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Impact of Internet Posting of Restaurant Inspection Scores on Critical Violations

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ABOUT THE COVER



Public posting of restaurant inspection scores is thought to increase compliance through consumer pressure. In 2009, the Salt Lake Valley Health Department launched a Web site that provides

restaurant inspection results, scores, rankings, and restaurant closure information. In this month's cover feature, "Impact of Internet Posting of Restaurant Inspection Scores on Critical Violations," the authors evaluated the Web site's impact on subsequent inspection results. The implementation of a web-based system for public access to restaurant inspection results appears to have had some impact on the frequency of critical violations noted by inspectors and may lead to a 20% to 30% reduction in the number of inspections with these critical violations.

See page 8.

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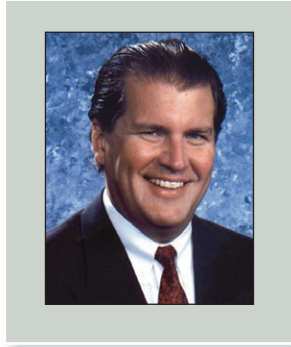




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▶ PRESIDENT'S MESSAGE



Brian Collins,
MS, REHS, DAAS

I professed a year ago in my first President's Message column that becoming NEHA president provided an opportunity to give back to the profession, membership, and association. I said I wanted to help NEHA, and by proxy, the environmental health profession, to "achieve and attain yet greater success." "It's all about giving back," I mused. Well, I was naive and myopic!

In attempting to fulfill this promise, once again the profession, membership, association, and your board of directors in particular provided me with so much more than I gave. Certainly, my experience this year was greater in breadth and scope than I anticipated, and in hindsight, I could never expect to give back as much as I received! In this column, I want to apprise you of how important and valuable a strong board of directors is to the success of the association. As I have stated before, no one gets things done by themselves—it takes others! Others are the team. Allow me to explain as I am relatively assured that many among us have only a conceptual understanding of what an association board of directors does, much less what it takes to succeed and prosper.

As a NEHA board member you are servant to an association that represents a noble profession. Integrated within this service are specific duties required of each board member. Some duties are legally binding and some are conventional expectations as requirements of service. First, legally, a board member is bound by the duty of loyalty. This means a board member must hold the interests of NEHA over personal or professional concerns or conflicts in interest, i.e., board members must at all times exercise good judgment and

"It's All About Giving Back"— a Toast to the Board!

I was naive!

make sound decisions in the best interests of the association, not of individuals or of specific businesses. Separating this is more difficult than it would appear! Second, a board member must abide by the duty of care. The board member must actively participate in planning, decision making, strategic thinking, and must exercise good judgment. This board, this year, has been exceptional!

Last of the legal duties is that of obedience. It is a board member's duty to ensure organizational compliance with federal, state, and local laws. In addition, board members must be committed (obedient) to the mission of the association. No hypocrisy allowed. No self-interest allowed.

Subordinate duties of the board include confidentiality, ambassadorship, a duty to disclose conflicts of interest, and a duty to contribute. This duty to contribute includes not only time and expertise but also financial contributions. I am happy to report that this board has met or exceeded expectations in all duties.

Beyond board of director duties are specific responsibilities. NEHA board responsibilities fall into four general categories: 1) governance, which includes mission and vision implementation, long-term planning, and program and services evaluation; 2) oversight, which includes high-level guidance for the executive director (important to this responsibility is ensuring and providing resources in support of the executive director's work); 3) financial

responsibility, in which the board is responsible for monitoring budget expenses and revenues, for ensuring adequate financial resources exist or are developed, and for accounting for association assets; and 4) protecting the reputation of the association. Again, I am happy to report, your board has met or exceeded expectations in all areas of responsibility.

The expertise, commitment, good judgment, connectivity, and reputation of your association have all been elevated. The board's ability to work with staff, the great operational leaders of the association, and external stakeholders is exemplary.

I tell you this because NEHA had one heck of a year. We've grown, we are fiscally robust as never before, we have evolved in capacity and resources, and we have learned. There were bumps along the way but we, as a team, managed a path to continued success. That's what strong teams with a passion for the mission do.

It has been my honor to serve the membership, the profession, and the association this past year. To you the membership, to the great NEHA team, to Nelson, and to a magnificent board: thank you for the privilege of service. I was naive! I take away so much more from this experience than I could have imagined. It's more than "all about giving back"; I was naive.

Thank you again! Cheers, y'all! 🍷

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

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Impact of Internet Posting of Restaurant Inspection Scores on Critical Violations

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Abstract Posting restaurant inspection scores on the Internet as a tool for improving food safety is becoming more common. The purpose of the study described in this article was to evaluate the association between Internet posting of restaurant inspection scores and the five most frequently cited critical violations in Salt Lake County, Utah. The study examined 2,995 inspections conducted at 796 full service and fast food restaurants for a one-year period before and after launch of a restaurant inspection Web site. Critical violations decreased significantly after the Web site launch compared to before-launch levels. The greatest improvements were found in temperature holding violations (odds ratio = 0.75, $p < .001$), hygiene practices violations (odds ratio = 0.68, $p < .001$) and equipment cleanliness violations (odds ratio = 0.58, $p < .001$). Restaurant type (full service, fast food), inspector experience, and season were significantly associated with the decrease in violations.

Introduction

Foodborne diseases result in 9.4 million illnesses, 55,961 hospitalizations, and 3,151 deaths annually in the U.S. (Scallan, Hoekstra, & Angulo, 2011). One in six Americans suffers from foodborne illness each year (Scallan et al., 2011). In 2008 the projected incidence rate for all reported foodborne illnesses in the U.S. was 40.22 per 100,000 population (Centers for Disease Control and Prevention, 2008). The estimated incidence for the same time period was 36.67 per 100,000 in Salt Lake County.

Most foodborne illnesses can be linked to improper food handling practices. State and local health departments are responsible for regulating food safety in restaurants.

Health departments rely on training and inspections to ensure proper food handling behavior and reduce the risk of foodborne illness outbreaks. These two procedures have not proven effective in creating long-term behavioral compliance (Simon, Leslie, & Run, 2005). In response, the Food and Drug Administration (FDA) has called for more innovative and effective strategies to improve food safety practices in retail food establishments (FDA, 2004; Green, 2008; Mitchell, Fraser, & Bearon, 2007).

Studies have examined the association between inspection scores and foodborne illnesses with varying results (Buchholz, Run, Kool, Fielding, & Mascola, 2002; Cruz, Katz, & Suarez, 2001; Irwin, Ballard, Grendon,

& Kobayashi, 1989; Jones, Pavlin, LaFleur, Ingram, & Schaffner, 2004; Penman, Webb, Woernie, & Currier, 1996). Studies conducted in Seattle-King County, Washington, and Los Angeles County, California, concluded that inspection scores can identify restaurants with increased risk of foodborne illness outbreaks. The Seattle-King County study identified overall inspection scores; improper heating, cooling, and storage temperatures; and improper storage and handling of equipment as being associated with foodborne illness outbreaks (Irwin et al., 1989). A study in California compared restaurants associated with foodborne illness outbreaks with previous inspections and found a lower inspection score to be predictive of foodborne illnesses (Buchholz et al., 2002).

By contrast, studies conducted in Miami-Dade County, Florida; Tennessee; and Alabama concluded restaurant scores alone are not predictive of future foodborne illness in a given restaurant. The Miami-Dade County study found that 45% of restaurants associated with foodborne illness outbreaks had no critical violations cited during the most recent inspection (Cruz et al., 2001). The Tennessee study compared scores from inspections conducted prior to foodborne disease outbreaks to all other inspections and found no significant difference (Jones et al., 2004). A study in Alabama linked two foodborne illness outbreaks to restaurant inspections and found the inspections were ineffective in preventing outbreaks (Penman, et al., 1996).

Public posting of inspection scores is thought to increase compliance through consumer pressure. In the only study of the impact

of public posting, foodborne illness-related hospital admissions in Los Angeles, California, decreased 20% after implementation of restaurant window postings of inspection scores (Jin & Leslie, 2003; Simon et al., 2005). The study compared inspection results of 13,544 restaurants between January 1, 1996, and December 31, 1998, to foodborne illness hospital admissions before and after the ordinance requiring window posting of inspection scores.

Municipalities nationwide have begun posting inspection scores on the Internet to improve the accessibility of scores to the public; however, the efficacy of Internet postings is unknown. A search of PubMed and EBSCOhost databases yielded no papers examining the impact of Internet access to inspection scores on subsequent scores or foodborne illness outbreaks.

On April 23, 2009, the Salt Lake Valley Health Department (SLVHD) launched a Web site that provides restaurant inspection results, scores, rankings, and restaurant closure information (<https://public.cdpehs.com/UTEnvPbl/ESTABLISHMENT/>). The purpose of our study was to evaluate the Web site's impact on subsequent inspection results.

Methods

Study Design

Our study used a longitudinal analysis of inspection results. Study data were limited to routine inspections performed by licensed environmental health specialists at full service and fast food restaurants in Salt Lake County, Utah. Inspections conducted 12 months before and after the Web site launch were included. Only those restaurants that were inspected at least twice before and twice after launch were included in our study. A total of 2,995 inspections conducted at 795 restaurants were evaluated.

Outcomes

The occurrence of five specific FDA-defined critical violations were included as outcome measures: poor hygiene practices (lack of hand washing and eating, drinking, or using tobacco in the food preparation area), improper holding temperatures (hot and cold holding temperature citations), inadequate equipment cleanliness (dirty equipment, utensils, or food contact surfaces), lack of protection from cross contamination

(food separation, packaging, and segregation citations), and improper sanitizer concentration (improper manual and mechanical ware washing chemical sanitizer levels). These violations are referred to as "target critical violations" and were selected because they were included in the domains identified by FDA as "most commonly reported to the Centers for Disease Control and Prevention as contributing factors in foodborne illness outbreaks (FDA, 2004)."

Statistical Analysis

Univariate and bivariate methods were used to assess the changes in the proportion of inspections during which the restaurant was cited for the target critical violations before and after the launch of the Web site.

Multivariable methods were used to assess the changes in inspection results. Logistic regression using a generalized estimating equation were used to account for the repeated measures from each restaurant. The outcome variables were each dichotomous indicating whether the restaurant was cited for that type of critical violation. A first-order autoregressive (AR1) correlation structure was assumed to account for any correlation between the previous and current inspection. Based on the quasi-likelihood criteria, the AR1 structure performed as well as other correlation structures. Odds ratios were used to describe the effect of the intervention. Data were analyzed using STATA software version 9.

Models were adjusted for restaurant type (full service compared to fast food), inspector experience, and season. Experienced inspectors were defined as those who conducted 200 or more inspections during the study period. Season was grouped into four, three-month periods: summer (June, July, August), fall (September, October, November), winter (December, January, February), and spring (March, April, May).

Two different model specifications were used to assess the changes in violation frequency associated with the intervention launch. The first set of models used a single indicator variable to denote whether the inspection occurred before or after the launch date. To account for the potential attenuation of the effect of the Web site over time, or a delay in its impact, a second set of models was run using indicator variables delineating three time periods after the launch. The attenuation analysis compared

before launch inspections with those conducted 0–30 days after launch, 31–60 days after launch, 61–180 days after launch, and 181–365 days after launch.

Results

The final dataset included 2,995 inspections conducted at 796 restaurants with an average of 3.8 inspections per restaurant (range = 1–8). Distributions of the number of inspections by the explanatory variable are presented in Table 1.

The proportion of inspections with any of the targeted violations was lower during the 12 months after the launch compared to before the launch (Table 2). The difference in proportions ranged from 2.07 (cross contamination) to 8.99 (equipment cleanliness).

Before/After Model Results

The probability of having a violation decreased in routine inspections conducted after the Web site launch when adjusted for inspector experience, risk level, and seasonality (Table 3). The adjusted odds ratios (aOR), ranging from 0.64 to 0.80, were statistically significant for all critical violations, with the exception of cross contamination, which was borderline significant ($p = .053$). The largest effect was found in equipment cleanliness violations (aOR = 0.64).

Full service restaurants were more likely to be cited for all of the targeted critical violations than fast food facilities, with aORs ranging from 1.43 ($p = .015$) in sanitizer concentration to 2.12 ($p = .000$) in holding temperature violations. Inexperienced inspectors were significantly more likely to cite personal hygiene, equipment cleanliness, cross contamination, and sanitizer concentration violations compared to experienced inspectors. Holding temperature violations, however, were more likely to be cited by experienced inspectors. The effect of season varied by the critical violation being examined. The odds of being cited for holding temperature, hygiene, and equipment cleanliness violations were lower in all seasons compared to summer. The odds of violation increased in all seasons compared to summer for cross contamination and sanitizer concentration violations with the exception of inspections citing sanitizer concentration violations conducted in spring, which showed a slight, insignificant decrease.

Attenuation Model Results

The effect of the Web site increased over time from launch for three of the critical violations: holding temperature, personal hygiene, and equipment cleanliness. The odds ratios for holding temperatures and personal hygiene were nonsignificant in the first 60 days after launch, but were significant for the time periods after 60 days.

Cross contamination and sanitizer concentration violations had an opposite trend in which the odds ratios increased in all time periods after launch. Significant odds ratios were identified in the first 60 days after launch but became insignificant over time.

Restaurant type, season, and inspector experience in the attenuated model were very similar to the odds ratios in the before/after model.

Discussion

The implementation of a web-based system for public access to restaurant inspection results appears to have had some impact on the frequency of critical violations noted by inspectors. The odds ratios for all of the five violations examined in our study indicate citations reduced significantly after the Web site launch compared to before launch when adjusted for restaurant type, season, and inspector experience. The effects were observed for all five critical violations studied, with a sustained effect (>180 days) observed for critical violations of holding temperatures, hygiene, and equipment cleanliness. Based on these results, implementing such a web-based system may lead to a 20% to 30% reduction in the number of inspections with these critical violations.

Full service restaurants had significantly higher odds of being cited for violations than fast food restaurants in all of the targeted critical violations. This may be due to the complex menus and processes found in full service restaurants and the protocols established by some fast food chain restaurants.

Season appears to affect critical violations differently. The largest effects were in temperature holding violations in all seasons compared to summer. The odds of inspections with holding temperature violations increased between 26% and 43% in the summer months compared to other seasons. This may be due to cooling units malfunctioning during periods of high ambient temperature. Equipment cleanliness and personal hygiene

TABLE 1
Distribution of Inspections by Season, Inspector Experience, and Before and After Launch

Characteristic	Before Launch # (%)	After Launch # (%)
Season		
Winter	206 (14.60)	323 (20.39)
Spring	371 (26.29)	365 (23.04)
Summer	416 (29.48)	444 (28.03)
Fall	418 (29.62)	452 (28.54)
Experienced inspector		
Yes	593 (42.03)	631 (39.84)
No	818 (57.97)	953 (60.16)
Restaurant type		
Full service	525 (37.21)	580 (36.62)
Fast food	886 (62.79)	1004 (63.38)
Total	1411 (47.11)	1584 (52.89)

violations were also reduced in other seasons compared to summer possibly due to an untrained temporary summer workforce storing personal drinks in the food preparation area during hot temperatures and a general lack of attention to cleaning detail. Hygiene practices violations reduced significantly in spring compared to summer, but differences in other seasons were insignificant.

To our knowledge, this is the first published study assessing the impact of such a web-based system. These results are similar to the results of previous studies that examined the effect of posting restaurant inspection scores at the restaurant. In a study conducted in Los Angeles, California, foodborne illness-related hospital admissions decreased 20% after implementation of restaurant window postings of inspection scores (Jin & Leslie, 2003; Simon et al., 2005).

Our study was limited by the available data. Factors that may have been associated with the frequency of violations include the type of food served and serving style (e.g., buffet compared to individual plate), the level of experience of the workers and management, and the “culture” and beliefs of the workers about the importance of good food handling practices.

Our study did control, however, for major predictors such as season, the level of experience of the inspector, and whether the restaurant was full service or “fast food.” Further, our study included virtually all “sit

down” restaurants in Salt Lake County, Utah, although this limits the generalizability of the findings. Given the magnitude of the results, it seems unlikely that the results are an artifact of uncontrolled confounding.

The occurrence of foodborne outbreaks is the primary public health concern. This was not used, however, due to the small number of observed outbreaks and underreporting. Violation codes have been recommended as proxy measures to determine food safety and are the focus of regulatory efforts (FDA, 2009). As such, the occurrence of these critical violations as the outcome variables was appropriate.

Conclusion

While our study included inspections as much as one year from the launch of the Web site, it would be useful to continue to assess the temporal trends to see if the rates of violation return to the levels observed before the beginning of this effort. It may be necessary to conduct periodic efforts to remind the public about the Web site and highlight the importance of food safety to maintain the impact of the web access to inspection results. The average daily Web site hits have diminished over time. Within one hour of the press conference announcing the Web site, over 68,000 visitors had logged onto the site, temporarily crashing the system (Moore, 2009). Over one million hits were received within the first 24 hours after launch. At the

TABLE 2

Change in Percentage of Inspections With Violations Before and After Web Site Launch

Critical Violation	# of Inspections With Violations		% of Inspections With Violations		Change (%)	<i>p</i> -Value (Difference)
	Before	After	Before	After		
Equipment cleanliness	461	376	32.67	23.68	-8.99	<.001
Holding temperature	457	456	32.39	28.71	-3.68	<.001
Hygiene practices	412	348	29.20	21.91	-7.29	<.001
Cross contamination	175	164	12.40	10.33	-2.07	.018
Sanitizer concentration	125	104	8.86	6.55	-2.31	.013

TABLE 3

Effect of Internet Posting of Restaurant Inspection Results on Specific Critical Violations by Before and After Launch, Restaurant Type, Season, and Inspector Experience

Characteristic	Holding Temperature Odds Ratio	Hygiene Odds Ratio (<i>p</i> -Value)	Equipment Cleanliness Odds Ratio (<i>p</i> -Value)	Cross Contamination Odds Ratio (<i>p</i> -Value)	Sanitizer Odds Ratio (<i>p</i> -Value)
After vs. before	0.80 (.009)	0.68 (.000)	0.64 (.000)	0.79 (.053)	0.73 (.024)
Before = referent group					
Restaurant risk level					
Full service vs. fast food	2.12 (.000)	1.81 (.000)	1.77 (.000)	1.69 (.000)	1.43 (.015)
Fast food = referent group					
Season					
Fall vs. summer	0.66 (.000)	0.89 (.346)	0.72 (.008)	1.25 (.213)	1.23 (.325)
Winter vs. summer	0.74 (.005)	0.82 (.101)	0.60 (.000)	1.36 (.068)	1.28 (.213)
Spring vs. summer	0.57 (.000)	0.76 (.026)	0.69 (.001)	1.13 (.507)	0.71 (.134)
Summer = referent group					
Experienced inspector	0.92 (.37)	1.32 (.003)	1.75 (.000)	1.44 (.004)	1.46 (.009)
Experienced = referent group					
Wald Chi-square	89.78 (.0000)	72.29 (.0000)	111.98 (.0000)	34.34 (.0000)	55.52 (.0000)
Attenuation					
Before launch = referent group					
Before launch vs. 0–60 days after	0.88 (.403)	0.75 (.145)	0.71 (.024)	0.56 (.024)	0.52 (.058)
Before launch vs. 61–180 days after	0.71 (.008)	0.67 (.005)	0.71 (.011)	0.71 (.103)	0.57 (.027)
Before launch vs. 181–365 days after	0.80 (.019)	0.64 (.000)	0.58 (.000)	0.94 (.650)	0.79 (.149)
Restaurant risk level					
Full service vs. fast food	2.09 (.000)	1.77 (.000)	1.84 (.000)	1.66 (.000)	1.47 (.013)
Fast food = referent group					
Season					
Fall vs. summer	0.65 (.001)	0.90 (.149)	0.75 (.029)	1.19 (.383)	1.11 (.628)
Winter vs. summer	0.72 (.013)	0.84 (.218)	0.64 (.001)	1.16 (.464)	1.20 (.449)
Spring vs. summer	0.54 (.000)	0.76 (.046)	0.75 (.032)	1.09 (.690)	0.73 (.200)
Summer = referent group					
Experienced inspector	0.90 (.281)	1.36 (.001)	1.72 (.000)	1.41 (.008)	1.39 (.026)
Experienced = referent group					
Wald Chi-square	80.16 (.0000)	70.09 (.0000)	111.58 (.0000)	34.31 (.0000)	33.07 (.0000)

end of January 2011 the average daily number of hits had dropped to 4,640.

SLVHD classifies restaurants according to risk level. Full service restaurants are part of the highest risk category and consequently are inspected three to four times annually. Our study confirms the risk level ranking and provides additional justification for the stated inspection frequency. Additional efforts should be directed at reducing the occur-

rence of critical violations in full service restaurants including active managerial controls and trainings. Studies identifying managerial attitudes are recommended to correctly identify effective interventions.

The impact of such an effort would certainly be expected to vary across locations. The results of our study suggest that such a program at least has the potential for improving some aspects of food safety in restaurants.

Studies in other locations may help to identify the factors that are important for ensuring the success of such programs. ☹

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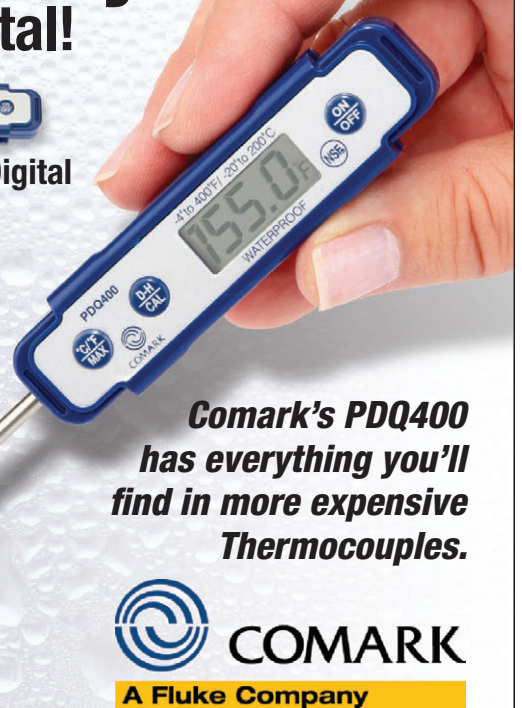
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A Health and Environmental Profile of the Dry Cleaning Industry in King County, Washington

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Abstract Workers in the dry cleaning industry are exposed to a variety of harmful solvents, and poor work practices can result in extensive environmental contamination. Of particular concern is perchloroethylene (PERC), which is the most commonly used cleaning solvent. This chlorinated hydrocarbon is a pervasive environmental contaminant and a probable human carcinogen. PERC is also a neurotoxin and is toxic to the liver and kidneys.

The study described here was comprised of key informant interviews, site visits, and a countywide business survey. The 64% response rate to the survey suggests that the results are likely representative of King County's dry cleaning industry. Dry cleaning was determined to be dominated by small, Korean-owned, family-run businesses. Although the use of PERC as the primary dry cleaning agent has decreased in recent years, this solvent is still used by the majority of businesses. This industry would benefit from regulatory intervention in concert with an educational campaign and enhanced technical and financial assistance. For any intervention to be effective, however, it must account for the unique financial and demographic characteristics of this industry.

Introduction

Dry cleaning refers to a process that uses nonaqueous solvents to clean clothes and other fabrics. Since the 1960s, the most frequently used dry cleaning solvent has been the chlorinated organic hydrocarbon, perchloroethylene (PERC, PCE, or tetrachloroethylene) (U.S. Environmental Protection Agency [U.S. EPA], 1998). Although considerable advances in dry cleaning technology in

the last decade have occurred, even modern machines present opportunities for PERC exposure (Rastkari, Yunesian, & Ahmadkhaniha, 2011). PERC may be released during routine dry cleaning operations due to poor housekeeping practices, malfunctioning equipment, spills, lack of maintenance, and other upset conditions.

PERC is a pervasive environmental contaminant that has been detected in the

air, groundwater, surface waters, and soil (Agency for Toxic Substances and Disease Registry [ATSDR], 1997). The human health and environmental effects of PERC exposure are well documented (ATSDR, 1997). PERC may be absorbed by the body via inhalation, dermal contact, and ingestion. Chronic exposure has been associated with neurological, liver, and kidney damage in humans (ATSDR, 1997). In 2010, the National Research Council concurred with the U.S. Environmental Protection Agency's (U.S. EPA's) finding that PERC is "likely to be carcinogenic to humans" (National Research Council, 2010). Several studies have also documented health outcomes in the general population associated with ambient exposure to PERC from residentially colocated dry cleaners (Benignus, Boyes, Geller, & Bushnell, 2009; Ma, Lessner, Schreiber, & Carpenter, 2009; Schreiber et al., 2002; Storm et al., 2011).

Several alternative cleaning solvents are available including carbon dioxide, hydrocarbon solvents, volatile methyl siloxanes, and propylene glycol ether (California Air Resources Board [CARB], 2006). The industry has been slow to adopt these technologies, however, in part because many dry cleaning business owners perceive that the alternative solvents do not clean as efficiently as PERC (Morris & Wolf, 2005).

Regardless of the particular solvent used, all dry cleaning processes generally follow similar steps (CARB, 2006). After the wash cycle, dry cleaning solvent is typically

distilled and filtered for reuse within the machine. This closed loop process generates still bottoms (also called “sludge”), separator water (from the physical separation of dry cleaning solvent and water in a water separator), and used filters. These wastes may be contaminated with dry cleaning solvent, spot cleaning chemicals, and residual solvent remaining in the fabrics from previous cleanings. Unless chemical characterization determines that these wastes contain contaminant levels below those specified in Washington State’s Dangerous Waste Regulations (Washington State Department of Ecology, 2009), they are considered hazardous and must be periodically collected and disposed of by licensed haulers. Handling these waste streams also provides opportunities for worker exposure and environmental release.

Field visits to dry cleaning businesses located in King County between November 2009 and July 2010 revealed numerous health and environmental deficiencies. The most common issues observed include poorly maintained machines, a lack of awareness about health concerns associated with exposure to dry cleaning solvents, and inappropriate treatment, storage, and disposal of hazardous wastes. In addition, personal protective equipment (PPE) was generally not used during machine maintenance or waste handling.

Recognizing that dry cleaners are in need of substantial technical assistance, we conducted key informant interviews, performed additional field investigations, and distributed a countywide survey to 1) learn about the demographics and cultural characteristics of the dry cleaning industry; 2) gather information about general business characteristics, including the solvents used for cleaning; 3) learn about current work practices; 4) learn about business owners’ perceptions and needs concerning health and environmental protection; and 5) gather information to inform future intervention strategies.

Methods

A detailed description of the methods used to develop the survey, including copies of the survey instrument and supporting documents, are provided in our technical report, *A Profile of the Dry Cleaning Industry in King County, Washington* (Whittaker & Johanson, 2011).

Survey Development

The design of the survey instrument was based largely on a needs assessment survey of the auto body industry in Washington State (Whittaker, Anderson, & Whitaker, 2005). Questions were also derived from a California Air Resources Board report (CARB, 2006) and a waste management survey conducted in Canada (Canadian Centre for Pollution Prevention, 2011).

The survey questions were reviewed by program staff with experience working with local dry cleaners. We administered a pilot version of the survey to 12 dry cleaning business owners during field visits. Further input was solicited from stakeholders in the dry cleaning industry, including the presidents of the Northwest Dry Cleaners Association and the Washington State Korean Dry Cleaners Association. Additional review was provided by staff at the Washington State Department of Labor & Industries (L&I), U.S. EPA Region 10, the Puget Sound Clean Air Authority (PSCAA), and the Washington State Department of Ecology (Ecology).

Selection of Businesses for Inclusion in the Survey

Five data sources were used to generate a master list of dry cleaners in King County: 1) a database of dry cleaning establishments visited by the Local Hazardous Waste Management Program in King County (LHWMP) before 2002; 2) a list of dry cleaners currently receiving technical assistance from LHWMP; 3) a Washington State Department of Revenue list of dry cleaners; 4) a PSCAA list of active (i.e., PERC-using) dry cleaners; and 5) a commercial InfoUSA directory, restricted to businesses located in King County with North American Industry Classification System code 81232 (drycleaning & laundry services [except coin-operated]).

Data from the five sources were combined, and duplicate records were eliminated to generate the master list of dry cleaning establishments. These data sources were accessed between July 2009 and July 2010. A total of 475 businesses were retained in the master list.

Human Subjects Protection and Document Translation

All study procedures and materials were reviewed and approved by the Washington State Institutional Review Board (WSIRB) for

human subjects’ protection and the Research Administrative Review Committee at Public Health-Seattle & King County (PHSKC). Per WSIRB requirements, materials were translated into Korean by a contractor certified by the Washington State Department of Social and Health Services (DSHS). The translated materials were then reviewed for accuracy and readability by native Korean speaking colleagues.

Survey Strategy

Preliminary Mailing

We mailed an introductory letter to all 475 businesses on the master list in August 2010. This letter, which was prepared in English and Korean, described the project, encouraged business owners to complete the survey, and was signed by the presidents of the Northwest Dry Cleaners Association and the Washington State Korean Dry Cleaners Association. Several of these initial letters were returned as undeliverable, and these businesses were removed from the master list of dry cleaners.

Mailed Survey

The survey was designed to gather information from the owners and managers of dry cleaning establishments and included 46 questions. Before the first question, recipients were asked to indicate if their business performed dry cleaning on the premises or whether it was a drop shop (i.e., a store front that does not do any cleaning on the premises, but collects clothing for delivery to a cleaning facility). If they answered that it was a drop shop, they were instructed to check the appropriate box and return the survey without answering the remaining questions.

Although respondents were allowed to remain anonymous, they were invited to provide contact information to avail themselves of LHWMP’s incentive programs or receive technical assistance.

We contracted with Gilmore Research Group (Seattle) to mail the survey and other materials to businesses, receive the responses, and record the data according to WSIRB requirements. Project staff provided Gilmore Research Group with the identities of the businesses remaining on the master list. Gilmore Research Group then applied a unique six-digit identification number to the businesses on the master list and to the

businesses' survey packet. The return envelopes did not include identifying information about the respondent other than this identification number.

Gilmore Research Group mailed the survey packet to the businesses remaining on the master list in August 2010. The packet included both English and Korean versions of the following materials: 1) a cover letter; 2) a two-page study description with contact information; 3) a survey booklet; and 4) a return envelope (including prepaid postage).

Approximately two weeks later, Gilmore Research Group mailed a reminder postcard, prepared in English and Korean, to businesses that had not yet returned the survey.

After another week, Gilmore Research Group mailed a second survey packet to businesses that had not yet responded.

Gilmore Research Group then provided project staff with a summary database. The data included which businesses had completed the survey, were identified as drop shops, had not responded, or had undeliverable addresses.

Telephone Follow-up

Follow-up telephone calls were made by project staff to businesses that had not responded to the mailed survey. A DSHS-certified interpretation service was used, when necessary. If the business owner or manager was not available, a message was left with contact information. Due to staffing limitations and time constraints, only one attempt was made to contact each business. Several businesses requested another copy of the survey, which was subsequently mailed via Gilmore Research Group.

Following the telephone calls, businesses were determined to fall into one of six categories: 1) a drop shop; 2) unwilling to complete the survey; 3) committed to complete the survey and return it by mail; 4) requested administration of the survey in-person; 5) another type of "cleaning" business (such as a house cleaners or coin operated laundromat); or 6) no longer in business.

Businesses in categories 5 and 6 were removed from the list of potential respondents and excluded from the sampling frame.

Data Analysis

Deidentified survey data were analyzed using Microsoft Access 2003, Microsoft Excel 2007, STATA 1, and IBM SPSS Statistics. Data were evaluated using cross tabulations for Chi-

TABLE 1

Dry Cleaning Survey Sample Disposition

Disposition	# of Shops
Completed survey responses received	154
Shops identified as drop shops	91
Unreachable: unable to determine if qualified (wrong number, no answer, answering machine, etc.)	17
Refused survey	3
No response: made contact, determined qualified, but no response (respondent said would send, left message for owner/manager, resent survey)	115
Determined not qualified (bad address, business outside King County, not a dry cleaners)	95
Total	475

square analysis, linear regression analysis, Student's *t*-tests, and Fisher's exact tests. Descriptive statistics were also calculated (i.e., means, medians, estimates of variability, percentages, and frequency distributions).

Results and Discussion

Detailed results, including tables of responses to all 46 questions, are provided in our technical report (Whittaker & Johanson, 2011).

Business Data Sources

The most useful source of business addresses was the commercial InfoUSA directory, which provided 94% of the valid business listings. The remaining four databases contributed only an additional 24 businesses.

Survey Response Rate

The sample disposition summary is presented in Table 1. As stated previously, the initial introductory letter was mailed to 475 businesses on the master list of dry cleaning businesses. Of these, 380 businesses were ultimately considered "qualified" for inclusion in the sampling frame. Responses were received from 64% of the qualified businesses, where the response rate was calculated as follows:

$$\begin{aligned}
 &\text{Response Rate \%} \\
 &= \left[\frac{\text{Completed surveys} + \text{Drop shops}}{\text{Completed surveys} + \text{Drop shops} + \text{Refused} + \text{Unreachable} + \text{No response}} \right] \times 100 \\
 &= \left[\frac{154 + 91}{154 + 91 + 17 + 115} \right] \times 100 = 64\%
 \end{aligned}$$

The response rate calculation includes responses from 91 drop shops and 154 dry cleaning facilities. Because the number of actual dry cleaning facilities in King County is unknown, it was not possible to calculate a response rate for these businesses alone.

Survey Responses

The remaining discussion will focus on the responses from the 154 dry cleaners who returned a completed survey. Sixty-five percent of the returned surveys were completed in Korean. Most survey respondents described themselves as the business owner (93%).

Selected survey responses are presented in Tables 2 through 5. Note that the sum of some of the percent values associated with some questions exceeded 100% when a respondent provided multiple answers to that question. Responses to additional questions are provided in our technical report (Whittaker & Johanson, 2011).

Survey Findings

Demographics and Cultural Characteristics

The first goal of our study was to learn about the demographics and cultural characteristics of the dry cleaning industry. The results of the survey (presented in Table 2) indicate that this is an industry dominated by small, family-run, independent businesses (84% are family-owned and operated; only 10% of businesses are part of a multistore business, consolidator, franchise, cooperative group, or similar collection of businesses). On the average, the owners have operated the businesses for 10 years. It is noteworthy, how-

TABLE 2

Dry Cleaning Industry Demographics and Cultural Characteristics

Question	Response
How long the respondent owned the business at the current location	1–5 years: 36%
	6–10 years: 20%
	11–15 years: 13%
	16–20 years: 18%
	>20 years: 13%
Business locations	Seattle: 34%
	Kirkland: 10%
	Other (22 cities): 56%
Number of employees	0: 26%
	1: 22%
	2: 24%
	3: 11%
	4: 5%
	5–10: 8%
	>10: 3%
Respondent's race/ethnicity	Korean: 84%
	Caucasian: 10%
	Other: 6%
Association membership	Washington State Korean Dry Cleaners Association: 56%
	Dry Cleaning Laundry Institute (DLI): 3%
	Northwest Dry Cleaning Association and DLI: 4%
	Other: 1%
	DLI and other: 1%
	Not specified: 4%
	No membership: 32%
Dry cleaning trade publications read	<i>The Korean Cleaners Monthly</i> : 34%
	<i>Dry Cleaning Times</i> : 13%
	<i>Clothesline</i> : 12%
	<i>American Dry Cleaners</i> : 12%
	<i>Western Cleaner and Launderer</i> : 11%
	<i>Dry Cleaning Information</i> : 10%
	<i>Dry Cleaners</i> : 5%
	Other: 16%
	Not specified: 9%
	No subscriptions: 16%

ever, that 36% had owned the business at that location for fewer than five years, indicating considerable turnover in business ownership. Businesses were located in 24 cities in King County, with over one-third located in the most populous city, Seattle.

Approximately one-quarter of the businesses had no employees and almost one-half had between one and two employees. Of the businesses that did not have employees, only 26% pay into L&I's industrial insurance system. Because businesses with no employees

or industrial insurance coverage are not subject to the Washington Industrial Safety and Health Act (WISH Act), they are not subject to compliance actions by local Division of Occupational Safety and Health (DOSH) inspectors at L&I, and are not eligible for technical assistance from DOSH consultants.

Over 80% of shops in King County were Korean owned, which is substantially greater than the estimate of 60% estimated by LHWMP in 1997–2000 (Local Hazardous Waste Management Program in King County

[LHWMP], 2005). This reported increase in Korean-owned businesses is consistent with oral testimony provided by key informants in the dry cleaning industry.

Sixty-eight percent of respondents belonged to a local or national dry cleaner association. The majority (84%) read at least one dry cleaning trade publication. Over one-third (34%) read *The Korean Cleaners Monthly*; this trade magazine has twice the reported readership of any other publication.

The majority (66%) received health and safety information from industry journals and newspapers. Only 18% retrieved information from state or local government agencies and none used private consultants.

Business Characteristics

The second goal was to learn about general business characteristics, including the solvents used for cleaning. Results are presented in Table 3. The vast majority (96%) had a single dry cleaning machine (four had two machines and two had three machines). Over two-thirds of businesses used PERC as a solvent, which was significantly fewer than was observed during LHWMP's 1997–2000 field activities (LHWMP, 2005). The LHWMP report states, "The industry, with a few exceptions, utilizes the solvent perchloroethylene ... as the principal cleaning agent during the process."

The median age of dry cleaning machines was 10 years. One machine was less than one year old, while three machines were 25 years old (see Figure 1). Almost a quarter (23%) were 15 years old or more, which is the expected lifetime of a dry cleaning machine. All machines older than 13 years (a total of 40 machines) used PERC.

On average, machines operated five or six days a week, usually in the morning, processing an average of two to three loads per day. Most businesses (71%) supplemented the dry cleaning with some amount of wet cleaning (i.e., with water as the solvent), even of "dry clean only" fabrics.

The shops were generally small (84% were less than 2,000 sq. ft. in area). Most facilities (77%) were part of a larger building, although people did not live in 84% of these buildings. Over two-thirds (69%) are colocated with businesses that sell or serve food, which is of potential concern because of PERC's ability to contaminate fatty foodstuffs in adjacent buildings (Miller & Uhler, 1988).

Current Work Practices

The third goal was to learn about current work practices. Machine maintenance was conducted primarily by the business owner (79%). Although the U.S. EPA's National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities requires PERC-using businesses to use a PERC vapor leak detector (or "sniffer"), the majority (69%) did not own or use such a device.

Although most respondents suggested that both respiratory protection (83%) and gloves (95%) were worn when the still bottoms are removed from the machine, the type of PPE used was often not appropriate. Although 39% of individuals who used respiratory protection used respirators with charcoal filters, an equivalent number used dust masks, even though those are not designed to provide protection from exposure to solvent vapors. Similarly, although 53% used reusable chemical-resistant gloves when cleaning out the still bottoms, 26% used latex gloves, which may not be adequate to protect against dermal exposures to complex solvent mixtures.

The majority (98%) of respondents reported that the still bottoms in their shop are hauled by a licensed hazardous waste carrier, which is the preferred method of disposal. The majority reportedly also managed their separator water appropriately, with 51% evaporating the water and disposing of the solvent, 32% having it hauled by a licensed hazardous waste vendor, and 17% using a carbon absorption system. It is noteworthy, however, that one business suggested that they disposed of this waste illegally by pouring it on the ground.

Business Owners' Perceptions and Needs

The fourth goal of the study was to learn about business owners' perceptions and needs concerning health and environmental protection. Data are presented in Table 4. Seventy-six percent of respondents who own a PERC machine said they were not considering buying a non-PERC machine in the next year. The vast majority of respondents (76%) cited financial considerations as the primary reason they would not switch from PERC to an alternative solvent. In addition, many respondents were not ready to replace equipment that operates well. Many also suggested that alternative solvents do not clean as well as PERC.

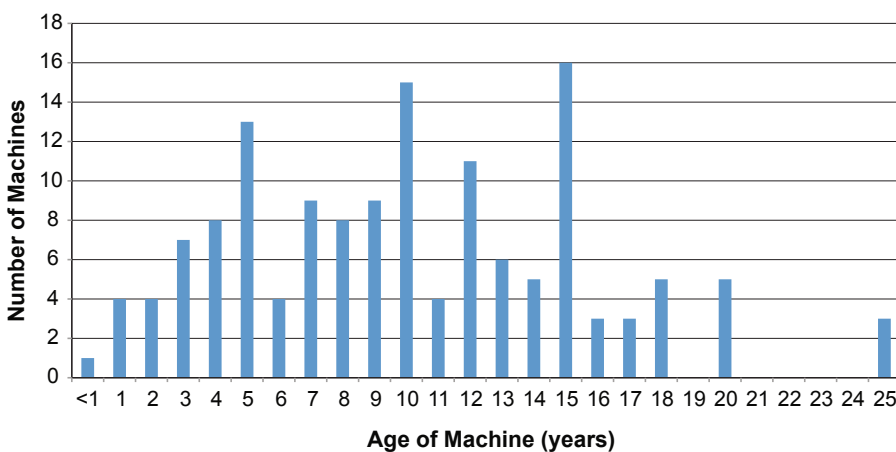
TABLE 3

Dry Cleaning Business Characteristics

Question	Response
Type of solvent used in primary dry cleaning machine	PERC ^a : 69%
	Hydrocarbon: 21%
	Glycol ethers: 4%
	Liquid silicone: 4%
	Liquid CO ₂ : 1%
	Other: 1%
Area of dry cleaning shop	<1,000 sq. ft: 3%
	1,000–1,999 sq. ft: 81%
	2,000–2,999 sq. ft: 12%
	>3,000 sq. ft: 4%
^a Perchloroethylene.	

FIGURE 1

Age of Dry Cleaning Machines



Of the 34% who said they are considering replacing their current PERC machine with an alternative solvent, 36% were considering wet cleaning, 32% were considering hydrocarbon, 20% were considering glycol ethers, and 16% were considering liquid silicone.

When asked to explain why they had switched from PERC, shops using alternative solvents said they were motivated primarily by environmental issues (59%). Only about one-third of respondents cited health concerns as a reason for switching. Other reasons cited include the costs associated with waste disposal and the prospect of more stringent regulations governing PERC usage.

When asked if they believe that PERC can cause health problems, 44% of respondents did not know or did not have an opinion. Only about one-quarter believed health problems are associated with using PERC. Most respondents who suggested any problems with PERC believed that it is simply an irritant, causing headaches or dizziness.

When asked what they think are the greatest challenges to running a profitable dry cleaning business that is also healthy and environmentally friendly, 36% cited the costs associated with buying or maintaining equipment and supplies.

TABLE 4

Perceptions About Health and Environmental Protection

Question	Response
Reasons preventing PERC ^a -using dry cleaners from buying a non-PERC machine	Financial barriers: 76%
	Current machine in good condition: 21%
	Alternatives not as good: 13%
	Leaving business soon: 3%
	Own a hydrocarbon machine: 3%
Reasons for switching to an alternative solvent	Lack of information: 1%
	Environment: 59%
	Health: 27%
	Landlord requirement: 22%
	Better cleaning: 11%
	PERC cost/regulation: 11%
	PERC odor: 8%
	Machine age: 5%
	Customer perception: 3%
To be "chemical free": 3%	
Challenges to running a safe, profitable, and environmentally friendly business	Equipment/supply costs: 36%
	Need for better/safer alternatives: 9%
	Lack of education/training: 9%
	General management challenges: 9%
	Taxes, fees, and regulations: 7%
	General financial difficulties: 7%
	Waste disposal fees: 4%
	Lack of public concern about environmental issues: 6%
	Nothing: 6%
	Other/don't know: 15%

^aPerchloroethylene.

Outreach and Intervention

The fifth goal of the study was to gather data to inform additional intervention strategies. Data are presented in Table 5. Fifty-seven percent of respondents requested technical assistance from LHWMP.

When asked what government agencies and programs could do to help improve the safety, health, and environmental performance of dry cleaning businesses, 42% requested financial assistance, particularly to assist with purchasing new machines and equipment. Interestingly, even more respondents (45%) requested training and education, particularly concerning health and safety.

Reflecting the demographics of this industry, 81% of respondents preferred to read technical and educational information in Korean; 29% said they prefer information in English.

Conclusion and Recommendations

The health and safety deficiencies noted in the dry cleaning industry are typical of those observed in previous studies of the auto body industry (Whittaker & Reeb-Whittaker, 2009) and other small businesses (National Institute for Occupational Safety and Health, 1999).

Education and Technical Assistance

The finding that the majority of dry cleaners are owned by Korean-speaking individuals compounds the difficulties in improving the health and environmental performance of this industry because of potential language and cultural barriers. Despite these challenges, the dry cleaning community in King County appears receptive to education and outreach efforts. For example, almost one-

half of respondents suggested a need exists for more government-sponsored training and education, exceeding the number who felt government should provide funds or other financial assistance.

Considering the resource limitations faced by state and local government programs, providing adequate technical assistance poses a significant challenge. Providing information to the dry cleaning community in a culturally appropriate manner is also challenging, but of paramount importance. In addition, any recommendations must be sufficiently specific to have the greatest impact. For example, many respondents were concerned about the lack of certainty regarding the safety of the alternative solvents and were requesting explicit recommendations from government agencies.

Dry cleaners would benefit from accessible information about the toxicity of PERC and how to protect against solvent exposure. Many dry cleaners do not believe PERC is hazardous or they view it as an irritant and are not aware that it is a probable carcinogen. Although respondents indicated that gloves and respirators were used, field observations suggest that those items, while available, frequently were not used. This finding is consistent with a 1999 study that found that although PPE was available, it typically was not used or used improperly (Goldenhar et al., 1999). Many dry cleaners understand that they should be using gloves and respiratory protection, but they do not understand how respirators function or why dust masks are inadequate.

Although most business owners maintain their own machines, field observations suggest that many would benefit from training on how to do so properly. For example, project staff observed an owner who had attempted to affix a failing gasket using rubber cement. The PERC vapors subsequently dissolved the rubber cement, rendering the repair ineffective. Dry cleaners would also benefit from education about the reasonable lifecycle of a dry cleaning machine and guidance about how to include equipment replacement costs into their capital budgets.

LHWMP has learned that the success of its outreach efforts hinges upon its ability to work through the local dry cleaning associations, provide materials in Korean and English, make repeated contact, and engage in face-to-face conversations with individual dry cleaners. This is particularly important

because of the high turnover in ownership. Many respondents indicated they would like educational opportunities provided in a seminar format, underscoring the need for a hands-on, interpersonal approach.

Given the substantial capital investment required to purchase and install new dry cleaning systems, another approach is to provide funding for businesses to make the transition from PERC. For example, the New Jersey Department of Environmental Protection provides grants of up to \$25,000 to businesses for dry cleaning equipment upgrades (New Jersey Department of Environmental Protection, 2011). Preliminary discussions with local dry cleaning business owners in King County revealed considerable enthusiasm for such a program, with several suggesting that a grant of this magnitude would allow them to upgrade their equipment almost immediately. Consequently, LHWMP recently implemented a pilot program to award grants of up to \$20,000 to several dry cleaners to facilitate the replacement of PERC machines. Other financial mechanisms could include low-interest loans or revolving funds designed specifically for small businesses administered either by local banks or government agencies.

Landlords and property owners are in a position to exert considerable pressure on PERC-using dry cleaners that operate within their buildings. Efforts could be directed towards these individuals by focusing on increased awareness of their liability should a business contaminate nearby environmental media.

Regulatory Options

Many local dry cleaners are not regulated by the DOSH program and are ineligible for consultation advice from L&I's industrial hygiene staff. Therefore, L&I should consider extending the protections afforded by the WISH Act to owner-operated businesses that do not pay into the state's industrial insurance program.

One of the most effective mechanisms by which PERC exposures can be reduced is banning its use as a dry cleaning solvent. The state of California is phasing out the use of PERC in dry cleaning, and officials in Illinois announced that they are also considering similar restrictions (Hawthorne, 2010). In addition, U.S. EPA's National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities specifies a phase-out of PERC-using dry

TABLE 5

Data to Inform Intervention Strategies

Question	Response
How respondents would spend \$500 in matching funds	Improving maintenance of existing machine: 48%
	Purchasing a “sniffer” or PERC ^a detector: 35%
	Improving the ventilation in my shop: 28%
	Improving spill management/containment around equipment: 24%
	Purchasing personal protective equipment: 21%
	Other: 3%
How government agencies and programs could help	Would not use the matching funds: 11%
	Financial assistance (all): 42%
	New machine/equipment: 24%
	General: 10%
	Waste disposal: 4%
	Health insurance: 4%
	Training and education (all): 45%
	Health and safety training and education: 32%
	Training and endorsement of specific technologies or brands: 8%
	Help increase public/customer awareness: 4%
	More regulation (all): 10%
	More inspections/enforcement: 6%
	Tighter zoning restrictions: 4%
Don't want government help/interference: 6%	
Other/don't know: 17%	

^aPerchloroethylene.

cleaners in facilities colocated with residential units. Several jurisdictions have adopted more stringent requirements than those specified by U.S. EPA. For example, the state of Maine extended the definition of “colocation” to include daycare centers; health care facilities; prisons; elementary, middle, or high schools; children’s preschools; senior centers; youth centers; or other facilities inhabited by children or the elderly (State of Maine, Department of Environmental Protection, Bureau of Air Quality, 2011).

Regulation could also have a substantial impact on public awareness and demand. Many customers do not understand that dry cleaning involves applying solvents to their clothes and other fabrics. Customers are likely not aware of the health concerns associated with dry cleaning solvents or know which alternatives are the safest or most environmentally friendly. The issue is further compounded by many businesses claiming to be “green” based on recycling practices rather

than solvent properties. To increase public awareness, efforts could be directed towards requiring that all dry cleaners display the type of solvent they use on the door or window of their business. This signage could alert customers to the type of solvent in use as well as any associated health concerns.

Improving Scientific Understanding

A final recommendation is for an independent review of the toxicology and environmental fate of the alternative dry cleaning solvents. Local government entities and businesses urgently need reliable information about “safer alternative” solvents and other products. This need has been highlighted by the recent finding of neurological disease in dry cleaners who adopted 1-bromopropane as a solvent alternative to PERC (Blando, Schill, De La Cruz, Zhang, & Zhang, 2010; Centers for Disease Control and Prevention, 2008). In addition, a new dry cleaning technology has recently been introduced to the U.S. from

Europe. Known as “System K4,” this process uses a solvent called “Solvon K4,” which is primarily dibutoxymethane (or butylal). To our knowledge the only toxicological data for this solvent have been generated by the manufacturer (Kreussler & Co.).

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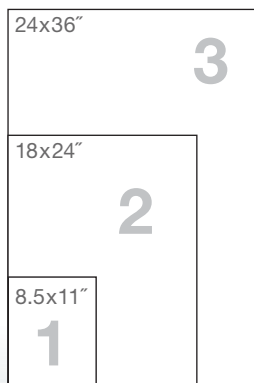
“Reducing Worker Exposure to Perchloroethylene (PERC) in Dry Cleaning” is the name of a guidance document prepared by the Occupational Safety and Health Administration to help dry cleaning establishments reduce employee exposure to PERC. You can access this document at osha.gov/dsg/guidance/perc.html.



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Public Infrastructure Disparities and the Microbiological and Chemical Safety of Drinking and Surface Water Supplies in a Community Bordering a Landfill

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Abstract The historically African-American Rogers-Eubanks community straddles unincorporated boundaries of two municipalities in Orange County, North Carolina, and predates a regional landfill sited along its border in 1972. Community members from the Rogers-Eubanks Neighborhood Association (RENA), concerned about deterioration of private wells and septic systems and a lack of public drinking water and sewer services, implemented a community-driven research partnership with university scientists and community-based organizations to investigate water and sewer infrastructure disparities and the safety of drinking and surface water supplies. RENA drafted memoranda of agreement with partners and trained community monitors to collect data (inventory households, map water and sewer infrastructure, administer household water and sewer infrastructure surveys, and collect drinking and surface water samples). Respondents to the surveys reported pervasive signs of well vulnerability (100%) and septic system failure (68%). Each 100-m increase in distance from the landfill was associated with a 600 most probable number/100 mL decrease in enterococci concentrations in surface water (95% confidence interval = -1106, -93). Pervasive private household water and sewer infrastructure failures and poor water quality were identified in this community bordering a regional landfill, providing evidence of a need for improved water and sanitation services.

Introduction

The disproportionate location of environmental hazards in low-income communities and communities of color is often referred to as environmental injustice (Bul-

lard, 1994; Bullard & Johnson, 2000). This may occur due to specific targeting, or it may be a consequence of historical land use patterns, land prices, or other structural factors arising out of inequalities of

race and class (Morello-Frosch Pastor, Porras, & Sadd, 2002; Norton et al., 2007; Wilson, Howell, Wing, & Sobsey, 2002; Wing, Cole, & Grant, 2000). Communities near waste disposal sites or industries that release harmful pollutants or other environmental hazards usually lack the financial resources and institutional connections to conduct research into sources and levels of contamination. It can therefore be difficult to improve understanding of the extent to which low-income communities and communities of color may be disproportionately affected. Such research may help strengthen community organizing efforts and actions to encourage policy change and compliance with public health standards. Although partnerships with researchers can help communities gain access to research and build capacity, the interests of relatively privileged research institutions as well as the career interests of researchers may conflict with the needs of communities facing environmental injustices. This potential for conflict has led to the development of principles to help communities prevent harm and maximize potential for research to improve community welfare (Heaney et al., 2011; Heaney, Wilson, & Wilson, 2007; Israel, Eng, Schulz, Parker, & Satcher, 2005; Minkler, Vasquez, Tajik, & Petersen, 2008; O'Fallon & Dearry, 2002; Parker et al., 2003; Wilson, Bumpass, Wilson, & Snipes, 2008).

Residents of the historically African-American Rogers-Eubanks community located in Orange County, North Carolina, which borders the Orange County regional landfill, have expressed concerns about a lack of basic amenities including public services such as regulated public drinking water and sewer service; storm water management; paved roads and sidewalks; community lighting; curbside solid waste collection; and emergency medical, fire, and police protection services (Campbell, 2007). Since 1972, Rogers-Eubanks community residents have requested connections to regulated public water and sewer services as well as assessments of the vulnerability of private wells, the failure of onsite septic systems, and the microbiological and chemical safety of drinking and surface water supplies in their community. The objective of our study was to investigate the lack of regulated public drinking water and sewer services and to assess the microbiological and chemical safety of household drinking water and surface water supplies following community-driven research methods (Heaney et al., 2007, 2011).

Methods

Below, we discuss the procedures to map water and sewer infrastructure disparities, inventory households, assess the prevalence of vulnerability and failure characteristics of household water and sewer infrastructure, evaluate the microbiological and chemical safety of drinking and surface water supplies, and sustain partnerships between the Rogers-Eubanks Neighborhood Association (RENA) and researchers at the University of North Carolina at Chapel Hill.

Mapping the Rogers-Eubanks Community, the Landfill, and Basic Amenities Disparities

GIS maps were created based on community members' historical knowledge of their community boundaries. Since 1972, RENA community members have served on local government task forces to develop consensus on community benefits for hosting the regional landfill and to define a boundary area of the predominantly African-American community for enhancement-planning purposes (most task forces defined community boundaries to facilitate cost estimation to provide services to RENA commu-

nity members). The "Rogers Road Historic Area" was created and maps were produced. These task force maps, GIS data files, and residents' knowledge were combined to map tax parcels and regulated public drinking water and sewer mains (as of November 2007) in the Rogers-Eubanks community. U.S. Census data (from 2000) on percentage African-American at the block level (Census blocks 1000, 1001, and 2020) were used to depict the racial composition of census blocks that bisect the community compared to census blocks surrounding the community. Property value data (from April 2007) were obtained from Orange County, North Carolina, tax parcel records. GIS maps were created using ArcMap.

Survey of Household Water and Sewer Infrastructure Survey

Since 1972, residents of the Rogers-Eubanks community have searched public records, organized residents, and distributed petitions to investigate water and sewer infrastructure concerns. Rogers-Eubanks community residents formed a partnership with scientists at the University of North Carolina at Chapel Hill (UNC) and student members of the Daniel A. Okun chapter of Engineers Without Borders (EWB). Community residents also partnered with the community-based organizations North Carolina Environmental Justice Network (NCEJN) and the West End Revitalization Association (WERA) to seek guidance to establish RENA, a 501c3 organization.

To inform recruitment planning, RENA and its partners inventoried households by reviewing an August 2008 list of tax parcels located in the Rogers-Eubanks community as compiled by the local county water and sewer authority. RENA tabulated the number of parcels with and without connections to regulated public water and sewer service, cross-referencing this list with community members' input to exclude vacant parcels and households recently built by Habitat for Humanity. RENA members performed outreach to households on the inventory list by going door-to-door and calling residents to inform them about the study partnership and survey and by inviting residents to attend community meetings describing the study. Study brochures were distributed door-to-door and

in person at community meetings held at a local church. RENA community members administered surveys to households that responded with interest.

Household survey questions were adapted from a survey developed by WERA, a community-based partner of RENA (Heaney et al., 2011), and covered information on household demographics such as race/ethnicity, age, average annual income, number of household occupants, rental/ownership status, age of the home, and length of residence within home. Guidelines of the World Health Organization (WHO, 1994), the North Carolina Department of Environment and Natural Resources (NCDENR, 2012), and Orange County Health Department's Division of Environmental Health Services (OCHD, 2008) were used to evaluate signs of the following:

- 1.) Well vulnerability, defined as reports of one or more of the following: failure of the well pump; well water has a cloudiness, tastes bad, or smells bad; and history of disinfection of the well with chlorine.
- 2.) Septic system failure, defined as reports of one or more of the following: septic tank pumping frequency of at least once a year; septic discharge making the yard wet during nonrainfall periods; and septic system backup into the home.

The household survey also included questions designed to assess residents' willingness to connect to municipal services, ability to pay a monthly water and sewer bill, willingness to sign a petition to be annexed by nearby towns, influences on decisions related to annexation (e.g., connection to water and sewer services, access to community development block grant [CDBG] funds, right to vote in town elections, voice in zoning of property), and willingness to sign a petition to create a neighborhood conservation district as a strategy to ease possible tax increases from annexation.

Drinking and Surface Water Sample Collection and Analysis

Teams of RENA community monitors (CMs), UNC scientists, and EWB members were trained in the aseptic method of water sample collection as described in the 20th edition of the American Public Health Association's (APHA's) *Standard Methods for the Examination of Water and Wastewater* (APHA,

FIGURE 1

Distribution of Regulated Public Water and Sewer Mains and Percentage African-American by Census Block (2000 U.S. Census) Within and Outside of the Historic Rogers-Eubanks Community



1998). Drinking water samples were drawn from an indoor faucet, outdoor spigot, or from the well pump spigot after running the water for three minutes. Drinking water samples were collected at households using private wells and those using regulated public water service. A surface water sample collection dry run was completed in May 2009 and weekly surface water samples were collected between June and July 2009 at varying distances from the landfill. GPS coordinates were recorded (latitude and longitude) for each surface water sampling location.

Each water sample was assigned a unique alphanumeric code before transport at 4°C to the laboratory for analysis.

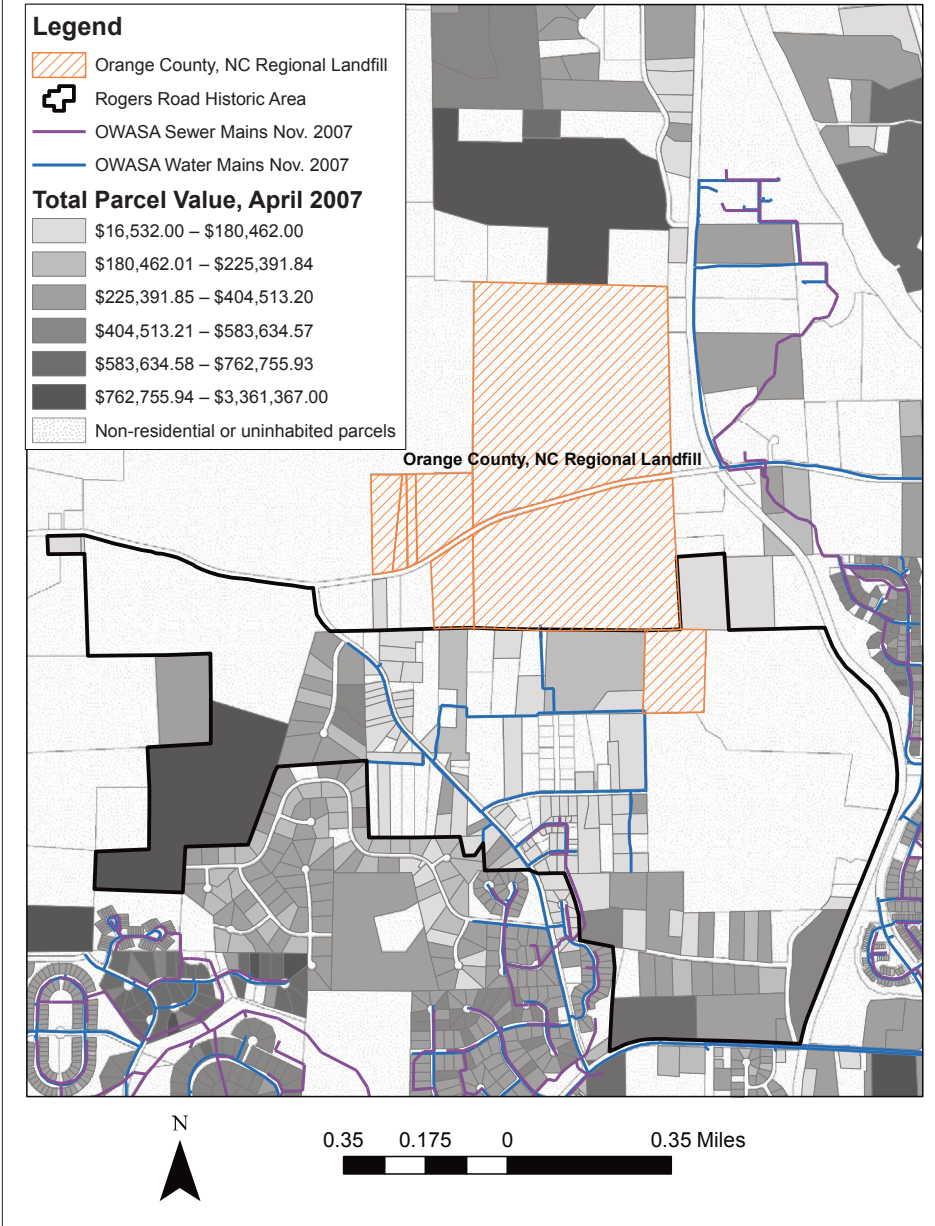
Physical, Microbiological, and Chemical Measurements

Turbidity was measured in nephelometric turbidity units (NTU) using the Hach 2100N turbidimeter. Fecal coliforms and *E. coli* were measured using the Colilert IDEXX Quanti-Tray most probable number (MPN) assay. Enterococci were enumerated using the Enterolert IDEXX Quanti-Tray

MPN assay. The North Carolina Division of Water Quality laboratory performed aluminum, arsenic, barium, cadmium, copper, chromium, nickel, lead, selenium, silver, and volatile organic compounds analyses of water samples following standard methods (U.S. Environmental Protection Agency [U.S. EPA], 1996a, 2006a, 2007a, 2007b). A state-certified commercial laboratory performed total organic carbon analyses of surface water samples following standard methods (APHA, 1998). The North Carolina Department of Agriculture and

FIGURE 2

Total Tax Parcel Value Within and Surrounding the Orange County Regional Landfill and Historic Roger-Eubanks Community



Consumer Services (NCDACS) laboratory performed analyses of ammonia, chlorine, iron, magnesium, manganese, nitrate, pH, phosphorus, potassium, total alkalinity, zinc, and hardness in drinking and surface waters in accordance with NCDENR specifications and methods for routine soil and solutions reports (NCDACS, 2012; NCDENR, 2005a, 2005b).

Statistical Analysis

Two-sample exact tests were used to evaluate differences in mean turbidity (NTU) and median fecal indicator bacteria (FIB) (MPN/100 mL) levels in private well water compared with public water samples (Stokes, Davis, & Koch, 2001). Binary variables, based on U.S. Environmental Protection Agency (U.S. EPA) national primary drink-

ing water standards maximum contaminant limits (MCLs) set by the Safe Drinking Water Act Amendments of 1996 (U.S. EPA, 1996b) and NCDENR groundwater quality standards (NCDENR, 2005a), were created for turbidity (>1.0 vs. ≤ 1.0 NTU), fecal coliforms (≥ 1 vs. < 1 MPN/100 mL), and *E. coli* (≥ 1 vs. < 1 MPN/100 mL). Although no drinking water quality guideline exists for enterococci, a binary variable was created for enterococci (≥ 1 vs. < 1 MPN/100 mL). A binary index variable was created to reflect when samples exceeded one or more of the drinking water quality standard MCLs for turbidity, fecal coliforms, or *E. coli*. Wilcoxon and Fisher's exact tests (Stokes et al., 2001) were used to evaluate the statistical significance of associations (two-tailed tests) between each binary drinking water fecal indicator variable (turbidity, fecal coliforms, *E. coli*, and enterococci) and binary variables for drinking water type (e.g., private well vs. public water) and septic system failure (i.e., yes vs. no), respectively (Stokes et al., 2001). Randomization was not used in the study design, therefore reported *p*-values should not be interpreted as reflecting the probability that the results would be observed by chance under the null hypothesis that no difference exists between the groups being compared.

Binary variables based on U.S. EPA and NCDENR recreational freshwater quality criteria were created to assess the frequency with which microbiological and chemical criteria and standards were exceeded in weekly surface water samples. Fixed effects linear regression models, conditioned on sampling location, were used to evaluate the association between weekly measures of concentrations of surface water quality parameters with increasing distance from the landfill (Allison, 2005). Statistical analyses were completed using SAS version 9.

Results

Mapping Regulated Public Water and Sewer Services in the Rogers-Eubanks Community

Figure 1 shows the boundary of the Rogers Road Historic Area (in a solid black line), which is the area of the Rogers-Eubanks community delineated by local governments for enhancement planning purposes. Regulated public water and sewer mains are depicted as

Orange Water and Sewer Authority (OWASA) water and sewer mains, respectively. Figure 1 shows a large network of regulated public drinking water and sewer mains surrounding the Rogers Road Historic Area, with some extensions bisecting the community. The OWASA water mains that extend into the Historic Rogers Road Area south of the Orange County regional landfill (Figures 1 and 2) have provided some households access; however, service connections remain out of reach for some Rogers-Eubanks community members. Census data on blocks 1000 (60% African-American) and 2020 (64% African-American) cover the majority of the area of the Rogers Road Historic Area. Census block 1001 (10% African-American) bisects the western area of the Rogers Road Historic Area (Figure 1) and is weighted disproportionately by a large non-African-American population in new high-density developments at the southern area of census block 1001. The Rogers Road Historic Area's proximity to the Orange County regional landfill is also depicted (Figure 1). Figure 2 displays total tax parcel value data from April 2007, illustrating a geographic pattern of depressed total tax parcel value that encompasses the Rogers Road Historic Area.

Survey of Household Water and Sewer Infrastructure

Household Recruitment and Demographic Characteristics

RENA formed 11 partnerships with university, community-based, and other service organizations, and trained six CMs to collect environmental data. RENA identified 73 households located in the historic African-American Rogers-Eubanks community. Of the 73 identified households, 38 (52%) responded positively to RENA's outreach activities. Of these 38 households, a total of 27 respondents (71%) completed a household survey, with one adult household member providing responses for additional household members. A total of 58 individuals lived in the 27 households surveyed. Twenty-six (96%) respondents reported African-American race/ethnicity and one (4%) reported Caucasian race. Just over one-third of the respondents were above the age of 65. Thirteen respondents reported an annual household income of <\$30,000 and 23 reported two or more people living in the household.

TABLE 1

Demographic Characteristics of Households Surveyed in a Community Bordering a Regional Landfill

Characteristic	#	%
Households in the Rogers-Eubanks community	73	100
Households responding to outreach	38	52
Households responding to survey	27	71
Race/ethnicity		
Caucasian	1	4
African-American	26	96
Age group (yrs.)		
18-<35	0	0
35-<45	1	4
45-<55	8	31
55-<65	7	27
≥65	10	38
Not given	1	4
Number of household occupants		
1	5	21
2	10	42
3	4	17
4	4	17
5	5	4
Not given	3	11
Annual household income		
<\$20,000	6	29
\$20,000-<\$30,000	7	33
\$30,000-<\$40,000	5	24
\$40,000-<\$50,000	1	5
≥\$50,000	0	0
Don't know	2	10
Not given	6	22
Number of years occupant lived in the household		
<1	1	4
2-<5	3	12
5-<10	2	8
10-<20	5	19
20-<30	2	8
≥30	13	50
Not given	1	4
Homeownership status		
Rent	1	4
Own	26	96

Six respondents (out of 27) reported that they had a job or occupation, which included keeping house or going to school, as well as working for pay or profit. Forty-one percent of the homes were built 30 or more years ago and nearly half of respondents reported living in their home for 30 years or longer (Table 1).

Vulnerability of Household Wells and Failure of Private Household Septic Systems
 Seventeen households (52%) reported having an operating private well, of which seven reported using a private well as their primary drinking water source. The median year of well construction was 1962 (with the oldest

TABLE 2

Drinking Water and Sewage Disposal System Characteristics at Households Surveyed in a Community Bordering a Regional Landfill

Characteristic	#	%
Household drinking water source (<i>N</i> = 27)		
Regulated public water	20	74
Private well	7	26
Households with an operating private well (<i>N</i> = 27)		
Yes	17	63
No	9	33
Not given	1	4
Year of well construction (<i>n</i> = 17)		
Before 1950	1	6
1950–<1975	6	35
1975–<1995	4	23
1995–present	1	6
Don't know	1	6
Not given	4	24
History of well pump failure (<i>n</i> = 17)		
Yes	14	82
No	1	6
Don't know	1	6
Not given	1	6
Well water is cloudy, tastes bad, or smells bad (<i>n</i> = 17)		
Yes	14	82
No	3	18
History of chemical treatment of well water (<i>n</i> = 17)		
No	8	47
Chlorine or other chemical	6	35
Don't know	3	18
Household wells with one or more signs of vulnerability (<i>n</i> = 17)		
Yes	17	100
No	0	0
Household sewage disposal system (<i>n</i> = 17)		
Connected to regulated public sewage	5	19
Private septic system	22	81
Year of septic system construction (<i>n</i> = 22)		
Before 1930	1	5
1930–<1950	1	5
1950–<1970	7	33
1970–<1990	4	19
1990–present	6	20
Don't know	2	10
Not given	1	5
Septic tank pumping frequency (<i>n</i> = 22)		
Less than once a year	13	59
At least once a year	5	23
Don't know	3	14
Not given	1	5

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constructed in 1949 and the most recent in 2005). Signs of well vulnerability were common and included failure of the well pump (14 of 17); a cloudiness, bad taste, or bad smell of well water (14 of 17); and a history of disinfection of the well with chlorine or another chemical (6 of 17). All 17 household well owners surveyed reported one or more of these three signs of well vulnerability (Table 2).

Twenty-two households (78%) reported having a private onsite septic system. The median year of septic system construction was 1971 (with the oldest constructed in 1926 and the most recent in 2008). Signs of septic system failure were common. Five households reported a septic tank pumping frequency of at least once a year, two reported septic discharge making the yard wet, six reported septic backup into the home, and 19 reported septic system malodor. Fifteen of 22 septic system users surveyed reported one or more signs of septic system failure. Of the 15 households with private septic systems and operating wells, 10 (67%) had one or more signs of well vulnerability and one or more signs of septic system failure (Table 2).

Willingness to Connect to Water and Sewer Services

Survey respondents reported that if a connection could be provided to them free of charge, they would be willing to connect to the following: public water only (1/28); public sewer only (5/28); both (18/28); neither (2/28), or didn't know whether they would be willing to be connected (1/28). Just over half (15/27) of respondents said that if they were connected, they could afford to pay a monthly water and sewer bill. Just under half of respondents (13/26) said that they would be willing to sign a petition to be annexed into town limits and 6/26 said they didn't know if they would be willing. Reasons respondents provided as influencing their decision about annexation included possibility of future connection to regulated public water and sewer services (8/13); access to CDBG funding for home repairs such as winterizing (10/13); right to vote in town elections (10/13); and voice in zoning of property (11/13). Eleven of 25 respondents reported needing urgent home repairs including plumbing (4/11), roof (4/11), windows/doors/winterizing (4/11), ceiling (3/11), floors (2/11), electrical

(2/11), and disability ramp (2/11). Eight of 27 respondents reported that they would be willing to sign a petition to create a neighborhood conservation district as a strategy to ease possible tax increases as a result of annexation, but over half (15/27) said they did not know whether or not they would be willing to sign such a petition.

Microbiological Safety of Household Drinking Water

Drinking water samples were collected from 20 households in the Rogers-Eubanks community: 12 households with private wells and 8 households with a regulated public drinking water supply. The FIB fecal coliforms, *E. coli*, and enterococci were detected in private wells, but not in regulated public drinking water (Table 3). The presence of fecal coliforms, *E. coli*, and enterococci was observed in 5/12, 1/12, and 1/12 private wells, respectively (Table 3). Mean turbidity of private well water samples was 28 NTU versus 0.7 NTU for public water ($p = .0005$) (Table 3). Of the 12 wells sampled, 8 wells had turbidity levels higher than standards set for public water utilities (1.0 NTU) (U.S. EPA, 2006b). Using a binary index variable of MCL violations for turbidity, fecal coliforms, and *E. coli*, all 12 private well water samples exceeded at least one or more national primary drinking water standards (U.S. EPA, 2006b), compared with only one of the regulated public drinking water samples (turbidity MCL violation only) ($p = .0001$). We did not observe evidence that microbiological and turbidity drinking water measures were associated with household septic system failure (data not shown).

Chemical Safety of Household Drinking Water

Methyltert-butylether (MTBE) (0.7 µg/L), trichloroethene (2 µg/L), 2,6-di-tert-butylquinone (2.3 µg/L), and 1,2-dichloropropane (2 µg/L) were detected in one private well. Another private well had measureable amounts of MTBE (2.2 µg/L) and one other well had measureable amounts of 1,1-dichloroethane (0.6 µg/L) (Table 3). Levels of MTBE, trichloroethene, 2,6-di-tert-butylquinone, 1,2-dichloropropane, and 1,1-dichloroethane were all below federal (U.S. EPA, 2006b) and North Carolina (NCDENR, 2005a) drinking water quality standards.

TABLE 2 continued from page 29

Drinking Water and Sewage Disposal System Characteristics at Households Surveyed in a Community Bordering a Regional Landfill

Characteristic	#	%
Septic system makes yard wet during nonrainfall periods ($n = 22$)		
Yes	2	9
No	20	91
Septic system backs up into the home ($n = 22$)		
Yes	6	27
No	16	73
Households with one or more signs of septic system failure ($n = 22$)		
Yes	15	68
No	7	32
<i>Note.</i> Vulnerable private household well defined as one or more of the following: history of pump failure; cloudiness, bad taste, or bad smell of water; or history of treatment of well. Private septic system failure defined as one or more of the following: septic tank pumping frequency of at least once a year; septic system makes yard wet during nonrainfall periods; or septic system backs up into the home.		

Nitrate levels in wells were below the federal (U.S. EPA, 2006b) and North Carolina groundwater standard of 10 parts per million (ppm) (NCDENR, 2005a). Mean nitrate in private wells was higher than in regulated public water supplies ($p = .0024$). The highest nitrate level in a private well was 4.2 ppm and in regulated public water was 0.5 ppm. Mean ammonia in private wells was also higher than in regulated public water supplies ($p = .00004$) (Table 3).

Levels of aluminum, barium, cadmium, copper, nickel, and zinc were detected in private wells within current regulatory standards (U.S. EPA, 2006b). Five of 12 wells were above the federal recommended drinking water limit of 0.3 mg/L for iron (U.S. EPA, 2006b) and mean iron was higher in private wells than in regulated public water supplies ($p = .0381$). One private well (0.065 mg/L) exceeded the federal recommended drinking water limit of 0.015 mg/L for lead (Table 3) (U.S. EPA, 2006b). Five of 12 wells were above the federal recommended drinking water limit of 0.05 mg/L for manganese (U.S. EPA, 2006b). One public water sample (2.7 mg/L) exceeded the federal recommended drinking water limit of 1.3 mg/L for copper (U.S. EPA, 2006b).

Chlorine was observed in all private well and regulated public water supplies at concentrations greater than 4.0 mg/L, the maxi-

mum residual disinfectant level set by U.S. EPA (2006b). Higher mean chlorine concentrations were observed, however, in regulated public water supplies compared with private wells ($p = .0007$). Disinfection by-products in the total trihalomethane group were detected more frequently and at higher mean concentrations in regulated public drinking water compared with private well water. For example, mean dibromochloromethane ($p = .0361$) and chloroform ($p = .0361$) concentrations were higher in regulated public drinking water supplies compared with private wells. Mean pH was lower in private wells compared with regulated public water supplies ($p = .00004$). Of the 12 private wells sampled, 11 were below the recommended drinking water limit of 6.5 pH units, whereas none of the public water samples fell below this pH limit ($p = .0002$) (Table 3) (U.S. EPA, 2006b).

Microbial Safety of Recreational Surface Water Supplies

Recreational surface water supplies exceeded the recommended federal guideline for fecal coliforms (200 MPN/100 mL) in 40/40 samples, *E. coli* (126 MPN/100 mL) in 21/50 samples, and enterococci (33 MPN/100 mL) in 43/50 samples. Twenty-one of 40, 8/50, and 11/50 surface water samples exceeded the assay upper detection limit (>2,420

TABLE 3

Microbial and Chemical Contaminants in Private Well Water Versus Public Drinking Water at Households in a Community Bordering a Regional Landfill

Contaminant	Private Well Water			Public Water		
	#	# Pos ^a	Mean (Min, Max) ^b	#	# Pos ^a	Mean (Min, Max) ^b
Turbidity (NTU)	12	8 ^c	28 (0.3, 231)**	8	1 ^c	0.7 (0.1, 4.7)**
Fecal coliforms (MPN/100 mL)	12	5	23 (0.5, 236)	8	0	–
<i>E. coli</i> (MPN/100 mL)	12	1	1	8	0	–
Enterococci (MPN/100 mL)	12	1	1553	8	0	–
Nitrate (ppm)	12	12	1.1 (0.1, 4.2)*	7	4	0.1 (0, 0.5)*
Ammonia (ppm)	12	12	0.5 (0.4, 0.7)***	7	4	0.2 (0.2, 0.4)***
pH ^d	12	–	5.5 (4.6, 6.8)***	7	–	8.0 (7.8, 8.2)***
Total alkalinity CaCO ₃ (ppm)	12	12	35 (10, 140)	7	7	45 (25, 110)
Arsenic	12	0	–	7	0	–
Aluminum	12	1	2*	7	3	1296 (0, 8300)*
Barium	12	2	2.5 (0, 28)**	7	7	29 (26, 38)**
Cadmium	12	1	2	7	0	–
Chlorine (mg/L)	12	12	8.8 (4.4, 23.8)**	7	7	18 (16, 20)**
Copper	12	12	90.8 (6.1, 510)	7	7	400 (7.6, 2700)
Iron (mg/L)	12	8	4.0 (0, 36.0)*	7	1	0.3*
Lead	12	2	6.3 (0, 65)	7	1	15
Manganese (ppb)	12	8	99.2 (0, 520)*	7	0	–
Nickel	12	0	–	7	1	20
Selenium	12	0	–	7	0	–
Silver	12	0	–	7	0	–
Zinc	12	12	135 (34, 630)*	7	6	55 (0, 250)*
1,1-Dichloroethane	12	1	0.6	7	0	–
1,2-Dichloropropane	12	1	2	7	0	–
2,6-Di-tert-butylquinone	12	1	2.3	7	0	–
Bromodichloromethane	12	0	–	7	2	3 (0, 11)
Bromomethane	12	0	–	7	0	–
Chloroform	12	1	0.17*	7	3	16 (0, 41)*
Chloromethane	12	0	–	7	0	–
Dibromochloromethane	12	0	–	7	3	0.7 (0, 1.9)*
Isopropylalcohol	12	0	–	7	0	–
Methyltert-butylether	12	2	0.2 (0, 2.2)	7	0	–
Trichloroethene	12	1	2	7	0	–

Note. NTU = nephelometric turbidity units; MPN = most probable number; ppm = parts per million; CaCO₃ = calcium carbonate; ppb = parts per billion.

^aNumber of samples above the detection threshold unless otherwise noted.

^bUnits are µg/L unless otherwise noted.

^cProportion of samples >1 NTU.

^dStandard pH units.

* $p < .05$, ** $p < .001$, *** $p < .0001$.

MPN/100 mL) for fecal coliform, *E. coli*, and enterococci, respectively (Table 4). Twenty-nine of 50 samples exceeded the NCDENR-recommended turbidity guideline of 50 NTU

for protection of freshwater aquatic life and 45/50 samples exceeded the NCDENR recommended guideline of 10 NTU for trout fishing waters (NCDENR, 2007).

Chemical Safety of Recreational Surface Water Supplies

Levels of nitrate and ammonia were low in all surface water samples (Table 4). pH was below 6.0 in 26/40 samples, which is the NCDENR recommended lower limit for protection of freshwater aquatic life (NCDENR, 2007). The NCDENR recommended levels for protection of freshwater aquatic life (NCDENR, 2007) were exceeded for aluminum (50 µg/L) in 2/40 samples, copper (7 µg/L) in 4/40 samples, iron (1 ppm) in 38/40 samples, and manganese (200 µg/L) in 27/40 samples. Total organic carbon was detected in 50/50 surface water samples (range = 2.5–83 mg/L). Disinfection byproducts and other volatile organics were detected at low levels (Table 4).

Association Between Distance From Landfill and Surface Water Quality

A 100-m increase in distance from the landfill was associated with a 600 MPN/100 mL decrease in average enterococci concentrations in surface water (95% confidence interval = -1106, -93) (Table 5). Concentrations of surface water contaminants generally decreased with increasing distance from the landfill. Associations between distance from the landfill and concentrations of other contaminants were not as strong, however, as the association observed for enterococci (Table 5).

Discussion

The results of our study suggest that racial and socioeconomic disparities exist in the geographic distribution of regulated public drinking water and sewer services (Figures 1 and 2) and that, among households surveyed in the Rogers-Eubanks community, problems exist with drinking water and sewer infrastructure, housing conditions, and the microbiological and physical-chemical safety of private well water and surface water supplies. Through this community-driven research approach (Heaney et al., 2007, 2011) Rogers-Eubanks community members empowered themselves to establish a 501c3 community-based organization (i.e., RENA), used memoranda of understanding to prioritize research partnerships, and developed organizational capacity to support environmental data collection. GIS maps and household survey data revealed service-extension and connection disparities in this predominantly African-

American community. Although regulated public drinking water and sewer mains extend to portions of the historic Rogers-Eubanks community, some African-American households cannot afford construction and tap-on costs associated with lateral lines to connect to regulated public drinking water and sewer mains. Local governments have not funded lateral line connections for all households regardless of income.

RENA's household survey data collection, involving training community monitors to distribute study brochures, make door-to-door visits and phone calls, and organize community meetings, resulted in slightly more than half of the households in the historic Rogers-Eubanks community responding positively to outreach activities, and nearly three-quarters of those households responding to the survey. The strength of the household survey results is not necessarily in their representativeness of, or generalizability to, the broader Rogers-Eubanks community; rather, they demonstrate that some Rogers-Eubanks households do indeed have problems with drinking water and sewer infrastructure, housing conditions, and compliance with microbiological and chemical water quality criteria and standards.

While the sample was small ($N = 27$), all 17 households with operating private wells reported one or more signs of vulnerability and 15 of 22 (68%) households with private septic systems reported one or more signs of failure. Comparison data from a county-wide survey of 1,333 onsite septic systems in Orange County, North Carolina, in 1980 showed an 11% prevalence of failure (Grayson, Olive, & Steinbeck, 1982).

Turbidity, or the amount of suspended solids in water, was higher in private well water samples than in regulated public drinking water samples. This is important because pathogenic bacteria and viruses can attach to suspended solids and solids can also interfere with well disinfection techniques, leading to an increased risk of gastrointestinal illness (Egorov, Naumova, Tereschenko, Kislitsin, & Ford, 2003; Morris, Naumova, Levin, & Munasinghe, 1996; Schwartz & Levin, 1999; Schwartz, Levin, & Goldstein, 2000; Uhlmann et al., 2009; U.S. Geological Survey, 2009). Fecal coliforms, *E. coli*, and enterococci were detected in private well water samples (at concentrations up to

TABLE 4

Microbial and Chemical Contaminants in Surface Water Collected May to July 2009 in a Community Bordering a Regional Landfill

Contaminant	Surface Water		
	#	# Pos ^a	Mean (Min, Max) ^b
Turbidity (NTU)	50	50	202 (5.6, 1358)
Fecal coliforms (MPN/100 mL) ^c	40	40	1480 (13, >2420)
<i>E. coli</i> (MPN/100 mL) ^d	50	21	535 (0.5, >2420)
Enterococci (MPN/100 mL) ^e	50	43	759 (2, >2420)
Nitrate (ppm)	40	40	0.21 (0, 2.75)
Ammonia (ppm)	40	40	0.35 (0, 1.42)
pH ^f	40	–	5.9 (4.7, 7.9)
Aluminum	40	2	5035 (770, 9300)
Arsenic	40	11	2.9 (0.3, 6)
Barium	40	11	113.8 (20.4, 710)
Cadmium	8	8	0.3 (0.3, 0.3)
Chlorine (ppm)	40	39	4.7 (0, 14.5)
Chromium	40	10	5.1 (0.3, 23)
Copper	40	12	16.5 (15, 21)
Iron (ppm)	40	40	6.9 (0.9, 20.5)
Lead	40	10	5.4 (1.3, 15)
Manganese (ppm)	40	40	0.7 (0.03, 2.0)
Nickel	40	2	14 (12, 16)
Selenium	8	8	0.4 (0.3, 1.0)
Silver	8	8	0.3 (0.3, 0.3)
Zinc	40	40	20.3 (17, 27)
Total alkalinity CaCO ₃ (ppm)	40	40	54.6 (5, 155)
Total organic carbon (mg/L)	51	51	19 (2.5, 83)
Bromodichloromethane	40	4	0.4 (0.3, 0.6)
Bromomethane	40	1	0.36
Chloroform	40	4	2.2 (1.6, 2.6)
Chloromethane	40	7	0.3 (0.2, 0.4)
Isopropylalcohol	40	1	0.9
Naphthalene	40	3	0.5 (0.4, 0.8)
p-Isopropyltoluene	40	3	0.5 (0.2, 1.1)
Toluene	40	10	0.6 (0.3, 2.1)

Note. NTU = nephelometric turbidity units; MPN = most probable number; ppm = parts per million; CaCO₃ = calcium carbonate.

^aNumber of samples above the detection threshold unless otherwise noted.

^bUnits are µg/L unless otherwise noted.

^cProportion of samples >200 MPN/100 mL.

^dProportion of samples >33 MPN/100 mL.

^eProportion of samples above 125 MPN/100 mL.

^fStandard pH units.

1,553 MPN/100 mL), but not in regulated public drinking water samples. These FIB suggest the presence of fecal contamination and although research has shown these FIB can occur at high concentrations in landfill leachate and groundwater (Belle, Genevois,

Mudry, & Aleya, 2008; Fantuzzi et al., 2003; Li, Li, Luo, & Li, 2008), numerous other sources of these FIB exist in the environment (Borrego & Figueras, 1997; Field & Samadpour, 2007). FIB presence in drinking water has been associated with pathogenic

TABLE 5

Relation of Distance From Landfill With Concentrations of Water Quality Indicators in Surface Water Collected in a Community Bordering a Regional Landfill From May to July 2009

Indicator	# Samples	Mean (SD)	β coefficient ^a	95% CI
Enterococci (MPN/100 mL)	50	759 (952)	-600.0	-1106, -93
<i>E. coli</i> (MPN/100 mL)	50	535 (892)	-418.0	-889, 52
Fecal coliforms (MPN/100 mL)	40	1480 (1050)	-213.0	-814, 388
Turbidity (NTU)	50	202 (289)	-85	-237, 68
Total organic carbon (mg/L)	50	19.3 (13.5)	-1.8	-7.8, 4.3

Note. SD = standard deviation; CI = confidence interval; MPN = most probable number; NTU = nephelometric turbidity units.

^aThe beta coefficient is the change in the concentration of the water quality indicator for every 100-m increase in distance from the landfill, derived from conditional fixed effects linear regression models.

microorganisms and gastrointestinal illness outbreaks (Liang et al., 2006). U.S. EPA has established national primary drinking water standards (U.S. EPA, 1996b, 1998, 2006b) for public water systems based on turbidity, fecal coliforms, and *E. coli*, and a higher prevalence of turbidity MCL violations was observed in private well water samples than in public drinking water samples. Failure of private septic systems did not appear to be related to measures of drinking water quality, although these results should be interpreted with caution due to the small sample size (data not shown).

Inorganic and volatile organic chemicals in drinking and surface water supplies sampled were generally detected below recommended levels for protection of human health and freshwater aquatic life (NCDENR, 2005, 2007; U.S. EPA, 1986, 2006b). The presence of MTBE, trichloroethene, and other volatile organic chemicals in well water in the Rogers-Eubanks community, however, suggests that further investigation of groundwater quality and provision of improved water sources may be advisable.

We observed an association between increasing distance from the landfill and decreasing levels of enterococci in surface waters sampled. The sources of FIB in surface waters are diverse, however, and can also include failing septic systems, runoff, and domestic and wild animals. Although rainfall can influence levels of FIB in surface waters, little variability exists in precipitation across the small sampling area of the

Rogers-Eubanks community. We did not aim to evaluate specific sources of contamination but rather to assess the general microbiological and chemical quality of surface water supplies sampled in the Rogers-Eubanks community. Tests of soil at the junction of two stormwater outfall pipes encompassing drainage to surface water downstream of an unlined construction and demolition landfill and a lined municipal solid waste landfill in the Rogers-Eubanks community revealed the presence of arsenic, chromium, lead, nickel, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzoic acid, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene (data not shown).

The lack of basic amenities is emerging as a national issue in low-income communities of color and has been tied to historical and ongoing institutional racism (Johnson, 2008; Smyth, 2008; Wilson, 2009; Wilson, Bumpass et al., 2008). Community-based organizations across the southern U.S. often face substantial challenges for data collection to assess the extent of problems with private water and sewer infrastructure services. Marginalized and underserved residents of color often harbor mistrust of state environmental protection agencies, local health departments, elected officials, and academic researchers attempting to investigate private household drinking water and sewer infrastructure problems (Wilson, Bumpass et al., 2008). Residents may fear condemnation of their property if violations are discovered.

This presents substantial barriers to achieving high participation in research to characterize the extent of drinking water and sewer infrastructure disparities in such marginalized and underserved communities (Wilson, Bumpass et al., 2008) and could lead to underestimation of the prevalence of failed systems and the existence of problems with water quality in these communities.

Conclusion

The community-driven research partnership between grassroots RENA community members and academic researchers reduced some residents' mistrust of the research process, led to participation by a population not often trusting of scientific research, and fostered collection of environmental data in a community bordering a landfill and lacking basic amenities. Data collected by the partnership revealed a disconnect between community drinking water and sewer infrastructure conditions and local public health compliance, enforcement, and assurance actions, and fostered local, state, and national policy and legal discussions about environmental justice concerns in the Rogers-Eubanks community (Campbell, 2007; Heaney et al., 2007; Wilson, Bumpass et al., 2008; Wilson, Heaney, Wilson, & Cooper, 2007).

The results of our study contribute further evidence to an understudied and emerging national environmental justice issue—the lack of basic amenities (Wilson, Cooper, Heaney, & Wilson, 2008). Effective interventions exist at the historical root of the public health movement (improving water and sanitation services) (Cutler & Miller, 2005; Kjellstrom, 2007; Ringen, 1979). Substantial institutional barriers to extending safe and adequate services to low-income communities of color endure, however, at the local level across the U.S. and have been characterized by some as environmental racism (Johnson, 2008; Smyth, 2008; Wilson, Bumpass et al., 2008) due to inequities in local planning and zoning practices (Maantay, 2001; Maantay, 2002; Wilson, Cooper et al., 2008; Wilson, Hutson, & Mujahid, 2009). Replication of this community-driven research partnership approach in similarly marginalized and underserved low-income communities of color could help identify problems with and improve the microbiological and chemical safety of

drinking and surface water supplies and advance a national popular movement for a right to basic amenities. 🐼

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The U.S. Environmental Protection Agency has created a roadmap to help integrate environmental justice into the Agency's programs, policies, and activities—Plan EJ 2014.

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The Exploration of Effects of Chinese Cultural Values on the Attitudes and Behaviors of Chinese Restaurateurs Toward Food Safety Training

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Abstract Foodborne illness is a challenge in the production and service of ethnic foods. The purpose of the study described in this article was to explore variables influencing the behaviors of U.S. Chinese restaurant owners/operators regarding the provision of food safety training in their restaurants. Seventeen major Chinese cultural values were identified through individual interviews with 20 Chinese restaurant owners/operators. Most participants felt satisfied with their previous health inspections. Several expressed having difficulty, however, following the health inspectors' instructions and in understanding the health inspection report. A few participants provided food safety training to their employees due to state law. Lack of money, time, labor/energy, and a perceived need for food safety training were recognized as major challenges to providing food safety training in Chinese restaurants. Videos, case studies, and food safety training handbooks were the most preferred food safety training methods of Chinese restaurant owners/operators, and Chinese was the preferred language in which to conduct the training.

Introduction

The Asian population in the U.S. is continually increasing. In 2000, 3.6% of the total U.S. population identified themselves as Asian. By 2010, that number had increased to 4.6%, and it is expected to reach over 8% by 2050 (Ortman & Guarneri, 2011). With the ethnic minority population increasing and people traveling outside the U.S. more often, Americans have become further exposed to and interested in ethnic foods. Chinese food is considered one of America's favorite ethnic cuisines as evidenced by the existence of nearly 41,000 Chinese restaurants in the U.S. (Chinese Restaurant News, 2007). Over 90% of Americans have tried Chinese food, and 63% eat Chinese food at least once a month (George, 2001).

Despite the progress made in the reduction of food safety risks in the U.S., foodborne illnesses remain a challenge, especially in ethnic food production and service. The Centers for Disease Control and Prevention reported that foodborne outbreaks associated with ethnic foods increased from 3% in 1990 to 11% in 2000 (Simonne, Nille, Evans, & Marshall, 2004). Restaurant inspection results of ethnic restaurants also revealed the need for further training in these establishments, as ethnic restaurants had more critical and non-critical food code violations than nonethnic restaurants (Kwon, Roberts, Shanklin, Liu, & Yen, 2010).

Several food safety training programs are available for restaurants, including the most widely used ServSafe® program. Roberts

and co-authors (2008) found that the four-hour ServSafe® food safety training program improved knowledge and food safety behavioral compliance associated with hand washing, the use of thermometers, and handling of work surfaces. They also noted, however, that improved knowledge alone did not increase behavioral intention to handle food properly (Roberts et al., 2008).

Health inspectors play an important role in protecting the public from foodborne illness outbreaks by carrying out duties such as routine health inspections, food safety training programs provision, and investigations in suspected foodborne illness cases (Pham, Jones, Sargeant, Marshall, & Dewey, 2010). Findings from an online survey of health inspectors, however, indicate the self-identified needs of health inspectors in Canada, such as a lack of food safety knowledge in different cultures (Pham, Jones, Sargeant, & Marshall, 2012). The increasing number of Chinese restaurants and the cultural differences may present unique food safety challenges for Chinese restaurateurs. Limited research has been conducted to assess the needs and challenges related to food safety training in Chinese restaurants as well as the possible cultural influences on food handling and food safety training at these restaurants.

Therefore, the purpose of our qualitative study was to explore variables influencing the behaviors of U.S. Chinese restaurant owners/operators regarding the provision of food safety training in their restaurants. The influence of Chinese cultural values (CCVs) on these behaviors was also investigated. Other variables, such as attitudes, past experiences, and perceived barriers related to health inspection and food safety training

TABLE 1

Respondents' Demographic Characteristics (N = 20)

Characteristic	#	%
Gender		
Male	13	65
Female	7	35
Education		
Less than high school	8	40
Bachelor's degree or higher	9	45
Declined to answer	3	15
Years of U.S. residency		
<10	3	15
10–20	12	60
>20	5	25

were also explored as they might also shed light on issues concerning the provision of food safety training in Chinese restaurants. In addition, the most preferred food safety training method(s) for this population was investigated for future research.

Methods

Approval of the research protocol to use human subjects in research was obtained from the university institutional review board prior to contacting participants for this research.

Participants and Recruitment

The target population of this study was Chinese restaurant owners/operators currently operating independent, traditional, full-service Chinese restaurants in the U.S. A list of Chinese restaurants was obtained through ChineseMenu.com, a suborganization of Chinese Restaurant News. Those subscribing to Chinese Restaurant News include owners and operators of Chinese restaurants in the U.S. who share their restaurant information online for marketing purposes. Only full-service, nonbuffet Chinese restaurants (N = 1,031) were selected to minimize variations due to different restaurant settings and styles of service. From the list, 50 Chinese restaurants were selected from various municipalities and regions and contacted by telephone to request an interview. When an owner/operator did not wish to participate in our study, a replacement from the same municipality was obtained to ensure the

inclusion of participants from different communities. The number of participants we planned to include in this qualitative study was 20 or more.

Development of Interview Questions and Pilot Study

Individual interviews with Chinese restaurant owners/operators were conducted to (a) investigate the core CCVs that influence Chinese restaurant operation and food safety training; (b) explore attitudes, past experiences, and barriers related to health inspection and food safety training; and (c) identify the most preferred food safety training method(s). The interview questions for our study were developed based on a literature review and input from three Chinese restaurant owners, food service systems–management educators, and food safety experts.

Prior to finalizing the interview protocols, a pilot study was conducted with three local Chinese restaurant owners/operators. The results of the pilot study were reviewed by experts, whose feedback served as the basis for revising and finalizing the interview questions. The revision process included the removal of questions that generated redundant responses, and the sequence of interview questions was changed to yield a logical interview process.

Data Collection

Participants were contacted by telephone and asked to participate in a 45-minute

interview. The informed consent form was read aloud to them via telephone by the researchers. Upon participant agreement, an interview was conducted, audio recorded, and transcribed verbatim.

Interviews were conducted by a bilingual researcher, who offered participants the choice of being interviewed (using identical questions) in English or Mandarin. The Chinese interviews were translated into English before being analyzed. All participants were encouraged to continue discussing each topic until no new ideas were generated. The researcher used a probing technique to stimulate new ideas and to get participants to elaborate on comments and clarify opinions.

Analysis

Common themes were identified from the transcribed data by two researchers, who coded each transcription independently. Codes with similar meanings were grouped together under the same categories. Themes were identified related to various CCVs; attitudes, past experiences, and perceived barriers related to health inspection and food safety training; and the most preferred food safety training methods in Chinese restaurants.

Results

Demographic Characteristics of Respondents

Out of 50 Chinese restaurant owners/operators from the list, 20 participants in different locations agreed to be interviewed. The majority (n = 13) of participants were male, and eight participants had a high school education or less, while nine had a bachelor's degree or higher (Table 1). Three participants refused to answer the question concerning education level because they felt the question was intrusive. The majority (n = 17) of participants had been residing in the U.S. for 10 years or longer. Among the 20 Chinese restaurants, eight had 100 seats or less, five had 101–200 seats, and four had more than 200 seats (Table 2). Three participants did not provide this information. Eleven Chinese restaurants had 10 or fewer full-time employees, and 15 Chinese restaurants had 10 or fewer part-time employees. More than half (n = 13) of the Chinese restaurant owners/operators used Chinese as the main language to communicate with their employees.

Past Experiences With Health Inspections and Food Safety Training

Past Experiences With Health Inspections

When asked how satisfied they were with previous health inspections, the majority of respondents indicated that they were satisfied, but a few participants stated their dissatisfaction, saying, “The inspector was very strict and picky.” One participant with over 20 years of restaurant operation experience also mentioned communication issues during the health inspection. “It [the health inspection] was OK. We don’t have critical violations or only a few, if any, that we overlooked. But different places have different standards, and there may be some communication problems,” he stated.

Difficulty understanding the health inspection report was a concern for Chinese restaurateurs due to language barriers. One participant who could only speak Chinese, stated, “If they write down the violations, I don’t know what they are talking about in the report.” By contrast, other participants who could speak a limited amount of English felt fully confident about following the health department’s instructions even without reading the report. “Even [though] my English is not that good, I understand what they [the health inspection reports] are talking about based on my experience,” stated one participant.

Some participants expressed their concerns about the health inspectors not understanding differences between Chinese and American cooking methods. One participant, who had more than 20 years of restaurant operation experience, stated, “The health inspector said we left the food [at] room temperature when cooking. But some foods need to be left at room temperature to cook in the traditional way.”

When asked about whether they agreed with the health inspectors’ comments, some participants stated that they fully agreed with their suggestions because they thought the comments made sense and were fair. Others had a different view, however, as reflected in one of the participant’s comments, “If the recommendations make sense, we have nothing to say. But if something is so ridiculous, or [if they are] saying we (Chinese restaurants) cannot use some types of containers when the one [restaurant] across the street can, this doesn’t make any sense.”

TABLE 2

Operational Demographic Characteristics (N = 20)

Characteristic	#	%
Number of restaurant seats		
0–50	5	25
51–100	3	15
101–150	3	15
151–200	2	10
>200	4	20
Declined to answer	3	15
Number of full-time employees		
1–10	11	55
11–20	3	15
>20	2	10
Declined to answer	4	20
Number of part-time employees		
1–10	15	75
11–20	1	5
Declined to answer	4	20
Number of kitchen employees		
1–10	6	30
11–20	2	10
>20	1	5
Declined to answer	11	55
Number of servers		
1–10	7	35
11–20	1	5
>20	1	5
Declined to answer	11	55
Communication language		
Chinese	7	35
English	2	10
Spanish	2	10
Both Chinese and English	6	30
Both English and Spanish	3	15

Past Experiences With Food Safety Training

Among the 20 participants, 15 had attended food safety training in the U.S. since food safety training was required for restaurant managers in certain states before opening a restaurant. When the researcher asked how effective they thought the food safety training was, all 15 participants felt that food safety training was very effective. “You don’t understand anything if you don’t go. It [the food safety training] is a must,” one participant who has been in the U.S. for a relatively short time (<10 years) stated.

Regarding food safety training for employees, however, different results were yielded. Nine of the 20 participants stated that none of their employees had participated in formal food safety training in the U.S. Many of them only provided their employees “ongoing training in the restaurants.” Ten participants provided formal food safety training for “some of their employees” and stated that they did not think it was necessary for all employees to participate in food safety training. Out of the 20 participants, only one, who had more than 10 years restaurant operation experience and

TABLE 3

Chinese Cultural Values (Chinese Culture Connection, 1987)

CVS I Integrity and Tolerance (Development of self)	CVS II Confucian Ethos (Relationships with others)	CVS III Loyalty to Ideals and Humanity (Social responsibility)
Filial piety	Loyalty to superiors	Observation of rites and rituals
Industry—working hard	Benevolent authority	Reciprocation of greetings and favors, gifts
Tolerance of others	Noncompetitiveness	Solidarity with others
Harmony with others	Keeping oneself disinterested and pure	Moderation, following the middle way
Humbleness	Contentedness with one's position in life	Ordering relationships by status and observing this order
Kindness (Forgiveness, compassion)	Being conservative	Resistance to corruption
Knowledge (Education)	Protecting your "face"	Patriotism
Self-cultivation	Chastity in women	Thrift
Sense of righteousness	Having few desires	Having a sense of shame
Personal steadiness and stability	Respect for tradition	
Sincerity		
Patriotism		
Persistence (Perseverance)		
Patience		
Adaptability		
Prudence (Carefulness)		
Trustworthiness		
Courtesy		

CVS IV Moderation and Moral Discipline (Worldly wisdom)
Repayment of both the good and the evil that another person has caused you
A sense of cultural superiority
Wealth

Note. CVS = Chinese Value Survey.

a college degree, asked all employees to attend formal food safety training, mainly because it was mandatory in their state.

Perceived Barriers to Providing Food Safety Training for All Restaurant Employees

Lack of Money, Time, Labor, and Energy

Chinese restaurant owners/operators shared their perceived barriers to providing food safety training for all restaurant employees. Four of the 20 participants identified lack of money as one of the challenges to providing food safety training for their employees. Several participants, especially the owners/operators of small restaurants, felt that the following comment rang true: "We can't afford to pay for those [employee training] expenses now. So we can only afford internal training."

Lack of time was another challenge some Chinese restaurant owners/operators faced when providing food safety training for all employees. One participant who had been operating restaurants for more than 10 years replied, "We need to squeeze time to provide training."

Two participants with 10 years of restaurant operation experience stated that a lack of labor was the main barrier they faced concerning food safety training in the restaurant. "There are difficulties in providing food safety training to all employees. [We] don't have a fixed schedule, and we don't have enough staff," one participant stated.

Another participant with more than 20 years of experience in the restaurant did not want to provide employees training for food safety because, as he commented, "They are super tired after each work day. [We have] no extra time or energy [for food safety training]."

Lack of a Perceived Need for Food Safety Training

In addition to the lack of time, money, and adequate staff mentioned by many food service management staff, seven Chinese restaurant owner/operators stated that they did not feel the need to provide food safety training for all employees. One participant with 10 years of restaurant operation experience stated, "No. It [food safety training for employees] is not necessary. We have internal training for employees; they don't need to go to any training." Another participant also stated, "[The training is] not necessary. We have

four trained employees, so it's enough." These responses showed that participants did not perceive a need to provide food safety training, partially due to having confidence in their ability to provide safe food. They did not seem to have a complete understanding of the importance of food safety or its relevance to their establishments. Such an attitude may prevent Chinese restaurant owners/operators from providing food safety training to all employees.

Other Barriers for Chinese Restaurateurs

Two participants perceived that employees were not willing to attend food safety training, even though the food safety training was provided free of charge. Others ($n = 4$) felt that their employees' education levels were too low for them to understand the food safety training. "Some employees are not qualified for food safety training. They don't understand it anyway," one participant stated. Other participants mentioned employees' language barriers and lack of transportation as a barrier. Additionally, perceived difficulty in changing employees' behaviors was noted as another barrier by one of the Chinese restaurant owners/operators: "It's not easy to change to good [food safety practice] habits only by training."

TABLE 4

Chinese Cultural Values

Chinese Cultural Values	Frequency*	Questions and Examples of Responses
Respect	29	<p>“What are some major differences between American and Chinese cultures?”</p> <ul style="list-style-type: none"> • <i>Mutually respect to different people.</i> • <i>We should respect ourselves first, and then other will respect you. If you don't respect yourself, you can't ask others to respect you.</i> • <i>Chinese tradition is to respect the elderly and care for the young, respect parents, and other people's life value.</i> <p>“Please describe the relationship between the owner and employees.”</p> <ul style="list-style-type: none"> • <i>Our boss is the best in town. He treats employees equally well. If you respect others, they will respect you as a return.</i>
Authority	28	<p>“Do you agree with health inspectors' comments?”</p> <ul style="list-style-type: none"> • <i>You have to follow their [health inspectors] recommendations.</i> • <i>We have to follow, because it's mandatory by state law.</i> • <i>Of course I will agree anything they [health inspectors] said. I can't argue with them.</i> <p>“How easy was it for you to follow the health inspector's instruction?”</p> <ul style="list-style-type: none"> • <i>Although I feel it's not necessary, we have to follow [inspector's instruction].</i>
Tolerance	23	<p>“What Chinese cultural values affected your attitude and behaviors on dealing with difficult customers?”</p> <ul style="list-style-type: none"> • <i>Patience, patience, and more patience. Since we are in the service business, just like what you've heard, “customers always right!”</i> • <i>Whatever customers did, they are always right. You need to make them come back.</i> • <i>We need try to satisfy them [customers] as well as possible.</i> • <i>You can't argue with them [customers], directly.</i>
Self-confidence	19	<p>“How confident are you to provide safe food to your customers?”</p> <ul style="list-style-type: none"> • <i>I am fully confident, 100%.</i>
Harmony	11	<p>“What Chinese cultural values affected your attitude and behaviors on dealing with difficult customers?”</p> <ul style="list-style-type: none"> • <i>There is a principle for Chinese restaurant: first, customers are always right. Even if you think it's the customers' fault, the wait staff still needs to act as if customers are always right.</i>
Courtesy	11	<p>“What are some major differences between American and Chinese cultures?”</p> <ul style="list-style-type: none"> • <i>If you need anything, you should say “Excuse me, could you help me...”</i> • <i>From a polite prospective, you also need to talk to your customers with courtesy.</i>
Friendship	10	<p>“What is your relationship with customers?”</p> <ul style="list-style-type: none"> • <i>Most of customers are our friends.</i> • <i>You should say every customer is your friend.</i>
Power distance	9	<p>“What is your relationship with your employees?”</p> <ul style="list-style-type: none"> • <i>[We have] Very good relationships! Just like the relationship between [a] boss and employees.</i>
Sincerity	9	<p>“What is your relationship with customers?”</p> <ul style="list-style-type: none"> • <i>Customers are the number one... [We provide] good food and service and [we are] honest to customers.</i> <p>“What makes your restaurant unique or competitive?”</p> <ul style="list-style-type: none"> • <i>We are honest in providing service. We don't cheat our customers.</i> • <i>I think honest to customers is very important.</i>
Reciprocity	7	<p>“What is your relationship with other Chinese restaurant owners/health inspectors?”</p> <ul style="list-style-type: none"> • <i>Having a good relationship makes mutually benefits.</i> • <i>They are friends. We could help each other.</i> • <i>Sometimes we discuss with each other about restaurant operation. And we can help each other, whenever we need help. We could have mutual benefits.</i>
Family trust	6	<p>“Whose opinions impact your business practices the most?”</p> <ul style="list-style-type: none"> • <i>I trust my people, my family.</i> • <i>I only trust my family.</i>
Thriftiness	6	<p>“What are some major differences between American and Chinese cultures?”</p> <ul style="list-style-type: none"> • <i>Chinese people like making and saving the money and developing their business.</i> • <i>Some customers throw a whole plate full of food out with only one bite eaten. I told them it's such a waste.</i>
Humbleness	5	<p>“What makes your restaurant unique or competitive?”</p> <ul style="list-style-type: none"> • <i>(Regarding their business success) It's not very good.</i> • <i>Actually I don't have any strategies.</i> • <i>How do you know our restaurant is very successful? (Rephrased question followed by a laugh and no answer).</i> • <i>Not very successful.</i>

continued ▶

TABLE 4 *continued***Chinese Cultural Values**

Chinese Cultural Values	Frequency*	Questions and Examples of Responses
Face	4	"What are some major differences between American and Chinese cultures?" <ul style="list-style-type: none"> • <i>As a Chinese, we love to keep our "face."</i> • <i>I can't serve food in the dining room, because I want to protect my "face." I rather working in the kitchen and no one could see me.</i>
Diligence	4	"What are some major differences between American and Chinese cultures?" <ul style="list-style-type: none"> • <i>I worked with three or four restaurants during the year; I just wanted to have some experience. I had lots of difficulties such as some work-related injuries because of hard work.</i> • <i>I think that diligent is on the top of the list.</i>
Carefulness	2	"What are some major differences between American and Chinese cultures?" <ul style="list-style-type: none"> • <i>Chinese are more careful and think more like "why things are like this or that?" They have more concerns and never take things granted.</i>
Adaptability	1	"What are some major differences between American and Chinese cultures?" <ul style="list-style-type: none"> • <i>[We] just follow American way to do things and adapt to their life style.</i>

*The total frequency of each value exceeds 20 because of repeated responses to a variety of questions by participants.

Chinese Cultural Values

A total of 17 major CCVs were identified through the individual interviews. The 17 CCVs from our participants were included among the previously identified 40 CCVs (Chinese Culture Connection, 1987). CCVs were captured when participants answered various interview questions (Table 3). When researchers asked participants to identify the major differences between the American and Chinese cultures, comments related to "friendship" were mentioned the most ($n = 12$), followed by "respect" ($n = 9$), "humbleness" ($n = 7$), and "thriftiness" ($n = 6$). Additionally, "courtesy," "carefulness," "diligence," "face," and "adaptability" were identified as CCVs that differed from those of U.S. mainstream culture.

When participants were asked about their relationships with difficult or regular customers, "tolerance" was identified as the major CCV ($n = 19$) followed by "sincerity" ($n = 9$) and "harmony" ($n = 7$). In answering the questions about their relationships with health inspectors, "authority" ($n = 18$) and "reciprocity" ($n = 7$) were mentioned most frequently. Six Chinese restaurant owners/operators mentioned "power distance" when asked about their relationships with their employees. "Power distance" was applied to measure the degree of inequality in power between a less powerful individual and a more powerful person (Mulder, 1977). "Family trust," "adaptability," and "self-con-

fidence" were other CCVs related to participants' business practices. Table 4 summarizes the Chinese values identified during interviews and provides examples of direct quotations from participants.

Preferred Food Safety Training Method and Language of Chinese Restaurant Owners

In an effort to identify the most suitable food safety training methods for this population, participants were asked about their preferred food safety training method and language of instruction. Eleven participants mentioned video as their preferred training method. "Watching [a] video is simple and easy to understand," one participant replied. Eight participants mentioned case studies as a preferred training method because, as one participant stated, "case studies will let my employees see [the] types of mistakes they commonly make that will make people sick." The third most preferred food safety training method ($n = 6$) was the use of a food safety training handbook. "I think a food safety training handbook is a good way for people to learn. It's convenient and flexible for employees to learn by themselves," one participant responded.

Most of our participants ($n = 13$) preferred the use of the Chinese language rather than English for food safety training materials. "[Chinese is] easy for us to understand," one of the participants stated. Six participants

said that they liked to use English because as one participant responded, "We have many employees from different countries, so we need to speak English to make sure everyone understand[s] one another."

Discussion

A total of 17 CCVs were identified as factors affecting Chinese restaurant operation. These 17 CCVs were a part of the 40 CCVs identified by the Chinese Culture Connection (1987). CCVs have been studied for many years, especially in the business setting. Confucianism is one of the largest influences on CCVs, and "trust, reciprocity, face, time, harmony, hierarchy, power distance, and long-term orientation" have been identified as major CCVs (China-biz.org, 2002).

"Respect" and "(saving) face" were frequently mentioned by our participants during the interviews. Face is defined as "the respect, pride and dignity of an individual as a consequence of his/her social achievement and the practice of it (Leung & Chan, 2003)." To Chinese people, face means not disgracing oneself or one's family, and it is an important element in the Chinese culture (King, 1988). Face not only encourages Chinese people to function properly within the community, but also represents a reputation that people make great efforts to build up during their lives (Huang, Davison, & Gu, 2011). Therefore, respect and face are two

important CCVs for health inspectors to consider for improving food safety practices in Chinese restaurants.

Given the importance of these two items as reflected in the interviews for our study, Chinese restaurant owners/operators might be more willing to cooperate and follow health inspectors' recommendations if the latter make additional efforts to show respect to this population. This, in turn, will improve the food safety practices in those food service establishments. Since face is the foundation of the Chinese culture, health inspectors need to utilize this unique characteristic to improve food safety practices among Chinese restaurants. If health inspectors disclosed health inspection results to the public, Chinese restaurant owners/operators would pay more attention to their health inspection/food safety performance due to the fear of losing face for having poor health inspection reports.

"Authority" and "power distance" were identified as major CCVs that affect Chinese restaurant operation and interactions with health inspectors. Authority was an important value as Chinese restaurant owners expressed a willingness to follow the orders/requirements of health inspectors, who are considered as authority figures in Chinese culture. One of the Confucian virtues is respect for authority or individuals who have a good reputation and considerable power (Kirkbride, Tang, & Westwood, 1991). Chinese restaurant owners/operators perceived that their operations were fully controlled by health inspectors (due to their position of power) and that they had to follow their instructions at any cost. Therefore, health inspectors may enforce specific regulations on food safety training for Chinese restaurants. Thus, Chinese restaurant owners/operators may be more motivated to provide food safety training to their employees if deemed mandatory by state law.

"Power distance" was another major CCV researchers identified as influencing dynamics in Chinese restaurants. Participants described a "good relationship" with their employees as "just like the relationship between [a] boss and employees." This is a good example of how the Chinese culture views power distance as a cultural norm, and as a result, they may consider themselves authority figures. Understanding this CCV may be useful when health inspectors are developing food safety training programs for this population. Employees in Chinese res-

taurants will improve their attitudes toward food safety training and be willing to attend food safety training if the health inspector or owner/operator asks them to do so.

"Sincerity" and "trust" are critical components to consider when Chinese people establish social networks. Sincerity indicates that communication can be taken at face value as it actually reflects people's thoughts and feelings (Tao, 2005). Showing sincerity allows individuals to gain trust from the other party. In our study, however, some participants implied that they did not trust people other than their family members or close friends. Chinese people often establish trusting social networks first with family members, relatives, friends, classmates, and colleagues. Since health inspectors interact with Chinese restaurant owners/operators regularly, they should be encouraged to establish trusting relationships with them. One way to establish such relationships might be for health inspectors to initiate displays of trust toward Chinese restaurant owners/operators. Health inspectors may gain trust from them in return, which could help to improve the level of collaboration between the two parties on restaurant food safety.

"Reciprocity," or "*guanxi*" in Mandarin, serves to establish relationships between two parties. Although a universal concept, reciprocity has particular salience for Chinese people. According to the principle of reciprocity, the person who first receives a benefit needs to repay it in the future. For most people in China, a transaction will only take place when it is mutually beneficial for both parties involved. Therefore, reciprocity is what sustains a network relationship in a business setting. Without reciprocity, established *guanxi* disappears (Chen & Chen, 2004). Thus, if health inspectors could provide information on the mutual benefits for Chinese restaurant owners/operators and health inspectors in terms of preventing foodborne-illness outbreaks, Chinese restaurant owners/operators might understand the importance of food safety practices and be motivated to provide food safety training to all employees in their foodservice establishments.

Individuals who follow the Confucian "Doctrine of the Mean" prefer to avoid competition and conflict and maintain harmony (Chen, 2002). "Harmony" plays a critical role in a two-party relationship. Without harmonious and reciprocal relationships, face and trust cannot continue to exist and *guanxi* will not be estab-

lished (Chen & Chen, 2004). "Tolerance" is an essential aspect of harmony. To avoid conflict, our study showed that tolerance and patience are frequently used by Chinese people in the business setting. Moise (1995) indicated that Chinese people tend to avoid conflicts and prefer resolving issues in an "implicit and mild" manner. Direct conflict hurts the relationship with the other party, especially when the other party is of a higher social status. Since Chinese people are more sensitive to the concepts of hierarchy and power distance in comparison with Americans, Chinese people avoid conflicts more frequently than Americans do (Friedman, 2006). If health inspectors could provide Chinese restaurant owners/operators with more details on the importance of food safety training as well as the negative consequences of foodborne-illness outbreaks (e.g., poor restaurant reputation and increased customer arguments and lawsuits), the awareness and attitude toward providing food safety training to employees in Chinese restaurants would improve in this population.

"Relationships" are also valued by the Chinese people. That is, once a relationship is established between the Chinese, it is unlikely to be broken. Once a relationship is severed, however, it is extremely difficult to repair (Huang et al., 2011). In other words, long-term relationships are essential for the Chinese people and their culture. Thus, by establishing long-term relationships with Chinese restaurant owners/operators, health inspectors can work with them more easily to prevent foodborne-illness outbreaks and improve food safety practices in Chinese restaurants.

According to Kwon and co-authors (2010), Asian and Mexican or Latin American ethnic restaurants had significantly more critical violations and inspections than nonethnic restaurants. In our study, most participants felt very satisfied with their previous health inspections. Several Chinese restaurant owners/operators expressed concern, however, about following the health inspectors' instructions in their restaurants. In our study, language barriers were reported to have occurred during health inspections. Several participants noted that they had experienced difficulty understanding the health inspection report and had questions about the health inspectors' comments, which may be partially due to the participants' lack of food safety knowledge (Mauer et al., 2006). Food safety training has been found to be an

effective way to improve food safety knowledge and food safety behavioral compliance related to hand washing, the use of thermometers, and handling of work surfaces (Roberts et al., 2008). The majority of our participants received food safety training in the U.S. and felt this training was effective in that they gained specific knowledge. Only a limited number of participants provided food safety training to their employees, however. Previous studies have presented similar results. Ram and co-authors (2000) reported that only 26% of independent ethnic restaurant operations provided food safety and personal-hygiene training to their employees and that the training was not given unless required by law.

Food safety knowledge and behaviors could be improved by food safety training (Roberts et al., 2008). A lack of resources, time constraints, and employees' attitudes have been identified as barriers to providing food safety training to restaurant employees (Roberts et al.; Youn & Sneed, 2002). In terms of the barriers to providing food safety training for employees in Chinese restaurants, our participants mentioned lack of money, time, labor, energy, and employee motivation/qualification as the biggest challenges in the Chinese food-service industry. Language barriers may also influence employee motivation and qualification for food safety training, similar to findings from a previous study in an ethnic restaurant (Mauer et al., 2006). Additionally, the attitudes of our participants toward food safety training were also found to be rather negative.

Our study also identified the food safety training method and language most preferred by participants. Videos, case studies, and food safety training handbooks using the Chinese language were most frequently mentioned by our participants. Based on these data, if health inspectors could provide food safety training programs to Chinese restaurants using videos, case studies, and food safety training hand-

books, their willingness and level of collaboration to participate in food safety training would increase. By presenting food safety training programs in Chinese, health inspectors could improve Chinese restaurant food handlers' learning capability of food safety knowledge.

Conclusion

A total of 17 CCVs associated with providing food safety training among U.S. Chinese restaurant owners/operators were identified. The values identified were consistent with general CCVs identified in previous research (Chinese Culture Connection, 1987). Recommendations for health inspectors on how to incorporate CCVs into the food safety practices in Chinese restaurants have been discussed previously. If health inspectors apply the CCVs identified in this study when inspecting and providing training in Chinese restaurants, the awareness, attitude, and motivation among Chinese restaurant owners/operators and their employees may be improved.

The majority of participants expressed satisfaction with previous health inspections, but several expressed concerns about their ability to follow the health inspectors' instructions in Chinese restaurants. Most participants attended food safety training in the U.S. and noted that they found the training effective in increasing their food safety knowledge. Only a few Chinese restaurants provided food safety training to their employees, however.

Our study has revealed several perceived barriers to the implementation of food safety training in Chinese restaurants, including lack of money, time, labor, energy, and employee motivation/qualification. Moreover, our study showed that Chinese restaurant owners/operators lack full recognition concerning the necessity to provide food safety training. Videos, case studies, and food safety training handbooks were found to be the most preferred food safety training methods of Chinese

restaurant owners/operators, and Chinese was found to be the preferred language for food safety training. Future quantitative research may validate these findings and provide a basis for developing effective food safety training materials for Chinese restaurants.

The results of our study have significant implications for both theoretical and practical applications. Our study, to the best of our knowledge, is the first to investigate cultural values and their influence on restaurant operations and food safety training in Chinese restaurants. Some food safety training programs have been developed for this population, but the lack of cultural sensitivity hampered program effectiveness (Mauer et al., 2006). By understanding traditional cultural values and preferred training methods, health inspectors and food safety educators may develop strategies to reach and influence Chinese restaurant owners/operators more effectively. The Chinese community may also utilize the research findings to recognize the need for food safety training and investigate ways to improve food safety in their restaurants, such as by providing food safety training to Chinese restaurant owners/operators using their preferred training materials and methods.

Limitations

The individual interviews were applied to gather in-depth data from a small number of participants ($N = 20$). Therefore, due to the nature of qualitative research and the limited number of participants, the data may not be generalizable to all Chinese restaurant owners in the U.S. The results are not intended to be representative of the opinions of all Chinese restaurant owners. ☹️

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Managing Editor's Desk

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time NEHA raised dues was in 2005—eight years ago! And at that time, we raised them by a whopping \$10. To this day, NEHA's dues remain one of the lowest to be found among national professional societies. And unlike that president whom I referred to above, we take pride in NOT raising our dues frequently!

I think it is important that NEHA members know these particulars when it comes to the cost of being a member of this association.

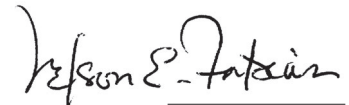
While still on the issue of dues and to ensure that this presentation is as complete and transparent as possible, I should also bring the membership up to date on where we stand with a multiyear dues option, which I first talked to you about over a year ago.

That opportunity—together with the publication of an e-journal—is still very much alive and sitting on the launch pad ... waiting for launch. The holdup has been due to the exasperating difficulty that we have been having in finishing up a conversion process from an archaic association management system to a much more modern and capable one. The good news is that we are almost done.

Once we have the conversion complete and depending on which membership option the member prefers, it is possible that the member will see an even lower NEHA dues fee. If a member prefers to continue to receive a hard-copy *Journal*, that member will see a dues increase.

We hope to be able to announce this new system of dues within the next several months.

In the meantime, please know that we take the matter of dues very seriously. You can be assured that our commitment to keeping NEHA's dues as low as possible will endure. It is embedded in our concept of whom and what NEHA is. Even during our worst year during the recession when NEHA lost almost \$200,000 (which for us was a huge sum of money), the issue of a dues increase never once came up. I can't imagine a stronger statement about NEHA's perspective on dues and the value we attach to having you as a member of this wonderful association. 🐼



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The NEHA 2014 Annual Educational Conference (AEC) & Exhibition is scheduled to take place July 7-10, 2014, in Las Vegas, Nevada.

The AEC will be host to the 2014 International Federation of Environmental Health (IFEH) Congress. The event will be hosted at the Cosmopolitan. Stay tuned to neha.org for more information.

▶ GUEST COMMENTARY

Integrating Research and Community Organizing to Address Water and Sanitation Concerns in a Community Bordering a Landfill

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In many underserved communities of color in the U.S. some residents are still living without safe and clean water and sewer infrastructure, storm water drainage, paved roads, sidewalks, and emergency services. These basic amenities provide a foundation for public health and well-being. Addressing disparities in access to these basic amenities lies at the historical root of the public health, hygiene, and sanitation movements.

One reason that these basic amenities are not enjoyed by all is that decisions about infrastructure extensions and service connections are influenced by economic and development interests. Infrastructure improvements bypass communities of color and low income, while surrounding areas receive services improvements (Heaney, Wing et al., 2011; Johnson, 2008; Smyth, 2008). Additionally, landfills, hazardous waste sites, abandoned underground storage tanks, and other locally unwanted land uses disproportionately affect these same communities, a pattern that has been characterized as environmental injustice (Bullard, 2000; United Church of Christ Commission for Racial Justice, 1987). Strategies and principles of community-driven and participatory research are being used to reverse historic patterns of infrastructure disparities and improve environmental health conditions, highlighted in this issue of the *Journal of Environmental Health* by Heaney and co-authors as well as others (Heaney, Wilson et al., 2011;

Heaney et al., 2013; Minkler, Vasquez, Tajik, & Petersen, 2008; Wilson, Bumpass, Wilson, & Snipes, 2008; Wing et al., 2008).

Integrating Research and Community Organizing

In 1972, when the town of Chapel Hill purchased 80 acres of land on Eubanks Road to use as a regional landfill, the surrounding Rogers-Eubanks community was comprised predominantly of low-income people of color. The community was strongly opposed to having a landfill nearby. Since 1972, four landfills (two municipal solid waste landfills and two construction and demolition waste landfills), and a solid waste, recycling, white goods, and household hazardous waste convenience center have been opened. Today, residents are still waiting for benefits—a community center, park, and basic amenities—that were promised when the landfill opened in 1972 (Eidenier-Pearce, 2008).

In 2007, the Rogers-Eubanks community achieved 501c3 status as the Rogers-Eubanks Neighborhood Association (RENA) through a partnership with the North Carolina Environmental Justice Network (NCEJN). Through its work with other local groups RENA founded the Coalition to End Environmental Racism (CEER). CEER became a vehicle for organizing and speaking out with a common voice. RENA then partnered with scientists at the University of North Carolina at Chapel Hill (UNC) and

student members of the Daniel A. Okun Chapter of Engineers Without Borders. The goal of the partnership, described in this issue of the *Journal of Environmental Health*, was to develop a strategy to address infrastructure disparities and improve environmental health conditions in the Rogers-Eubanks community.

Overcoming Barriers of Fear and Mistrust

Financial and legal liability of the property owner and fear of condemnation create substantial barriers to uncovering failures of private wells and septic systems in low-income African-American communities. These issues can create fear and mistrust that deter residents from investigating and fixing problems with private wells and septic systems. Compliance data in the files of environmental health agencies can be “out of sync” with actual conditions in the community. The RENA partnership provided confidential means to test household drinking water and surface water supplies and survey private wells and septic systems. This partnership built a foundation of trust between residents and scientists because the research team protected privacy and confidentiality.

Extending the Partnership to the Local Health Department

RENA's efforts created pressure on the Orange County Board of Commissioners to request a formal follow-up study by the Orange

County Health Department (OCHD). Elected officials and OCHD staff provided assurances to residents that they would avoid enforcement of fines or condemnation of property if infrastructure problems were discovered. To address mistrust, teams consisting of a RENA resident, UNC researcher, and OCHD engineer conducted well and septic system inspections and tested well water quality.

Forty-five households participated in the septic system assessment (Orange County Health Department [OCHD], 2010). Of the 45 household septic systems, 24 were non-compliant, malfunctioning, or in need of maintenance. Five of the 24 needed complete replacement (OCHD, 2010). Nine of the 11 wells sampled exceeded one or more water quality standards for total and fecal coliforms, iron, manganese, pH, and lead (OCHD, 2010). Two homes had low levels of methyl tert-butyl ether while two other homes had low levels of pesticides (OCHD, 2010).

Building Connections With County, State, and National Institutions

The OCHD follow-up study helped validate the community's concerns in the eyes of the Orange County Board of Commissioners. As a result, in 2012, the board voted to begin a mitigation process for residents of the Rogers-Eubanks community. Funding from local, state, and federal sources was leveraged to connect residents to public water, repair wells and septic systems, provide interim septic failure relief, and connect other residents to public sewer. A \$75,000 community development block grant, obtained by the Orange County Housing and Community Development Office, connected six homes to public water service, four homes to public sewer service, and one to both. The North Carolina Department of Environment and Natural Resources and U.S. Environmental Protection Agency (U.S. EPA) worked together to connect one home to public water. Efforts to connect the rest of the community to public water and sewer services are ongoing.

Broader Successes

RENA successes include securing a partial ban of garbage trucks driving through the community, increasing law enforcement presence to reduce illegal dumping, reducing speed limits on local roads, obtaining limited neighborhood bus service, blocking the siting of solid waste transfer station in the community, clos-

ing the municipal solid waste landfill in June 2013, and creating a community garden and waste reduction campaign. RENA has also initiated local, state, and federal partnerships to secure funding and other support for its programs on historic preservation and environmental, health, and nutritional education and organizing. The Orange County Board of Commissioners also voted to set aside \$650,000 to build a new permanent community center in the neighborhood (Dulaney, 2013). This shows that RENA members are starting to be involved as meaningful contributors to policy making, whereas in the past their voice was not heard and did not lead to fair representation of the community's concerns.

Strategies and Principles That May Benefit Communities Facing Similar Environmental Health Problems

Communities facing environmental injustice and infrastructure disparities need to build on their own strengths and resources. The strategies and principles that contributed to RENA's success included the following:

Strategies

- 1) *Ground-trooping.* Through on-the-ground training of community residents and university partners (ground-trooping), RENA was able to uncover evidence that countered years of incomplete and incorrect information about well water quality and septic system failure collected and stored by local, state, and federal agencies. This strategy was based on the community-owned and managed research approach developed by the West End Revitalization Association (WERA) (Heaney, Wilson et al., 2011), one of RENA's primary community-based partners.
- 2) *Holding local authorities accountable and maintaining transparency.* It was important to hold people in positions of power and authority (e.g., local elected officials and health department and water and sewer authority staff) accountable. Residents were prepared to publicly challenge these individuals in positions of power and authority about their response to scientific evidence generated by RENA's community-driven research efforts.
- 3) *Superseding local authorities after decades of environmental injustice and infrastructure*

disparities. After 35 years of inadequate response to community concerns about the landfill and the lack of basic amenities, RENA filed an administrative complaint on July 7, 2007, under Title VI of the Civil Rights Act of 1964 and Executive Order 12898 on Environmental Justice (Campbell, 2007). This complaint was developed with assistance from UNC researchers, attorneys, WERA, and NCEJN.

- 4) *Documentation and archiving.* RENA documented and archived all materials to support its Title VI administrative complaint. RENA sent the U.S. Department of Justice, U.S. EPA, and other federal agencies information from its research and local government records—information that often was contradictory—to support its Title VI complaint.
- 5) *Coalition building.* A turning point for initiating change came through CEER, which pooled and leveraged the strengths of a broader set of diverse partners consisting of people from a variety of racial/ethnic and professional backgrounds.

Principles

- 1) *Communities must be the driving force for creating the organizing, research, and education strategy to inform residents about infrastructure disparities.* This is critical for empowering residents to hold municipalities and government agencies accountable to resolve these disparities, which are often underrecognized in the U.S.
- 2) *Holistic view of health and environment.* RENA grounded its advocacy for restoring community environmental health in the World Health Organization's definition of health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (World Health Organization, 1948)."
- 3) *Patience and perseverance.* RENA showed the importance of patience and perseverance, not just by bringing attention to problems locally for over 40 years, but by pursuing solutions nationally. RENA followed the blueprint established by WERA to pursue administrative action for environmental justice at the federal level. This precedent can be followed by other overburdened and underserved communities. After 40 years of bearing the cumulative burdens associated with several solid waste

facilities and lack of basic amenities, the Rogers-Eubanks community still struggles for solutions. By integrating their community organizing strategy with a collaborative and community-driven research strategy, however, RENA has had many successes. RENA's approach has validated long-time concerns of residents through the use of principles of community ownership and management of

the research process (Heaney, Wilson et al., 2011); given the community a voice at the decision-making table; corrected years of inaccurate official records; secured positive local, state, and national attention and community support; and started long-requested actions to address public health concerns in the community. While it is important that other communities seeking to address infra-

structure disparities tailor their community-driven research approach to their own unique situation, RENA has demonstrated principles and strategies that may help others. 🐼

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Did You Know?

The U.S. Environmental Protection Agency's Office of Environmental Justice has launched a 20th Anniversary Video Series (epa.gov/environmentaljustice/events/20th-anniversary.html). These videos feature federal and local government officials, non-profit leaders, and students who tell stories about the lessons that they have learned over their time working on environmental justice.

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Lisa C.
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Jesse Pevear, III,
MSPH

Environmental Public Health Online Course (EPHOC) Series: Are We Making a Difference?

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

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

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

Lisa McCormick is an assistant professor at the University of Alabama at Birmingham School of Public Health (UAB SOPH) and has been working with the South Central Partnership for Workforce Development since 2002. Jesse Pevear is a statistician and works with the Survey Research Unit at UAB SOPH.

In 2007, the University of Alabama at Birmingham's (UAB) School of Public Health (SOPH), the Jefferson County (Alabama) Department of Health (JCDH), NEHA, and the Centers for Disease Control and Prevention's National Center for Environmental Health (CDC/NCEH) partnered to begin development of a comprehensive online package of courses for environmental public health (EPH) practitioners. This series of courses, known as the Environmental Public Health Online Courses (EPHOC), was developed in response to the 2005 National Profile of Local Health Departments (National Association of County and City Health

Officials, 2007), which indicated that many local health departments suffer from a lack of basic workforce development infrastructure, insufficient training budgets, and a shortage of designated staff persons to coordinate training. This series of courses, launched in its completion in 2010, is the first of its kind for public health discipline-specific workforce development training.

The EPHOC package provides over 45 hours of instruction through 15 courses that mirror the chapters of the NEHA *Registered Environmental Health Specialist/Registered Sanitarian (REHS/RS) Study Guide* (see Sidebar). The courses are designed for both new

EPH workers who wish to learn more about the spectrum of EPH practice and experienced EPH workers who are ready to pursue professional credentialing. A combination of leading academic professors and EPH practitioners provide lecture-style video presentations (Figure 1). Each course includes a pretest, a number of individual 20–40 minute modules, and a posttest. EPHOC courses are freely available and accessible without charge through a learning management system operated by the South Central Public Health Partnership for Workforce Development, which is a partnership among UAB SOPH; the Tulane University School of Public Health and Tropical Medicine; and the state health departments of Alabama, Louisiana, and Mississippi. Courses are available at www.south-centralpartnership.org/EPHOC.

EPHOC courses are evaluated according to Kirkpatrick's four-level taxonomy for training evaluation. Level I (program level satisfaction) and Level II (knowledge) evaluation data are collected at the time participants complete courses. To determine to what degree the information learned in the EPHOC courses has been applied in carrying out daily job duties and to determine the utility of the program in preparation of the REHS/RS professional credentialing exam, a follow-up survey was conducted. At the time the electronic survey was sent out in the fall of 2012, 1,906 individuals had completed one or more of the EPHOC courses. Of these, 355 responded to the survey for an 18.63% response rate.

Of the respondents, 53.42% reported having a bachelor's degree or higher and 50% indicated that they have an environmental health-related degree. The mean age of respondents was 44.23 years with an average

FIGURE 1

Screenshot From Environmental Public Health Online Course Training on Food Protection



Environmental Public Health Online Course Topics

1. General Environmental Health
2. Statutes and Regulations
3. Food Protection
4. Potable Water
5. Wastewater
6. Solid and Hazardous Waste
7. Hazardous Materials
8. Zoonoses, Vectors, Pests, and Weeds
9. Radiation Protection
10. Occupational Safety and Health
11. Air Quality and Environmental Noise
12. Housing Sanitation and Safety
13. Institutions and Licensed Establishments
14. Swimming Pools and Recreational Facilities
15. Disaster Sanitation

of 10.47 years of EPH experience and 7.22 years in their current position.

Respondents were asked to rate the following on a scale of 1 to 10:

- Their level of satisfaction of the EPHOC series as a whole,
- how useful they found the EPHOC courses to be in providing information needed to perform their job role, and
- the degree to which they were able to apply the knowledge they learned in their daily jobs.

Overall, the results were positive:

- Regarding level of satisfaction with the EPHOC series as a whole, 73.73% of respondents gave a rating of 8 or better. (Scale: 1 = not at all satisfied to 10 = extremely satisfied.)
- Regarding usefulness of the EPHOC course in providing information needed to perform their job role, 64.23% gave a rating of 8 or better. (Scale: 1 = not at all to 10 = critical.)
- Regarding the degree to which respondents were able to apply the knowledge they learned to their daily job, 51.06% gave a rating of 8 or better. (Scale: 1 = not at all to 10 = often.)

Furthermore, the survey provides preliminary findings that EPHOC may be a powerful study tool for preparing for the REHS/RS exam.

Survey respondents who took the EPHOC courses before taking the REHS/RS exam passed at a higher rate than those who did not take the EPHOC course first. The success rate of passing the REHS/RS exam before taking EPHOC was 60.41% (29 of 48) while the success rate after taking the EPHOC courses was 90.90% (30 of 33). Sixty percent (18 of 30) of those who reported taking the REHS/RS exam after completing the EPHOC course reported that the EPHOC courses were helpful to them in preparing for the REHS/RS exam.

Although it is a new program, EPHOC has already identified some areas of improvement. The number-one complaint about the training is related to lost time and course accessibility. Currently it is necessary to alternate between two different e-learning platforms to view course modules. Hiring a programmer to streamline EPHOC into a singular learning management platform could address this problem. Another future need for EPHOC is to periodically update it to ensure it is relevant to the profession and stays in alignment with REHS/RS exam content.

Collectively, these results provide preliminary evidence that the EPHOC participants found the 15-course series satisfactory and use-

ful in providing information applicable to their daily jobs. In general, a majority of the respondents rated the courses not only applicable to their daily job duties, but also helpful in preparation for and passing the REHS/RS exam. 🗣️

Acknowledgement: The authors would like to acknowledge Lieutenant Commander Jasen Kunz, MPH, REHS, who coordinates the EPHOC program at CDC/NCEH.

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▶ DEMYSTIFYING THE FUTURE



Thomas Frey

Moving From Just-in-Case to Just-in-Time Living

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.

How many extra shavers, bars of soap, or cans of soup do you currently have on your shelves at home? How much money do you currently have tied up in "inventory" of typical household items? What if you could get by without any?

Every time you buy a loaf of bread, pack of gum, or stapler for your desk, you take ownership of those items. All of these become part of your personal assets. The ownership cycle generally ends whenever the item is consumed, abandoned, or thrown in the trash.

Most of us have houses full of personal belongings and we even rent storage units for overload items.

Our possessions continue to grow until we start approaching retirement age. That's when we start taking a hard look at everything we've accumulated and begin the shedding process.

Two recent trends are beginning to change this cycle. One is the transition from physical products to digital ones. The other is our ever-evolving systems that enable us to access items at the time of need rather than maintaining a standing inventory.

This is all part of our transition from just-in-case to just-in-time living.

Shifting Our Thinking About Ownership

In her "2012 KPCB Internet Trends Year-End Update," famed Kleiner Perkins venture capitalist Mary Meeker zeros in on this shift by first explaining the move to mobile technology. During the last quarter of 2010 we saw our first inflection point with the sale of mobile devices exceeding the sale of desktop PCs. She goes on to predict the next inflection point will be when the total install base of mobile devices will exceed the number of desktop PCs sometime in 2013.

During the past few years our thinking about everything being physical and stationary has transitioned to the mobile and digital mindset.

- Smart device cameras overtook stand-alone camera sales in 2008.
- Smart phone GPS apps overtook portable GPS devices in early 2012.
- Job fairs in physical locations have been replaced with LinkedIn and other online job finder services.
- In-bank paper-based loan forms have been replaced with online credit applications.
- Physical in-store cash registers are being replaced by iPads with Square.
- College lectures in the classroom are being replaced with Coursera, Kahn Academy, EDx, Udemy, and more.

In Meeker's view, we are moving from an asset-heavy generation, dependent upon physical money, physical time constraints, and physical space issues, to an asset-light era where we can walk out the door with our clothes, smartphone, and nothing else and can still be functional all day.

Freeing ourselves from the physical limitations of time and place proximity dramati-

cally reduces our cost of living and the overhead cost of a business employing us.

Moving From Just-in-Case to Just-in-Time

Rather than having closets full of CDs, record albums, and VHS videos, we can have our entire entertainment library hosted in the cloud and retrieve it whenever we want.

Rather than owning a car and paying for parking, insurance, and maintenance, services like Zipcar, Uber, and Hailo are offering some very appealing on-demand transportation options.

Rather than having pockets full of cash and credit cards, our smartphones are quickly becoming the do-everything wallet of choice.

Over the coming years, entrepreneurs will force us to rethink our need for almost anything physical.

As delivery services improve, with future automated drones reducing the time it takes to receive an order from days to minutes, our thinking about our ties to the physical world will begin to morph.

3D printers are beginning to show us how we can create what we need rather than spending countless hours searching the planet to find the item and have it shipped to us.

The time and precision with which our needs can be met will cause us to rethink virtually everything that feels like ownership.

Final Thoughts

On a recent trip to Australia I was shown a house that was owned by Elton John. He owned it for 12 years but only showed up there once.

In the past, rich people were always defined by how much they owned. Real estate, expensive cars, vacation homes, and fancy jewelry have long been the symbols of greatness.

But at the same time, all of our physical trappings weigh us down. They occupy our mind, cloud our judgment, and consume our time. Our possessions become our obsessions.

No, the world of physical ownership will not abruptly end overnight. But the speed with which we begin to migrate in that direction is about to pick up.


Today, 144 million Americans spend an average of 52 minutes a day in their car, most of it spent commuting to and from work. In the future, we will not show up for work just-in-case we need to be there. Rather, we will figure out schemes for being there just-in-time, either virtually or physically, as business needs dictate.

If the average nonproductive time spent in cars were cut in half, how else could people spend their extra 26 minutes a day?

What will a world of on-demand education, on-demand health care, and on-demand employment look like? If you're struggling to imagine this kind of future, you're not alone. But we are about to find out very soon.

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

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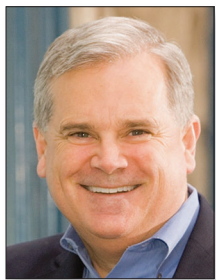
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▶ LEGAL BRIEFS



Bill Marler, JD

Why Your Jobs Are Important

Editor's Note: The *Journal* recognizes the importance of providing readers with practical and relevant legal information and is pleased to publish the popular Legal Briefs column. In every other issue of the *Journal* this information will be presented by the attorneys at Seattle-based Marler Clark, LLP, PS (www.marlerclark.com). Marler Clark has developed a nationally known practice in the field of food safety. They represent people who have been seriously injured or the families of those who have died after becoming ill with foodborne illness during outbreaks traced to restaurants, grocery chains, and other food suppliers.

Bill Marler is managing partner of Marler Clark. He began litigating foodborne illness cases in 1993. Since then, he has dedicated his law practice to representing victims of foodborne illnesses, including *E. coli*, *Salmonella*, and *Listeria*. In addition to his law practice, Bill is a food safety advocate and publisher of *Food Safety News*.

Lauren Beth Rudolph died on December 28, 1992, in her mother's arms due to complications of an *E. coli* O157:H7 infection—hemolytic uremic syndrome. She was only 6 years, 10 months, and 10 days old when she died. Her death, the deaths of three other children, and the sicknesses of 600 others were eventually linked to *E. coli* O157:H7-tainted hamburger produced by Von's and served undercooked at Jack in the Box restaurants on the West Coast during late 1992 and January 1993. Roni Rudolph, Lauren's mom, and I have known each other for 20 years. As a parent of three growing daughters, I cannot imagine what it must be like not to share their lives.

Dave Theno became head of food safety for Jack in the Box shortly after the outbreak. I have also known Dave for 20 years. I put him under oath more than a few times, and I faced him and his team of lawyers in several courtrooms from 1993 to 1995.

I learned only a few years ago, however, a significant fact about Dave—one that made me admire him—one that I think all in food safety should emulate.

Dave and I shared the stage at the National Meat Association (NMA) annual convention a few years ago. The NMA is an association representing meat processors, suppliers, and exporters. Dave spoke just before I did and was rightly lauded as someone who takes food safety to heart. It was his story about Lauren Rudolph and his relationship with Roni, however, that struck all in the room.

Dave told the quiet audience about Lauren's death. He told us how her bowels liquefied and she suffered several strokes. Dave also told us that the death of Lauren and his friendship with Roni had changed him. He told us all that he had carried a picture of Lauren in his briefcase every day since he had taken the job at Jack in the Box. He told

us that every time he needed to make a food safety decision—who to pick as a supplier, what certain specifications should be—he took out Lauren's picture and asked, "What would Lauren want me to do?"

I thought how powerful that image was. A senior executive charged with making a company's food safety decisions holds the picture of a dead child—seeking guidance to avoid the next possible illness or death. The image is stunning, but completely appropriate.

I wonder if other people responsible for food safety—whether in industry or government—would ever do such a thing. If they do not, perhaps they should?

Shortly after seeing Dave at NMA, I spent time in South Carolina with the family of a four-year-old who had eaten *E. coli* O157:H7-tainted cookie dough and was hospitalized for months, suffering weeks of dialysis and seizures. She still faces a lifetime of complications.

I then left South Carolina for Ohio, where I sat across the kitchen table from a family who lost their only daughter because she died from an *E. coli* O157:H7 infection. A hamburger was to blame.

These and dozens of other visits over 20 years have left an imprint on me.

I have thought much about how we should all be like Dave Theno. We should run our businesses, inspections, and lives like Dave ran food safety at Jack in the Box after the outbreak. We should go meet these families. Sit across their kitchen tables. Go to a hospital room and see more tubes and wires than you can count. Understand what these people have lived through.

We should take their stories into our hearts. It is hard, very hard, but it will give us all a real clear reason to do our jobs. 🐾

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IN MEMORIAM

William Kimura

NEHA was saddened to learn that William Kimura passed away in January 2013. Kimura was the division director of environmental health for the city of Pasadena. He was a great resource for environmental health in southern California. Many registered environmental health specialists (REHS) either took Kimura's preparedness course or used his study book to help them pass California's REHS exam.

NEHA wishes to express its deepest sympathies to Kimura's family, colleagues, and friends. He was an exemplary figure in environmental health and will be greatly missed.

Gordon Robbins

NEHA was saddened to learn that Gordon Robbins passed away in March 2013. Gordon was the founding assistant director for

program operations of the Centers for Disease Control and Prevention's (CDC's) National Center for Chronic Disease Prevention and Health Promotion. He worked at CDC for 37 years and retired in 2003. Gordon was CDC's first certified health educator and a winner of the Samuel J. Crumbine Consumer Protection Award while working at a Kansas health department early in his career.

NEHA wishes to express its deepest sympathies to Robbins's family, colleagues, and friends. He was an exemplary figure in the field of health education and will be greatly missed.

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

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Thanks!

Did You Know?

Each June, the National Safety Council encourages organizations to get involved and participate in National Safety Month (NSM). NSM is an annual observance to educate and influence behaviors around leading causes of preventable injuries and deaths. For more information, visit nsc.org.

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**Alaska**

October 2–4, 2013: Annual Educational Conference, sponsored by the Alaska Environmental Health Association, BP Energy Center, Anchorage, AK. For more information, visit <https://sites.google.com/site/aehtest/>.

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, Oceanside Inn & Suites, Jekyll Island, GA. For more information, visit www.gehaonline.org.

Montana

October 8–9, 2013: 2013 Fall Educational Conference, sponsored by the Montana Environmental Health and Public Health Associations, Great Falls, MT. For more information, visit www.mehaweb.org.

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.

Texas

October 8–12, 2013: 58th Annual Education Conference, sponsored by the Texas Environmental Health Association, Double Tree Hotel Austin, TX. For more information, visit www.myteha.org/Annual_Education_Conference.

Wisconsin

September 25–26, 2013: Joint Regional Education Conference, presented by the environmental health association affiliates from Wisconsin, Minnesota, Iowa, Nebraska, North Dakota, and South Dakota, Radisson Hotel, La Crosse, WI. For more information, visit www.weha.net.

Wyoming

October 8–10, 2013: 2013 Annual Education Conference, sponsored by the Wyoming Environmental Health Association and the Wyoming Food Safety Coalition, Hotel Terra, Teton Village, WY. For more information, visit www.wehaonline.net.

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/.

Did You Know?

If you can't make it to Washington, DC, for the NEHA 2013 AEC, you can access it online instead. About 30 educational sessions will be recorded live, and you can participate online almost as if you were sitting in the room by registering for the Virtual AEC. You can also earn continuing educational credits for participating in the sessions. To register for your access to the Virtual AEC, visit neha2013aec.org.



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RESOURCE CORNER

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



Professional Food Manager (Third Edition)

National Environmental Health Association, Inc. and MindLeaders, Inc. (Portions) (2013)



Though the food service industry is ever evolving, one factor remains consistently important: the competency level of managers responsible for the safety of food served. In order for a food service operation to manage its risks effectively, managers must not only pass a Conference for Food Protection/American National Standards Institute-accredited food safety manager examination, they must retain that information and put it

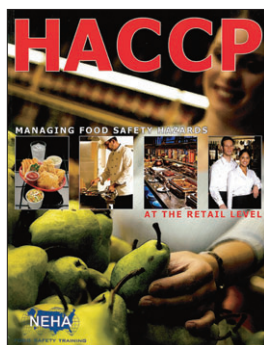
into practice every day on the job. Revised and updated by food safety experts, *Professional Food Manager, Third Edition* helps managers prepare for the certification examination while also demonstrating how to maintain the highest level of proficiency after achieving certification. It is written in an easy-to-read style that prepares current and soon-to-be managers for the many challenges encountered in the workplace.

141 pages / Paperback / Catalog #EZ6002

Member: \$22 / Nonmember: \$26

HACCP: Managing Food Safety Hazards at the Retail Level

National Environmental Health Association, Inc. (2009)



This economically priced HACCP training material was created to meet the growing demands on the food service industry to look at risk factors affecting food safety. The HACCP approach to food safety addresses the analysis and control of biological, chemical, and physical hazards through active managerial control within the retail establishment. *HACCP: Managing Food Safety Hazards at the Retail Level*

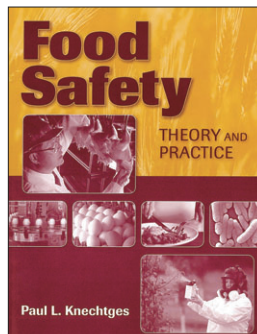
will walk a food manager step-by-step through creating a workable HACCP plan as well as prepare individuals for NEHA's Certified HACCP Manager exam. Reviewed and accredited by the International HACCP Alliance as meeting the required standards for content and training for introductory HACCP. This book is also a recommended study reference for NEHA's CP-FS exam.

128 pages / Paperback / Catalog #EZ6011

Member: \$24 / Nonmember: \$29

Food Safety: Theory and Practice

Paul L. Knechtges (2012)



Authored by a NEHA member! Written from a "farm-to-fork" perspective, this book provides a comprehensive overview of food safety and discusses the biological, chemical, and physical agents of foodborne diseases. Early chapters introduce readers to the history and fundamental principles of food safety. Later chapters provide an overview of the risk and hazard analysis of different foods and the impor-

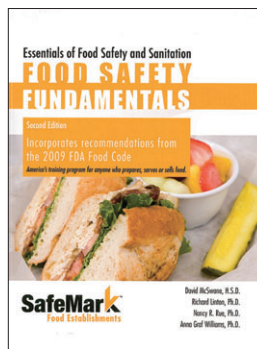
tant advances in technology that have become indispensable in controlling hazards in the modern food industry.

460 pages / Paperback / Catalog #1120

Member: \$78 / Nonmember: \$83

Food Safety Fundamentals: Essentials of Food Safety and Sanitation (Second Edition)

David McSwane, Richard Linton, Nancy R. Rue, and Anna Graf Williams (2010)

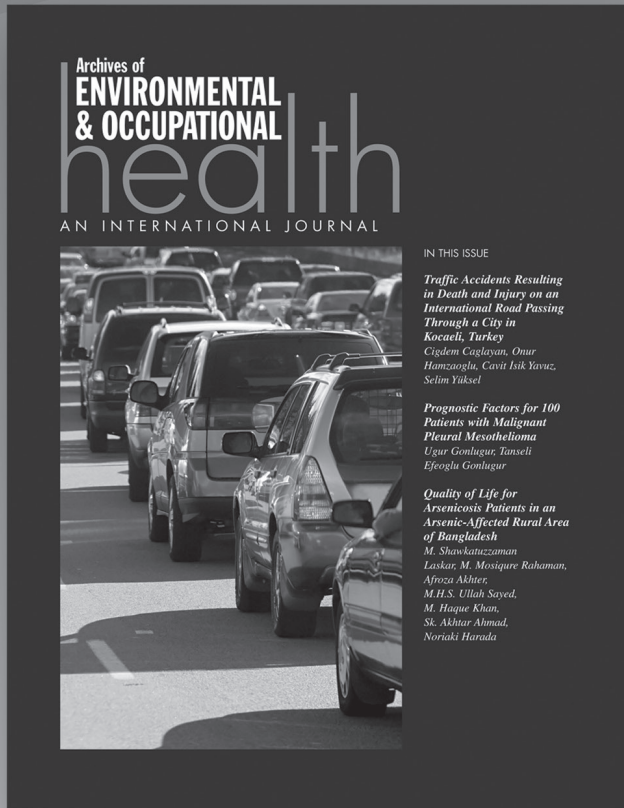


This book incorporates the best food safety and sanitation practices for the overall food industry. It utilizes the latest standards in FDA's 2009 *Food Code* and is filled with food service and retail industry photos and easy-to-read charts. It is designed to make managers knowledgeable about food hazards while emphasizing proper food handling practices to enable participants to successfully complete all nationally certified

exams. This book is a recommended study reference for NEHA's CP-FS exam.

321 pages / Paperback / Catalog #1093

Member: \$59 / Nonmember: \$69



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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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Living Machine Systems

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National Registry of Food Safety Professionals

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www.cdc.gov

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NEHA NEWS

A Tribute to 75 Years of the *Journal of Environmental Health*

The issue in your hands marks the close of the *Journal of Environmental Health's* (JEH's) 75th volume—and the culmination of 75 years of publication! We wanted to commemorate this amazing milestone with a brief history, as well as give thanks to the thousands of individuals who have contributed to the JEH.

The Sanitarian (the original title of the JEH) was first published by the National Association of Sanitarians (changed to NEHA in 1970) in June 1938. This issue was 6 3/4 in. by 10 in. and was 28 pages long (see image below). The cost of a yearly subscription in the U.S. was \$2.50 and a single issue cost \$0.25.

From 1938 to 1942, *The Sanitarian* had a monthly publication frequency but this fluctuated and it was officially changed to bimonthly in 1943. Thus, the standard of six issues printed a year was followed until 1993 when the publication frequency was changed to 10 issues a year with bimonthly issues for January/February and July/August. The 10-issue frequency has been followed for the past 20 years. This equates to the publication of around 550 issues of the JEH over the past 75 years!

Walter S. Mangold was listed as the editor of *The Sanitarian* from 1938 to 1949. Over the years other notables such as Floyd Jimison, A. Harry Bliss, Milton M. Miller, Frank Justice, William Walter, Trenton G. Davis, Franklin Carver, John M. Barry, and Welford Roberts have served as editors, editorial directors, or technical editors. The JEH currently has a group of seven technical editors that make final publication decisions on all submitted articles (see page 4 for a listing).

Along with editors or technical editors (as we now call them), the JEH has had thousands of individuals act as peer reviewers or associate editors throughout the years. The JEH only publishes peer-reviewed articles and requires that each submitted article be subjected to a three-step editing process: 1) initial relevancy review

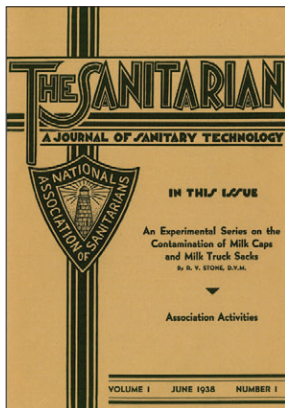
by the managing editor, 2) review by two peer reviewers, and 3) review by a technical editor. The JEH currently has over 100 peer reviewers who represent the U.S. and over 10 other countries. (A tribute to the current peer reviewers will be published in the July/August 2013 issue.) With approximately 120 articles sent through peer review each year, over 240 peer reviews are conducted by this amazing group of professionals annually.

The Sanitarian title was changed to the *Journal of Environmental Health* in 1962. While certain aspects of the JEH have changed over the years, the strong content has been a constant. With an average of two to four articles published in every issue, the JEH has contributed around 1,650 scientific articles over the past 75 years. This does not count all the columns that the JEH has offered over the years (from columns written by NEHA's president and JEH managing editor to columns on professional writing, international viewpoints, relevant products, legal issues, and federal agency updates). In fact, since assuming the role as managing editor of the JEH in 1983, Nelson Fabian has written about 260 columns in the JEH!

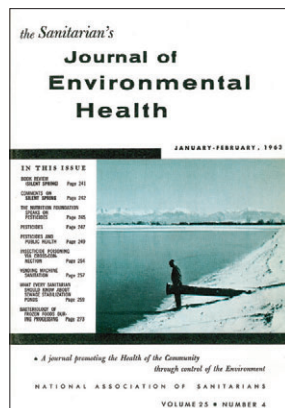
In 2009 the JEH started publishing online articles that could be accessed by NEHA members. The online articles are then published in a January/February compendium issue. The JEH will publish 20 online articles in 2013. And shortly, the JEH will be available in electronic format with members being able to decide how they want to receive the JEH—in print, electronically, or both.

It is not possible to mention all the individuals who have contributed to the JEH, and therefore to the environmental health profession. We wish to extend, however, a tremendous thank you to all those who have contributed to the JEH—editors; peer reviewers; authors; columnists; advertisers; production staff and designers; and NEHA's board, staff, and members—for making the JEH a well-respected and honored publication, and for making the past 75 years possible. We wish the JEH many more years of successful publication! 🐼

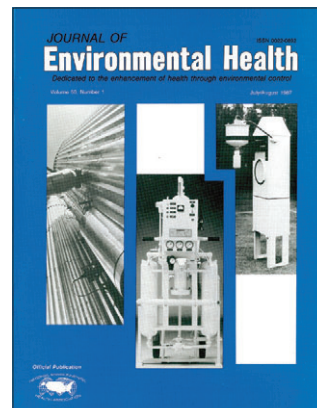
A pictorial look at the *Journal of Environmental Health's* covers over the past 75 years.



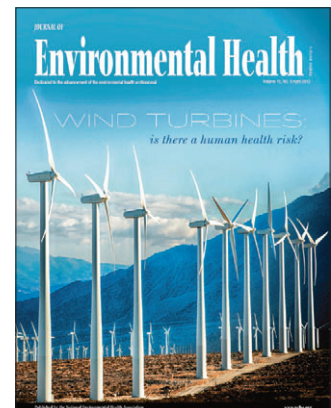
Volume 1, June 1938



Volume 25, January/February 1963



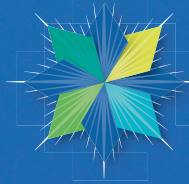
Volume 50, July/August 1987



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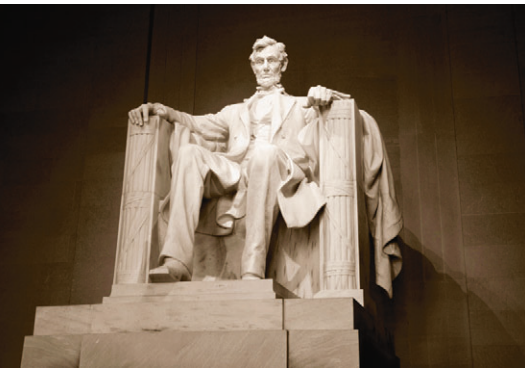
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Away from these celebrated federal sites, Washington, DC, unwinds into a fascinating network of neighborhoods where visitors discover trendy boutiques, hip bars and restaurants, plus art galleries, historic homes, and lush parks and gardens. Shoppers 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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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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	MEMBER/NONMEMBER	Thru May 24	After May 24
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

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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.

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



EDUCATION

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



LECTURE SESSIONS

Knowledge. Understanding. Expertise.

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 ZOONOTIC 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

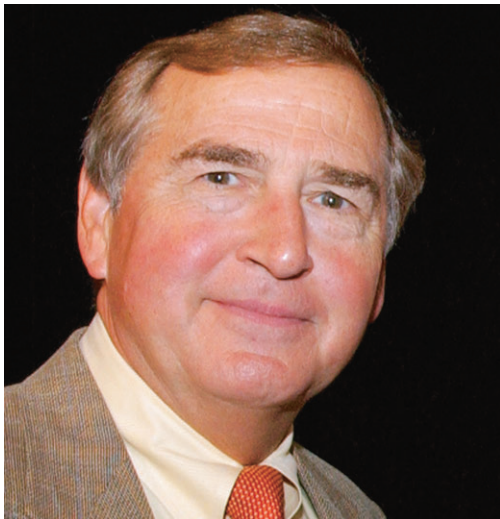
Pharmaceuticals are emerging contaminants in water and, to date, cannot be removed as part of wastewater treatment options. So, what can be done to mitigate their effects upon the environment, yet maintain their efficacy for human and animal use? In this session, the presenters examine this topic from 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**

neha2013aec.org

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.



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.

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.

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

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.*

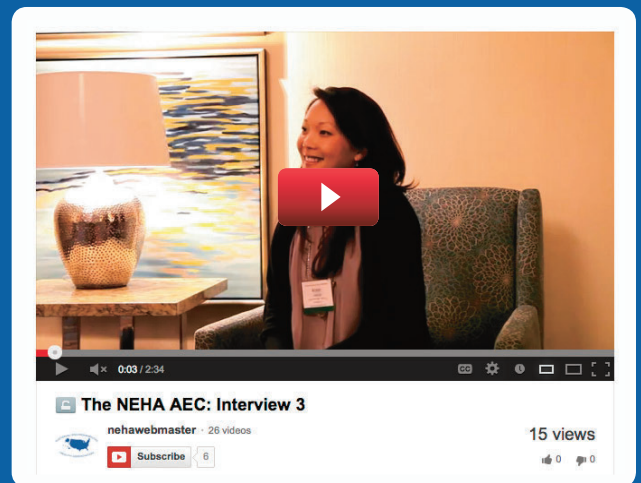
ADVANCEMENT *Careers. Aspirations. Respect.*

MOTIVATION AND INSPIRATION *Perspective. Leadership. Excellence.*

WATCH

Join us online to learn what environmental health professionals are saying about the NEHA AEC.

The NEHA AEC is so much more than a conference. It is the nexus for environmental health training, education, networking, and advancement. It is the event environmental health professionals attend to acquire practical and real-world information and expertise. It is the event from which environmental health professionals leave trained, motivated, inspired, and empowered to further advance their organizations and themselves.



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Shop Online

- It's time to get registered for the NEHA 2013 AEC, so shop online and purchase your conference registration using My NEHA
- Purchase membership, books, and more
- Handle open orders, invoices, and other transactions
- Receive a receipt automatically via e-mail for your purchases



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Questions?

Visit neha.org for more information or call us at 303-756-9090.

▶ MANAGING EDITOR'S DESK



Nelson Fabian, MS

Some years back, I sat on the board of the association that served and represented association executive directors here in Colorado. (Such associations exist in almost every state and nationally, we are all served by the American Society of Association Executives [ASAE].)

Of all the experiences I had on that board, one in particular comes to mind as I write this column. In fact, I'll never forget it.

Before I explain what this experience entailed, you need to know that at that time, we were in the midst of some big financial challenges. In fact, we ultimately laid one of our staff off. In addition, I was serving in the treasurer position and was therefore "steep deep" in all of our financial numbers and trends.

As our board was poring over the numbers and looking for a way forward, suddenly our president, without so much as pausing to consider the impact of what he was saying, stood up and dismissively announced that the answer to our problem was easy. Just raise our dues! It made no matter to him that we had been raising dues fairly regularly over the years (in fact, almost annually).

When I asked him about several options that I had come up with that would generate nondues revenue to cover our losses, I got brushed aside with a flippant, "Oh, my association raises dues all the time. It's no big deal. Our members have come to even expect it."

In the end (and after I resigned from the board), this association did in fact deal with its problem by once again raising its dues.

At the time (and even through today), I thought that this was all rather odd. I thought this, quite possibly, because that kind of

Dues !#\$%&*!!

*Between one-half
and two-thirds
of all associations
raise their dues
at least once every
three years!*

*The last time
NEHA raised dues
was in 2005—
eight years ago!*

attitude differed markedly from how we at NEHA have viewed dues, and for that matter, other association fees.

For years, NEHA has been on a mission to keep this association economically accessible to all who practice environmental health. In addition, we are well aware that many of our members work in employment settings where finances are tight and funding for association dues and activities is lean, if it exists at all. Accordingly, NEHA has long worked to reduce the size of the "dues" piece of our revenue pie.

Most associations count on dues for about 50% of their total income. At NEHA, we've reduced dues down to the point where they now makes up only about 6.4% of our total revenues! (I confess that I love the look of shock and disbelief I see when I proudly tell

my association executive director colleagues about this percentage!)

I was thinking about all this the other day when I ran across a most interesting report that dealt with the issue of how often associations raise membership dues. It turns out that my instincts about dues increases were considerably out of the mainstream. Research compiled by ASAE clearly indicated that between one-half and two-thirds of all associations raise their dues at least once every three years! What surprised me even more was the fact that this pattern of frequent dues increases did not change over the course of the recession and its aftermath. And this despite the fact that many association executive directors have been very publicly complaining over the last several years about flat and even declining membership numbers. (In other words, one would think that if one's membership is struggling financially, if anything, you keep your dues low!)

As you take in what I've just said, let me note that I sometimes counsel the staff here that they need to talk more about some of the cool things that they do. (People can't appreciate the good stuff that gets done for them if they know nothing about it.) In a similar vein, our board sometimes talks about the many neat things that NEHA does that our members know too little about (often despite our efforts to get the word out).

My point is that it is difficult to cultivate an appreciation for the value of membership if the members are seldom told what their association is doing for them. It is precisely for this reason that I thought it important that the NEHA membership knows that we take the issue of dues very seriously. The last

continued on page 46

Environmental health professionals make a difference. Every day.

Decade is thrilled to work alongside NEHA. By providing 15 scholarships to attend the NEHA 2013 AEC, we help recipients share in the experience of the AEC. They'll gain knowledge from the leading, innovative thinkers in our profession.

Meet three of this year's scholarship winners.



Stephanie Gorman, R.E.H.A

"Our lives are directly impacted by the environment. Think about one of the earliest epidemiological cases—John Snow and cholera. Snow's observations enabled him to stop the spread of this deadly disease in a simple step—removing the handle from a contaminated drinking well. One small action can reach several lives."

Larry Johnson, R.S., M.S.

"Every day I get to make a decision which has a positive effect on Public Health and the environment in which we live. No two days are alike and each day presents new challenges."



Amanda J. Echler, MPH, MLS(ASCP)cm

"I have always wanted to help people and started out working in hospitals. I later realized I didn't want to help people after they are sick or hurt, but I want to prevent people from getting to the point where they need to end up in a hospital."



Read about all the winners at www.decadesoftware.com/aecschorships2013.

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