topic from a lifecycle approach using hands-on demonstrations, and discuss several solutions and policies you can take home to mitigate and address these contaminants in your community.



KEYNOTE SPEAKER

NEHA is honored to announce Dr. Graham Allison as the keynote speaker at the 2013 AEC. Dr. Allison will speak on the topic, “What Do the Cuban Missile Crisis and Environmental Health Have in Common?”

This is a unique opportunity to hear from an expert with experience at the highest level of government discuss policy and share lessons learned in decision making. Register today for the 2013 AEC so you don't miss this opportunity!



The keynote speaker is sponsored by NSF International.

Additional information about Dr. Allison and all of the fantastic session speakers that are conducting training and education at the NEHA AEC is available at neha2013aec.org.

Dr. Allison has served as Special Advisor to the Secretary of Defense under President Reagan and as Assistant Secretary of Defense for Policy and Plans under President Clinton, where he coordinated Department of Defense strategy and policy towards Russia, Ukraine, and other states of the former Soviet Union. During his keynote presentation at the NEHA 2013 AEC, Dr. Allison will talk about decision making in the most extreme of circumstances where literally the fate of the planet hangs in balance. The insights that he has learned about decision making will be shared to benefit each and every environmental health professional who is involved daily in decisions regarding politics, policies, finances, technology, human resources, legal considerations, liabilities, and of course, environmental health!

Dr. Allison has the sole distinction of having twice been awarded the Department of Defense's highest civilian award, the Distinguished Public Service Medal. In addition, he is the author of *Essence of Decision: Explaining the Cuban Missile Crisis*, an all-time bestseller, and *Nuclear Terrorism: The Ultimate Preventable Catastrophe*, which was selected by *The New York Times* as one of the “100 most notable books of 2004.”

Environmental Health Training in Emergency Response (EHTER) Awareness Level Course

Sunday & Monday, July 7 & 8, 8:00am–5:00pm

CDC and NEHA are pleased to offer a condensed version of the EHTER Awareness Level course for environmental health professionals. This two-day, 16-hour course provides an overview of the environmental health roles and responsibilities, issues, and challenges faced during emergency preparedness, response, recovery, and mitigation. The purpose of the course is to increase the level of emergency preparedness of environmental health practitioners and other emergency response personnel by providing them with the necessary knowledge, skills, and resources to address the environmental health impacts of emergencies and disasters.

Applicants are encouraged to complete basic NIMS/ICS trainings prior to attendance.

Cost is \$139 for members and \$239 for nonmembers. Limit 50 people.

Industry-Foodborne Illness Investigation Training-Recall Response (I-FIIT-RR) Workshop

Sunday, July 7, 1:00–5:00 pm and Monday, July 8, 8:00am–5:00 pm

I-FIIT-RR is a one and a half day face-to-face workshop that will provide a better understanding and clarification of the investigation process by identifying roles and responsibilities, discussing recall response and early detection strategies, and establishing and implementing control measures based on model practices. The workshop is designed to bring together the retail food industry with local and state regulatory officials in an effort to create stronger working relationships prior to a potential foodborne incident occurring, so that if and when it does, the foundation is already set for a collaborative effort. By providing this training, I-FIIT-RR aims to assist industry and regulatory officials in building capacity for a more rapid, efficient, and effective response to recalls and foodborne illness incidents.

The target audience for this workshop is mid-to-upper level management from retail food service stores and restaurants.

Cost is \$69 for both members and nonmembers. Limit 30 people.

How to Make Public Participation Work For You

Monday, July 8, 8:00am–5:00pm

NEHA and U.S. EPA are offering this eight-hour training course for technical staff that will examine basic elements of public participation, teach you to design a successful public participation program, and teach essentials of effective communication with the public. The workshop will be held offsite at the U.S. EPA's Potomac Yards location, which is nearby in the DC area.

Cost is \$39 for both members and nonmembers. Space is limited.

Can Justice Prevail? Where Outbreak Investigations and Lawsuits Collide

Monday, July 8, 1:00–5:00pm

This workshop introduces attendees to the battleground where outbreak investigations, regulatory enforcement activities, and civil litigation intersect. The workshop will explore a mock outbreak, simulated governmental investigation, and mock lawsuit aimed at both regulators and industry. You will learn what to expect from the key depositions in the case including the plaintiff, health department investigators, and the company CEO. The workshop will also explore common areas of improvement for regulators and the consequences that result when mistakes are made.

Cost is \$99 for members and \$199 for nonmembers. Space is limited.

Conflict Analysis and Resolution in the Practice of Environmental and Occupational Health (EOH)

Monday, July 8, 1:00–5:00pm

This workshop introduces EOH professionals to the theory and practice of conflict analysis and resolution. Two hours are reserved for lecture and class discussion with an emphasis on conflict analysis models and integration of a) conflict analytical skills, b) negotiation techniques, and c) conflict resolution methods into the practice of EOH. The two remaining hours are devoted to simulation exercises in which the concepts and methods are demonstrated and practiced. One hands-on hour is reserved for exercises that demonstrate conflict dissection. The second hands-on hour is devoted to mediation and negotiation exercises. Attendees will need to bring notebooks and pens to complete the exercises.

Cost is \$99 for members and \$199 for nonmembers. Space is limited.

National Environmental Health Aquatic Symposium: Launch of Version 1.0 of the Model Aquatic Health Code (MAHC)

Monday, July 8, 1:00–5:00pm

Over the past five years a group of public health, academic, and industry experts have been working with CDC to develop a set of public health standards to improve health at aquatic venues. This workshop will launch the results of this effort with the first completed version of the MAHC being released for a final round of public comment to the audience at the NEHA 2013 AEC. Experts from CDC, U.S. EPA, U.S. Consumer Product Safety Commission, National Conference of State Legislatures, and the MAHC committee will present and answer questions on this vital effort, which can help prevent outbreaks, drowning, and chemical injuries at aquatic facilities.

Cost is free with a full conference or one-day conference registration to the NEHA 2013 AEC. Space is limited.

Leave the NEHA AEC much better prepared to realize your career goals and personal aspirations. Also be positioned to contribute even more greatly to both your organization and your profession!

Careers. Aspirations. Respect.

Advancement

CREDENTIAL/CERTIFICATION COURSES AND EXAMS

Advance your expertise and career potential by obtaining a NEHA credential or certification at the AEC. You may choose to take just a credential/certification course, just an exam, or both a course and an exam while at the NEHA AEC.

(Note: Only qualified applicants will be able to sit for an exam.)

Separate applications are required prior to registering for courses and exams. Additional fees also apply. For applications, deadlines to apply, and information on eligibility, visit neha2013aec.org.

Earn up to 24 CE contact hours for your credential when you attend the 2013 AEC.

Certified Professional of Food Safety (CP-FS)

Sunday & Monday, July 7 and 8, 8:00am – 5:00pm

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

Cost: \$299 for members and \$399 for nonmembers, which includes the CP-FS Study Package (*CP-FS Study Guide [2010 Edition]*, *NEHA's Professional Food Manager [Third Edition]* book, and *2005 and 2009 FDA Food Codes* on CD), a \$145 value. *Limit 45 people.*

Exam: Tuesday, July 9, 8:00 – 10:00am. Exam application deadline is May 24.

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

Sunday & Monday, July 7 and 8, 8:00am – 5:00pm

This two-day refresher course is designed to enhance your preparation for the NEHA REHS/RS credential exam. Participants are expected to have a solid foundation of environmental health knowledge and training equal to the eligibility requirements to sit for the REHS/RS exam. This course alone is not enough to pass the REHS/RS credential examination. The course will cover exam content areas as described in the job task analysis.

Cost: \$429 for members and \$529 for nonmembers, which includes the *REHS/RS Study Guide*, a \$179 value. *Limit 50 people.*

Exam: Tuesday, July 9, 8:00am – 12:00noon. Exam application deadline is May 24.

Hazard Analysis and Critical Control Points (HACCP) Manager Certification Course

Monday, July 8, 8:00am – 5:00pm

Managing food safety risks in a food service or food manufacturing setting has never been more important. With new mandates on preventive controls, food operations need to protect their liability and livelihood by implementing food safety management plans to reduce the risk of becoming involved in a food safety outbreak. This course will provide participants with the information necessary to implement an effective and dynamic HACCP program in any food operation. The course will teach students how to identify, assess, and reduce or eliminate potential food hazards by utilizing the principles of HACCP. Students will gain the understanding to develop and manage preventive control plans. Participants are expected to have prior food safety knowledge. Previous training with a minimum of Certified Professional Food Manager is recommended.

Cost: \$249 for members and \$299 for nonmembers, which includes NEHA's *HACCP: Managing Food Safety Hazards at the Retail Level*, and the national HACCP Manager Certification Exam, a \$79 value.

Limit 45 people.

Exam: Tuesday, July 9, 8:00 – 10:00am

Certified in Comprehensive Food Safety (CCFS): NEHA's Newest Credential

Sunday & Monday, July 7 and 8, 8:00am – 5:00pm

NEHA is please to offer the introductory course for the Certified in Comprehensive Food Safety (CCFS) credential at the 2013 AEC. The CCFS is a strong core credential for food safety professionals with a primary concern of overseeing the producing, processing, and manufacturing environments of the U.S. food supply. It has been designed to meet the increasing need for highly qualified food safety professionals that provide oversight in preventing food safety breaches at U.S. production and manufacturing facilities and abroad. The credential course will cover exam content areas as described in the job task analysis. The course will utilize different learning modalities from critical thinking exercises to small group breakouts and videos.

Cost: There is no charge for this introductory course, but classroom capacity is limited. This course will be closed once capacity is reached. Only candidates who meet the prerequisite requirements for the credential will be qualified to enroll. All additional fees, including application for exam and cost of exam, are excluded. *Limit 30 people.*

Exam: Tuesday, July 9, 8:00 – 10:30am. Exam application deadline is May 24.

Friends. Contacts. Connections.

Networking

At the NEHA AEC, network with not only your environmental health peers, but other experts and professionals from across related industries (such as retail food, onsite wastewater, and sustainability) and government.

Strengthen your business and personal relationships and build a network of colleagues you can call on at anytime!

How Can You Network at the NEHA AEC?

- Set up meetings with people you would like to meet before arriving at the AEC by utilizing the **Virtual AEC** networking features
- Participate in the **Community Volunteer Event** on Monday afternoon. This is the perfect opportunity to give back to the community hosting the AEC while working with and getting to know your environmental health peers.
- Meet new people and enjoy time outside on the golf course during the **Golf Tournament** Monday afternoon
- Reunite with friends at the always-exciting **UL Event** on Monday night
- Connect with exhibitors that will help you be more productive in your job during the **Exhibition Grand Opening & Party** Tuesday night, and during exhibit hall hours on Wednesday
- Collaborate with other environmental health professionals during policy discussions at the **Town Hall Assembly** on Wednesday morning
- While at the **Networking Luncheon** on Thursday, discuss with other environmental health professionals all that you've learned so far and what you're excited to implement when you return to work
- During the final event of the AEC—the **President's Banquet**—reconnect with everyone you have met throughout the AEC and make a plan for staying connected
- Stay connected to your friends and contacts after leaving the conference using the networking features of the **Virtual AEC**

3rd Annual Community Volunteer Event

For more details and to sign up as a volunteer, visit neha2013aec.org

FOUR MILE RUN CLEANUP

Monday, July 8, from 1:00– 4:30pm

The volunteer event is designed to give back to the AEC host city community and enhance NEHA's "green" efforts by helping to offset the energy expenditures and greenhouse gas emissions of holding a large conference. It is also a great opportunity to get to know your environmental health peers.

This year's event will be a cleanup of a nearby stretch of the Four Mile Run tidal stream, which has been adopted by the neighboring U.S. EPA's Potomac Yards Green Team. This portion of Four Mile Run is contained in a hardened flood control channel and marks a rough boundary between Arlington County and the City of Alexandria. Along this stretch of Four Mile Run are neighborhoods, commercial districts, and some industrial facilities, including the Arlington County Water Pollution Control Plant. NEHA will be coordinating this community event with the U.S. EPA Potomac Yards Green Team and the City of Arlington, Virginia.

Volunteers will don work gloves and hiking gear to remove litter and trash from the banks and riparian habitat adjacent to the stream. This is an important intervention in protecting downstream areas, which include the Potomac River, Chesapeake Bay, and the Atlantic Ocean, from litter, debris, and pollution.

neha2013aec.org



NETWORKING

Friends. Contacts. Connections.

Annual UL Event



Experience the sights of Washington, DC, from a different point of view at the Annual UL Event.

Monday, July 8 from 6:30 – 9:30pm

Join us for the Annual UL Event aboard a cruise ship similar to the riverboats of Europe. Experience the sights of Washington, DC, as the ship glides past the Washington Monument, Jefferson and Lincoln Memorials, and the Kennedy Center. Take in the beauty of a centuries-old center of commerce, as seen from the decks of merchant ships long ago. See the sights of Georgetown as the ship turns around and heads back to the pier, but not before you venture out onto the 464 square-foot marble dance floor to dance to the best music of every generation. Or, for a more low-key end to the evening, enjoy the monuments one more time from the quiet solitude of the 3,700 square-foot open upper deck.

The UL Event is not included in the registration pricing for the AEC. There is a separate cost to attend this event and registration is required. To register for this event, visit neha2013aec.org/register.html.

The Virtual Experience

VIRTUAL AEC



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

Register to attend the AEC in-person or virtually and use the Virtual AEC to:

- Create your own schedule. Browse a list of conference sessions and events, add them to your schedule with the click of a button, export the schedule to your Outlook calendar, and access via your mobile device.
- (For virtual attendees only) View 20–30 educational sessions live as they happen at the AEC, and participate in sessions almost as if you were sitting in the room by submitting your questions via chat
- Network with other environmental health professionals, speakers, and exhibitors before, during, and after the conference
- Ask questions of other attendees, contribute to discussions, and post comments for specific sessions using the discussion features
- Access video archives of educational sessions, as well as speaker presentations and other materials after the AEC concludes
- Earn Continuing Education Credits

Go Mobile!

Your smartphone provides you easy access to all the same information that you can access via the Web. With the Virtual AEC mobile app your personalized schedule, session information, interactive maps, and attendee profiles, and exhibitor lists are available in the palm of your hand!

Tips for Using the Virtual AEC

For a step-by-step guide on how to use the NEHA Virtual AEC, visit neha2013aec.org/virtual_experience.html.

COMPLETE AND UP-TO-DATE INFORMATION CAN BE FOUND ONLINE AT NEHA2013AEC.ORG.

Customize Your Learning Experience



The NEHA AEC offers so many different facets for you to choose from to customize your own learning experience. From the multitude of environmental health topics discussed to the different learning environments of the Lecture and Learning Lab to the option to attend in-person or virtually, the NEHA AEC offers a fresh, progressive, and modern approach to training and education.

TRAINING *Productivity. Efficiency. Effectiveness.*

EDUCATION *Knowledge. Understanding. Expertise.*

NETWORKING *Friends. Contacts. Connections.*

POLICY INVOLVEMENT *Voice. Collaboration. Influence.*

ADVANCEMENT *Careers. Aspirations. Respect.*

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Managing Editor's Desk

continued from page 78

- » 60% have executed furloughs, and
- » 91% have lost staff due to attrition.
- Combined with studies done by the National Association of County and City Health Officials, it is asserted that 46,000 public health jobs have been lost since 2008, *which represents 21% of the total state and local health department workforce.*

The news from the Centers for Disease Control and Prevention (CDC), the nation's public health agency, isn't a whole lot better.

According to the Campaign for Public Health Foundation, CDC's budget authority is \$724 million less today than it was in FY 2005, almost 10 years ago!

If CDC's total budget had kept pace with the consumer price index since 2005, CDC's budget would be almost \$1 billion more today.

The U.S. Environmental Protection Agency's budget has dropped from a high of \$10.3 billion in FY 2010 to an estimated \$8.3 billion for FY 2013.

And we haven't even brought the impact of sequestration into this discussion.

As many NEHA members are all too painfully aware, the budget situations in local government are hardly any better. As we are learning through our Center for Priority Based Budgeting program, local governments are quite frankly learning to operate differently, which invariably means more leanly.

The vitality of environmental health programs closely correlates to the vitality of the housing industry. New housing construction means increased permitting for onsite systems, restaurants, and institutions.

We all know what happened when the housing market busted almost six years ago. Though the housing market certainly seems to have regained some of its health, how long will that last?

The Atlantic Cities (a resource that explores innovative ideas and pressing issues facing today's global cities and neighborhoods) recently posted a fascinating article on the next housing crash (predicted for around 2020). The argument was compelling. In short, the author maintained that as baby boomers age, they will leave behind their large homes in search of downsized housing. The demand for large homes on large lots (one-third of the homes built between 1989 and 2009 were larger than 2,500 square feet

and 40% were built on lots of one half-acre to 10 acres in size!), however, will decline (25% of the population now seeks smaller and more affordable homes, which is a huge shift in housing demand), thereby creating another housing bubble of unsold homes and lost wealth.

The message would seem to be, enjoy this weak economy now because it is likely to crash again by 2020.

My point is not to editorialize. I'm not saying that these cuts to public and environmental health and the agencies that support this kind of work are either good or bad. They just are.

More to the point, these changes are not going to go away. For those still wistfully hoping that we can get things back to normal soon and return to the good old days, happy dreams! For those who detest the term "new normals," enjoy your tirades but you're missing out on seeing a remarkable societal change taking place right before your eyes.

It is our assessment that traditional public and environmental health is in decline. It may yet happen that with the Affordable Care Act and the emergence of accountable care organizations, new and nongovernmental lines of funding for traditional environmental health may materialize to save the day. But aside from that possibility and the promise of what IT can do to enhance our productivity with fewer human resources, (which I've written about extensively in previous columns), the raw data suggest that our profession is losing ground, not gaining it.

The good news is that this doesn't have to happen! As I have pointed out in the past, just as we are losing sway in some aspects of environmental health, there are opportunities for our profession to move into new areas of practice that can more than compensate for our losses. *And that is the path that NEHA is on.*

As I speak, we have applied for a huge, multiyear "capacity building" grant.

We are seeking to accomplish two giant tasks with this grant, should this grant be awarded to NEHA.

First, we will develop a specialized line of training meant to equip today's environmental health professional with the competence necessary to effectively deal with the range of environmental health implications associated with the adverse health effects of global climate change, adaptation to global climate

change, sustainability, healthy communities, healthy built environments, and the environmental health role in emergency response resulting from climate change events.

Second, we will develop a professional credential that will certify that this competence has been achieved.

In other words, our vision is to create a credentialed workforce capable of carrying out a wide assortment of environmental health type work across this new arc of contemporary and urgent issues.

You ask, "OK, so you build a competent work force ... what if there is no funding available to support that workforce? Where will these people work?" Good question!

Through the work of our Center, we have learned that somehow, despite all the cuts taking place in local government, local leaders ARE finding dollars to fund these very kinds of programs. Unfortunately, they tend to direct those funds toward an assortment of people and professions ranging from political science majors to land use planners ... but not to environmental health. We mean to change that.

Imagine being a city manager or a county administrator. Wouldn't you be sky high knowing that a trained and capable workforce exists to do this work and further, that they are some of your own employees?!

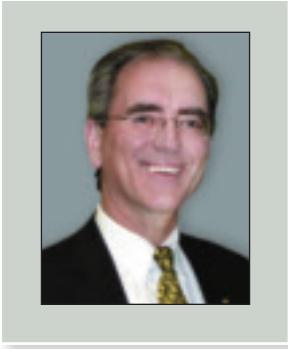
Unfortunately, too many public administrators don't know what we do, to say nothing of knowing what we're capable of doing. I have more good news!

Again, through the work of our Center program, we have been (intentionally) building a communication line to these local policy leaders all across the nation. In other words, NEHA is developing the communication channels that are necessary to educate these local leaders about you and your capabilities.

All to say, if our talented Research and Development program headed up by Larry Marcum can land this grant, we'll be taking off on a mission to build this profession, even as other forces work to shrink it. We go down this new and exciting road not because we believe that our history and traditions are bunk but rather because this is where environmental health is needed in 2013 and beyond. Moreover, we are determined not to let our traditional sense of

continued on page 41

▶ MANAGING EDITOR'S DESK



Nelson Fabian, MS

An Exciting NEHA Grant Initiative and History Is Bunk!

Henry Ford was once quoted as saying, “History is bunk.” In my increasingly passionate belief that the practice of environmental health *must* evolve in the direction of future trends, I fear that some in the NEHA membership might think that Nelson Fabian also believes that history is bunk and that by exploring new frontiers for this profession, we somehow dishonor our heritage. (Over the years, I’ve heard it said that environmental health will always be [and needs to be] food safety, vector control, onsite, and wells and that forays into other issues like global warming or fracking are sideshows at best.)

Let me respond to the possibility that our emerging efforts to extend the boundaries of this profession are tantamount to calling history bunk by expanding on what Henry Ford actually said. In 1916, he was quoted in an interview with the *Chicago Tribune* as follows:

“History is more or less bunk. It’s tradition. We don’t want tradition. We want to live in the present, and the only history that is worth a tinker’s damn is the history that we make today.”

As with many quotes, once we see the full sweep of the comment, our understanding starts to change.

My own sense of what Ford was trying to say was that traditions (his definition of history) can get in the way of progress. And if we’re honest, isn’t it true that we can all cite numerous examples of this happenstance?

I’ve read scholastic accounts that offer some insight into why we hold onto traditions, even when upon closer inspection they no longer make sense. In some cases, we hold onto them for fear of dishonoring our ancestors. In other cases, traditions simply



become comfortable. In still other cases, too much work (i.e., brain damage) is required to discredit a tradition and conceptualize an alternative. And so forth.

NEHA certainly has its traditions, some of which no longer make sense. For example, up until three years ago, NEHA had a tradition of holding an annual conference for four days. In view of the extreme time demands that exist for our members, we shortened our annual event to three days. And yes, we heard from some members who were upset that we toppled a long-standing tradition, no matter the reason.

Though it would be fun to list outdated traditions that we’ve all maintained, that is not the line for this column. Rather, I want to make the case that circumstances surrounding the world of environmental health have changed so much that some of our traditions really do need to change if we are to have a chance at maintaining health and vitality for this profession.

As I have written before, wishing that the good old days of 1982 could somehow be magically recreated just isn’t going to cut it as a strategy for dealing with the challenges facing us today. And if I step on the toes of some of our traditionalists as I explain how NEHA is aggressively pushing the evolution of this profession, please understand that we mean no dishonor to our past and our past heroes. To borrow from Ford, I am only trying to focus on the present without the weight of the past distorting my view. And the clear view I see of the present leads me to believe that a new (or at least updated) vision for environmental health is called for.

As we look at the present from an unimpeded line of sight, we see the following (from a 2013 report just issued by the Association of State and Territorial Health Officials):

- From July 2008 through to the end of 2012, “budget cuts (in state health agencies) are not showing any definitive signs of tapering off.”
- Since 2008:
 - » 91% of state health agencies have reduced services,
 - » 62% have eliminated entire programs,
 - » 60% have implemented layoffs,

continued on page 77



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