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About Biobased
Metalworking Fluids*



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ABOUT THE COVER



Our cover feature this month, “The Dilemma of Promoting Green Products: What We Know and Don’t Know About Biobased Metalworking

Fluids,” hits upon a common and current issue: when a product is labeled “green,” what exactly does that mean? The authors set out to try answer this question in the category of metalworking fluids (MWFs), comparing “green” MWFs with traditional MWFs. They found that the “green” MWFs had a lot of the same ingredients as the traditional MWFs; therefore, claims that biobased MWFs are “green” should be greeted with caution. See page 8.

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► PRESIDENT'S MESSAGE



Mel Knight, REHS

Program Resources—How Much Is Enough? Building the Case for Environmental Health Program Credibility

NEHA recently received an e-mail that related the writer's concerns for an initiative by the City of Chicago to establish a self-certification program for certain retail food facilities. A new Chicago city ordinance allows for designated low-risk facilities to self-certify compliance. These facilities include retailers that sell prepackaged foods and recently inspected restaurants with no history of foodborne illness or closure. The stated purpose of the initiative is to enable the city's finite resources to be allocated to higher-risk operations.

This issue was widely discussed by the NEHA board of directors and food safety technical advisors, generating a general consensus that the Chicago initiative appeared to be an acceptable if not optimal practice. There was agreement that the new Chicago model appeared to be similar to actions being taken today by many jurisdictions that are seeking to stretch available resources. The adoption of risk-based inspection categories and frequencies is now a common practice, consistent with our responsibility to work better/smarter/cheaper whenever doing so is *not at the expense of the public's health*.

Efficiency/Efficacy

The Chicago initiative makes a case for the importance of clearly understanding and communicating the relationship between program efficiencies and program impacts or efficacy. This is especially important when developing or implementing service-level changes. When implemented strategically, program efficiencies do not always have

Strong environmental health programs need to be able to demonstrate accountability, efficient use of resources, innovative revenue generation, and evidence of impact.

to result in decreased public health protection. Strong environmental health programs need to be able to demonstrate accountability, efficient use of resources, innovative revenue generation, and evidence of impact. Lesser programs are at risk of losing public credibility and may unfortunately be destined to a spiral of decline that is frequently referred to as "a race to the bottom."

I think that most of us would agree that food safety regulatory programs (and all other environmental health programs, for that matter) have an obligation to strive for both efficiency and efficacy. We cannot continually defend practices that expend resources without apparent benefit, and we must be careful to ensure

that program reductions or regulatory relief actions do not contribute to an unacceptable increased risk to the public. NEHA, as the voice for environmental health professionals, must always advocate for adequately resourced environmental health programs, especially in these economically challenging times.

Resource Needs—How Much Is Enough?

The challenge appears to be the difficulty in defining *adequate resources*. There are a number of initiatives that have sought to characterize the competence or quality of environmental health programs, some more successfully than others. Many environmental health programs are now focusing on measurement of performance outcomes, rather than simply counting activities. There is also a recently initiated national certification process for public health agencies including environmental health programs. Additionally, federal, state, and local agencies have developed model codes or guidance documents that are now widely available. Although some of these measurement tools are still in development and there are significant variations in community needs, program evaluation is important and useful.

Financial Resources—Innovative Funding

While many environmental health programs may be able to determine their adequate or appropriate resource needs, their currently available funding may not be able to meet those needs. Environmental health is fortunately in a somewhat unique position relative to other

public health and safety programs in that there are multiple alternative sources of revenue beyond taxes, including fees and contracts.

I was recently in contact with a local agency that was facing drastic tax revenue losses. They had been initially informed by their governing body that fee revenue increases were not an available option. As the public became aware of the consequences and likelihood of significant reductions in services and protection, the elected officials in that jurisdiction became open to revenue-generating fee options and they developed the political will to adopt a new fee schedule that covered most if not all of the revenue shortfall. Many environmental health programs in California and other states have decreased or entirely eliminated taxation as a revenue source, and NEHA has been active in sharing these best practices in alternative revenue enhancement.

Environmental health must also be in a position to favorably compete for general fund or tax revenues where appropriate. NEHA has established an innovative venture, the Center for Priority Based Budgeting, that is now working in many cities and counties to assist in developing budget allocations

that reflect actual community needs and priorities. This activity will hopefully elevate awareness as to the value and importance of environmental health services.

The Value of Compelling Evidence

With heightened competition for finite resources, it has become increasingly important that environmental health programs are able to convince the public, elected officials, and ratepayers that program dollars are being well spent. NEHA has advocated the concept of ROI (return on investment) as a means to demonstrate maximizing “bang for the buck.” The term “evidence-based practices” is now being widely used to describe activities or programs that have a documented basis for their efficacy. There is a limited but expanding body of experience and independent literature that serves as evidence for establishing optimum inspection frequencies, appropriate staffing levels, and the cost/benefit relationship of our programs. NEHA representatives have been active participants in assisting agencies, academia, and industry in collaborations to provide the basis for sound data-driven decision making.

Lessons Learned

We continue to experience widespread reductions in public and environmental health services, and these resource shortfalls are well documented. Some, but not all, are related to the continuing poor economy. We can all learn from the experiences of programs that have enjoyed some degree of success in meeting these challenges. We can improve our programs’ standing and credibility by generating and sharing evidence of the value added to the community. We all need to become active in our interactions with the public, elected officials, and the regulated community. We have opportunities and obligations to seek out innovative funding sources and options. We cannot become discouraged by single or even repeated setbacks, and we should be prepared for windows of opportunity to open when least expected. I continue to be confident that our hard work, program quality, and value to the community will be recognized. 🐼

Mel Knight REHS

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For more information, please contact Shelly Wallingford at swallingford@neha.org.



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The Dilemma of Promoting Green Products: What We Know and Don't Know About Biobased Metalworking Fluids

Ephraim Massawe, ScD
Kenneth Geiser, PhD

Abstract Advocates of “green products” argue that promoting these products can protect the environment, workers, and public health. Biobased metalworking fluids (MWFs) are among the products promoted as “green products.” The main question is, what constitutes a green product? To answer this question, the authors compared and contrasted the health and safety aspects of biobased and petroleum-based MWFs in terms of their additives. These two product categories of MWFs derived from various feedstocks were investigated through interviews and literature review. Three classes of biobased MWFs and four classes of petroleum-based MWFs were identified and compared. The little information available on the individual constituents for biobased MWFs indicates that they had biocides and preservatives, corrosion inhibitors, extreme pressure, and antiwear components, which are also common additives in petroleum-based MWFs. Precautionary approaches should be taken when promoting biobased MWFs as “green products” until individual components are evaluated for their health and safety impacts.

Introduction

For many decades, concerns have been growing about negative environmental, health, and safety impacts of chemicals and products that are derived from petroleum-based feedstocks. As a result, the search for environmentally friendly products, commonly referred to as “green products,” has received worldwide attention in recent years. The U.S. and countries in Europe have continued to provide financial support toward research and development of “green products.” In the U.S., many firms design and manufacture a myriad of biobased products and sell them as “green products” or “sustainable products.”

Advocates of biobased products argue that these products are “green” because they are safer, more ecologically friendly, and healthier than their counterparts that are derived from petroleum feedstock (Honary, 2001). Little research, however, has focused on what actually constitutes “green products.”

No universally agreed-upon criteria exist to define a “green product.” It is generally construed as a product that will not damage environmental compartments such as air, water, or soils to a degree that will be socially, ecologically, and economically acceptable by society. In addition, “green products” will not affect consumers’ or workers’ health

and safety. A study conducted recently used criteria such as global warming and ozone depletion potential, pH, flammability, and volatile organic compounds to evaluate biobased floor strippers for their ecological, health, and safety aspects (Massawe, Geiser, Ellenbecker, & Marshall, 2007). The weakness of these criteria is that they may apply only in limited circumstances, including geographical and political boundaries.

Biobased lubricants are a class of the so-called “green products” on the market today. They include metalworking fluids (MWFs), greases, hydraulic oils, and turbine oils. Manufacturers, formulators, and suppliers contend that biobased MWFs will soon replace the conventional petroleum-based MWFs as “green products.” By the very nature of the functions of an MWF, however, biobased MWFs products must be formulated to meet the technical performance and other expectations of consumers in terms of efficiency and cost. As a result, petroleum-based MWF formulations use a series of additives to withstand robust work environments involving cooling of metal parts running against one another, usually in machine shops.

Recognizing that both conventional and biobased MWFs will require various additives to function well under various conditions, the goal of our study was to identify categories of these two MWFs and compare and contrast their health and safety aspects on the basis of their composition. In other words, our study was designed to investigate if the additives used in one type of MWF formulation varied significantly from the other and what this means in terms of their health and safety impacts.

Materials and Methods

Purpose

Our study was designed to investigate various categories of petroleum-based MWFs on the market and compare with biobased MWFs in terms of the composition or additives used in their formulations. To accomplish this objective, surveys and informal telephone interviews were administered to various formulators of biobased MWFs in the U.S. Relevant journals, books, trade magazines, and materials, particularly material safety data sheets (MSDS), were used as additional sources of information.

Surveys and Telephone Interviews

A questionnaire was designed and sent as a mail survey followed by formal and informal telephone interviews with the manufacturers and formulators of biobased MWFs in the U.S. Eleven manufacturers and one university research laboratory were contacted for this survey. This segment of stakeholders was considered a good source of primary information in our study. Only one perceived limitation of this method existed: a lack of cooperation due to the desire to protect market niche and trade secrecy, including pending patents.

The survey questionnaire focused on requesting generic information related to the MWFs and the additives that were being used to formulate biobased MWFs in particular. The main question asked was about the broad categories of additives used to make biobased MWFs, and the follow-up questions requested the specific types and amount of additives used in the biobased MWFs.

MSDS

To complement the above method, MSDS were obtained from the Internet and used to identify and quantify additives used to formulate biobased MWFs. Ideally, section 2 of any MSDS is generally supposed to be a public source of this category of information by providing the identity, amount, and possibly the toxic properties of chemicals. A Hazard Communication Standard (HCS) requires manufacturers and suppliers of chemicals to provide or make available to the public through MSDS any toxicity information for each chemical product stored, manufactured, or transported (Hazard

Communication, 2011). Employers and employees can rely upon this information to make informed decisions on the type of engineering controls or personal protective equipment or other preventive measures to use when they are handling a chemical or product containing toxic agents in the workplace and in the community setting. The strength of the MSDS in this regard is to provide information useful for evaluating health and safety aspects of various products. By using a chemical abstract service number, composition can be reported and subsequently determine a product's health and safety from other related toxicity databases.

Information Database

Literature review of peer-reviewed journals and other open-access publications was used to document various classes of petroleum-based MWFs and the properties of additives used in different classes of biobased MWFs. The *Journal of Cleaner Production*, *Journal of Industrial Ecology*, *Industrial Lubrication and Tribology*, *Tribology International*, and industry trade magazines such as *Lubes 'n' Greases* and the *Agricultural-Based Industrial Lubricant* magazine of the University of Northern Iowa were particularly useful for this purpose. In addition, proceedings from national and international conferences on tribology and product design were used. Electronic journal databases from various libraries were used to search for the availability of journals by using key words such as additives, biolubricants, life cycle assessment of biolubricants, and industrial ecology of the industrial lubricants.

Results and Discussion

Our study can report four classes of conventional petroleum-based MWFs as documented by the National Institute for Occupational Safety and Health (NIOSH, 1998). These MWFs are categorized as straight oils, soluble oils, synthetic, and semisynthetic. The four classes of petroleum-based MWFs reported by NIOSH are dependent upon the amount of the base oil or feedstock and the quantity of water used in each formulation (Gauthier, 2003; Whittaker, 1997). NIOSH has described the health and safety aspects of these petroleum based MWFs in detail (Whittaker, 1997).

Straight-Oil MWFs

Straight-oil MWFs, also referred to as "neat oil," are comprised of nearly 100% of base oils; this means that they are made up of severely refined mineral or petroleum products (Gauthier, 2003; Whittaker, 1997). In other scenarios, straight-oil MWFs have base oils derived from animals, marine life, or vegetables in combination with mineral oils (Gauthier, 2003; Whittaker, 1997). As expected, straight-oil-based MWFs are designed to improve the metalwork as a coolant but at the same time to prevent rusting of metal parts during operations, particularly in moderate- to heavy-duty machining work environments. It is reported that since the amount of petroleum feedstock used to formulate this category of MWFs is close to 100%, very few additives, and only in small quantities, are usually added to this category of MWFs (Childers, 1994).

Soluble-Oil MWFs

Soluble-oil MWFs are defined as emulsion fluids containing much less severely refined petroleum or vegetable oils than straight oil. The composition of severely refined petroleum or vegetable oils lies between 30% and 85% of petroleum-based feedstocks. The remaining components required to formulate these products are emulsifiers, pH stabilizers, rust preservatives, antifoaming agents, corrosion inhibitors, lubricity aids, viscosity modifiers, biocides, and extreme pressure additives such as chlorine, sulfur, and phosphorus-based additives.

Soluble oil-based MWFs are often diluted with water in the range of 5%–25%, creating the need to use biocides and emulsifiers as a way to limit environmental conditions conducive for bacteria or fungal growth (Hewstone, 1994; John, Bhattacharya, & Raynor, 2004).

Soluble oil-based MWFs were developed between 1910 and 1920 to replace straight-oil MWFs because the latter had many risks, including high flammability and poor cooling properties (Wu & Dacre, 1997). Due to the nature of the components used in this category of MWFs, technical performance characteristics of most soluble-oil MWFs are reported to be "extraordinarily good" when used in a high-temperature environment.

TABLE 1

Common Additives in Different Classes of Petroleum-Based Metalworking Fluids

Component	Function	Classification			
		Straight Oils	Soluble Oils	Semisynthetic	Synthetic
Water	As a coolant, solvent, diluents	Dissolved 10–500 ppm ^a	5–40 parts/1 part	10–40 parts/1 part	10–40 parts/1 part
Mineral oils	Carries lubricants	60%–100%	30%–85%	5%–30%	n/a
Emulsifier	Emulsifiers	n/a	5%–20%	5%–10%	5%–10%
Chelating agents	Ties up ions in solutions	n/a	0%–1%	0%–1%	0%–1%
Coupling agents	Stabilizes	n/a	1%–3%	1%–3%	1%–3%
VI modifiers	Maintains viscosity	Different amounts	n/a	n/a	n/a
Detergents	Prevents deposit formation	Different amounts	Different amounts	Different amounts	Different amounts
Plasticizers	Reduces tackiness	n/a	Different amounts	Different amounts	Different amounts
Antimist agents	Reduces misting	Different amounts	Different amounts	n/a	n/a
Antiweld agents	Prevents welding	0%–20%	0%–20%	0%–10%	0%–10%
Oiliness agents	Increases film strength	Different amounts	n/a	n/a	n/a
Surfactant wetting agent	Reduces surface tension	0%–10%	5%–20%	10%–20%	10%–20%
Dispersant	Prevents deposit formation	Different amounts	n/a	n/a	n/a
Passivator	Prevents staining	Different amounts	n/a	n/a	n/a
Antifoaming agents	Prevents foaming	0–500 ppm	0–500 ppm	0–500 ppm	0–500 ppm
Alkaline reserve	Acts as buffer control	n/a	2%–5%	2%–5%	2%–5%
Dyes	Leak detection	n/a	0–500 ppm	0–500 ppm	0–500 ppm
Odorant	Masks odor	Different amounts	Different amounts	Different amounts	Different amounts
Corrosion inhibitors, antirusts	Prevents rust and film barrier	0%–10%	3%–10%	10%–20%	10%–20%
Biocides	Prevents bacteria/fungal growth	n/a	0%–2%	0%–2%	0%–2%
Extreme pressure additives	Reaction lubrication	0%–40%	0%–20%	0%–10%	0%–10%

Source: Bartz, 1998.
^appm = parts per million.

Synthetic Oil-Based MWFs

The third category of petroleum-based MWFs falls under the category of the synthetic oil-based MWFs that evolved in the 1950s as the concentrates of synthetic esters and organic and inorganic salts (Nachtmann & Kalpakjian, 1985). Several additives are reported under this category of MWFs: synthesized hydrocarbons, polyglycols and phosphate esters, corrosion inhibitors, and biocides; and emulsifiers, chelating, antiwear, wetting and coupling agents, rust preservatives, corrosion inhibitors, extreme pressure, antifoaming agents, surfactants, and dyes are often added in the formulation of these products (Fritz, 2006).

Semisynthetic-Based MWFs

The fourth category of petroleum-based MWFs is semisynthetic oil-based MWFs, commonly referred to as “preformed” emulsions (Choi, Ahn, Kwon, & Chun, 1997). These MWFs contain water in the range of 30%–40% and severely refined petroleum oils almost in the same percentage range (Ratoi, Anghel, Bovington, & Spikes, 2000). Additives reported for these products are emulsifiers, coupling agents, extreme pressure and antiwear agents, antifoaming and defoaming compounds, rust preservatives, and corrosion inhibitors.

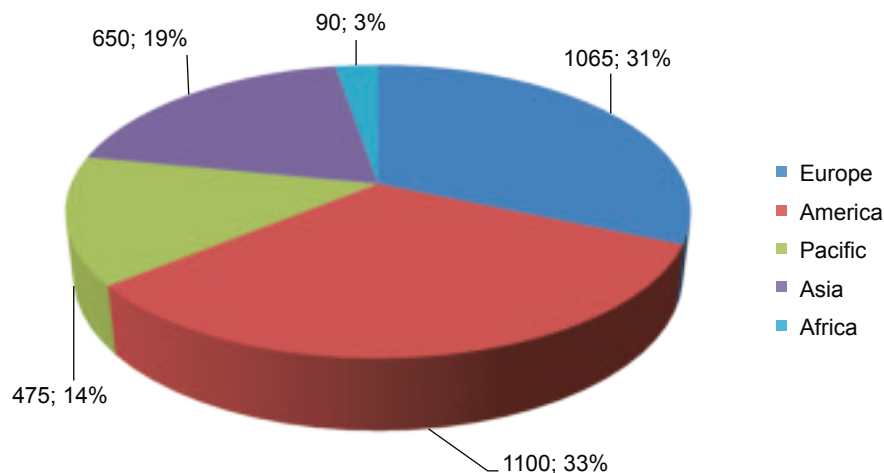
Analyzing the additives presented above for petroleum-based MWFs categories echoes

the sentiments that they seem to be a huge “library of cookbooks” or “a black box of chemical blends (Wu & Dacre, 1997).” This observation is also supported by the NIOSH findings of the additives used in the petroleum-based MWFs as evident in Table 1 (Bartz, 1998).

From the literature review, we recognized that a large and complex nature of additives is available for use with MWFs and other lubricant formulations on the market (Figure 1). The U.S. market for these additives for this purpose alone is about 33% of the total world demand or approximately 1.1 million tons (Modern Applications News, 2001). The market

FIGURE 1

Demand for Additives (Tons) in the Industrial Lubricants Industry by Continent



Source: Rajewski, Fokens, & Watson, 2000.

value of additives to support these traditional MWF formulations and other industrial lubricants worldwide is about \$7.5 million (Lin & So, 2004).

Results of survey and telephone conversations with stakeholders in the industry inquiring about biobased MWFs indicate that three main classes of biobased MWFs are identified (Table 2) as opposed to the four classes of conventional MWF products that are identified and reported in literature through NIOSH documents. It can be reported that Table 2 shows a high resemblance to Table 1 for various types of additives commonly found in the conventional or petroleum-based MWFs as reported in NIOSH studies.

Out of 10 manufacturers or formulators who were contacted for this study, four (40%) responded to the question about the identity of the additives that were used in their biobased MWFs formulations. For example, one manufacturer noted that “we don’t use sulfur, chlorine, or phosphate-based additives, but other manufacturers in the biobased industry do.” Another biobased MWFs formulator expressed similar concerns over the products they formulated. He noted that biobased feedstocks form a large percentage of the company’s biobased

MWFs, however, they include other additives in the formulations in the form of “oiliness additives” in order to control wetting, emulsification, and other properties that include colloidal stability of the final biobased MWFs. These two statements point out the possible use of additives that are also commonly or similarly used in the conventional petroleum-based MWFs.

As expected, none of the manufacturers or formulators of biobased MWFs disclosed information related to the identity or amount of the specific additives used to formulate their biobased MWFs. This outcome can only be perceived as an attempt to control market niche by protecting trade secrets and other related technical information.

MSDS and Information on Additives Found in the Biobased MWFs

Eleven MSDS were downloaded from the Internet and analyzed. As expected, most MSDS did not provide valuable information about the specific types and amounts of additives used to formulate biobased MWFs. Three out of 11 MSDS revealed the three categories of biobased MWFs as straight-oil, water-soluble, or semisynthetic-based MWFs.

Although one could tell from the MSDS that biobased MWFs formulations contained soybean oil as the main feedstock, other additives were not disclosed. A possible explanation for this could be the reluctance to reveal trade secrets and protection of pending patents. Nondisclosure of information can be crucial in evaluating the health and safety aspects of products and a comparative assessment can be relatively difficult to conduct in this situation. It is reasonable to assume that manufacturers are weighing the benefits of selling their biobased MWFs in a competitive market versus the burden of disclosing trade secret information through publicly available MSDS (Norrby, 2003). As expected, an HCS, which mandates disclosure of information on chemicals, has not been successful in this regard.

Regarding information disclosure on MSDS, Section 1910.1200(g)(2)(i)(c)(1) of HCS states the following: “...the chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d) of this section shall be listed if the concentrations are 0.1% or greater”; and Section 1910.1200(g)(2)(i)(c)(2) of this HCS law adds, “the chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees (Hazard Communication, 2011).”

Table 3 provides only scanty information about biobased MWFs and the additives. This information may not be useful to make informed decisions about the extent of “greenness” of biobased MWF formulations. The language in the HCS is clear about the content of MSDS. We can only speculate that perhaps the disclosure of trade secrets is the main reason why manufacturers of biobased MWFs, who claim to be promoting these formulations as “green products,” would not want to disclose information related to the individual components used to formulate such biobased products.

TABLE 2

Additives in Three Classes of Biobased MWF Products Investigated

Component	Function	Classification		
		Straight Oils	Water-Soluble Oils	Semisynthetic
Water	As a coolant, solvent, diluents	—	5–40 parts/1 part	10–40 parts/1 part
Vegetable oils	Base oil	70%–100%	30%–85%	5%–30%
Emulsifier (ester of vegetable oil)	Emulsifiers	n/a	5%–20%	5%–20%
Chelating agents	Tie up ions in solutions	n/a	0%–1%	0%–1%
Coupling agents TEA/MEA/DEA	Corrosion/emulsion	n/a	1%–3%	1%–3%
Viscosity index modifiers (blown vegetable oil)	Maintain viscosity	Present in different amounts	n/a	n/a
Detergents (alcohol ethoxy sulphate)	Prevents deposit formation	n/a	Present in different amounts	Present in different amounts
Antimist agents	Reduce misting	Present in different amounts	Present in different amounts	Present in different amounts
Extreme pressure and antiwear (ZDDP)—phosphate esters	Prevent wear	0%–20%	0%–20%	0%–20%
Surfactant wetting agent (polyisobutylene succinic anhydride amino ester)	Reduces surface tension	0%–10%	5%–20%	10%–20%
Passivator	Prevents staining	Present in different amounts	n/a	n/a
Antifoaming agents (polydimethylsiloxane)	Prevent foaming	0%–1%	0%–1%	0%–1%
Alkaline reserve agents	Buffer control	n/a	2%–10%	2%–10%
Dyes (optional)	Color	n/a	0–500 ppm	0–500 ppm
Odorant (optional)	Masks odor	Present in different amounts	Present in different amounts	Present in different amounts
Corrosion inhibitors, antirusts	Prevent rust	0%–10%	3%–10%	10%–20%
Biocides/preservative	Fungal/bacteria growth	n/a	0%–2%	0%–2%
Antioxidants	Prevent oxidation	0–1000 ppm ^a	n/a	n/a

^appm = parts per million.

The only useful information appearing to promote biobased MWFs is presented in Table 2 showing that the feedstock (base oil) used in these products is within 5%–90%. Biobased feedstock, such as high oleic rapeseed, is derived from sunflower oils, soybean, or canolas, or the lard, neatsfoot, and tallow oils (Durak, 2004). While Table 3 illustrates the world production of biobased feedstocks and their corresponding fatty acids, Table 4 is an illustration of comparative performance of different base oils or feedstocks used to formulate MWFs.

Conclusion and Recommendations

Our study confirms that as many additives are used in the biobased MWF formulations as in the traditional or conventional petroleum-based MWF formulations. Some additives, such as biocides, can potentially be toxic, ecologically damaging, and probably unsafe. Our study did not address this issue in detail. With the information available now, it is difficult to conclude if biobased MWFs can be promoted as substitutes to petroleum MWFs in order to protect workers' health and safety or contribute to sustainability, as widely perceived.

Looking at the results of our study, it is relatively difficult to accept biobased MWFs as “green products” without subjecting them to a rigorous process of assessment on the basis of health and safety criteria regardless whether the feedstock used are biobased, which can be biodegradable. Perhaps biodegradability should not be the only deciding factor to categorize biobased MWFs as “green products” until a thorough knowledge of the health and safety information of individual additives is presented (Table 5). Until then, precautionary measures should be taken when promoting biobased MWFs as “green products” to avoid health and safety impacts

TABLE 3

Biobased Feedstock: World Production and Type of Fatty Acid

Source	World Production (Million Tons/Year)	Fatty Acid Type	Carbon Chain Length and Number of Double Bonds
Soybean oil	20	Linoleic oleic	C18:2 or C18:1
Groundnut oil	4	Linoleic oleic	C18:2 or C18:1
Palm oil	16	Palmitic oleic	C16:0 or C18:1
Rapeseed	11.5	Oleic	C18:1
Sunflower	9	Linoleic oleic	C18:2 or C18:1
Beef tallow	7.5	Oleic palmitic stearic	C18:1 or C16:0 or C18:0
Lard	6	Oleic palmitic	C18:1 or C16:0
Coconut oil	3	Lauric	C12:0
Palm kernel oil	2	Lauric	C12:0
Olive oil	2	Oleic	C18:1
Fish oil	1.5	Long chain fatty acids	C20:2 to 6 or C22:2 to 6
Corn oil	1.8	Linoleic oleic	C18:2 or C18:1
Castor oil	0.5	Ricinoleic	C18:1 -OH
Linseed oil	0.6	Linoleic	C18:3

Source: Igartua, 1999.

of these products that could be similar to those presented by petroleum-based MWFs.

Research efforts should focus on identifying the specific types and amount of individual additives that manufacturers use to formulate various biobased MWFs. Regardless of the source, base oils should also be considered as a source of serious health concerns because of the potential of these feedstocks to aerosolize. To avoid this scenario, good housekeeping measures recommended for handling petroleum-based MWFs should also be planned and adopted to control worker and public exposures from aerosols related to working with biobased MWFs.

Another conclusion of our study is that it is difficult to depend on the information from manufacturers of biobased products, MSDS, and other literature sources about the specific types, the amount, and quantity of individual additives used to formulate biobased MWF products. This was anticipated because of the existing trade secret and potential pending patent information. MSDS that were used in our study did not

TABLE 4

Relative Comparison and Rating of Different Base Oils

Characteristic	Mineral Oils	Polyalpha Olefines	Polyalkylene Glycols	Dicarboxylic Acid Esters	Neopentyl Polyesters	Rapeseed Oils
Viscosity temperature behavior (VI)	4 ^a	2	2	2	2	2
Low temperature behavior (pour point)	5	1	3	1	2	3
Liquid range	4	2	3	2	2	3
Oxidation stability (aging)	4	2	3	2/3	2	5
Thermal stability	4	4	3	3	2	4
Evaporation loss, volatility	4	2	3	1	1	3
Fire resistance, flash temperature	5	5	4	4	4	5
Hydrolytic stability	1	1	3	4	4	5
Corrosion protection properties	1	1	3	4	4	1
Seal material compatibility	3	2	3	4	4	4
Paint and lacquer compatibility	1	1	3	4	4	4
Miscibility with mineral oil	—	1	5	2	2	1
Solubility of additives	1	2	4	2	2	3
Lubricating properties, load carrying capacity	3	3	2	2	2	1
Toxicity	3	1	3	3	3	1
Biodegradability	4	3/4	1/2	1/2	1/2	1
Price relation against mineral oils	—	3–5	6–10	4–10	4–10	2–3

Source: Lin & So, 2004.
^aEvaluation criteria: 1 = excellent; 2 = very good; 3 = good; 4 = moderate; 5 = poor.

TABLE 5

Specific Additives in the Biobased Metalworking Fluids Based on Literature Review and Interviews

Specific Additive	Functions	CAS #	References	
Zinc dialkyl-dithiophosphate (ZDDP)	Extreme pressure/antiwear	68649-42-3	Barnes, Bartle, & Thibon, 2001; Nicholls et al., 2005; Snyder & Foster, 1983; Wu & Dacre, 1997	
Chlorinated paraffin, sulfur, phosphorous	Extreme pressure/antiwear	n/a	Childers, 1994; Pawlack, 2003	
Alkyl hydrogen phosphites	Extreme pressure/antiwear	n/a	Bansal, Dohhen, & Sarin, 2002	
S-alkyl O,O dialkyl phosphorodithioate	Extreme pressure/antiwear	n/a		
Chlorinated paraffins	Extreme pressure/antiwear	108171-26-2		
Tricresyl-phosphate (TCP)	Antiwear	78-30-8	Choi et al., 1997	
Dibutyl 3,5-di-t-butyl 4 hydroxy benzyl phosphate (DBP)	Antiwear	n/a	Choi et al., 1997	
Tri-n-octyl thiophosphate (TOTP)	Antiwear	n/a	Weimin et al., 2004	
Tri-n-octyl tetrathiophosphate (TOTTP)	Antiwear	n/a		
Antimony dithiocarbamates	Antiwear	n/a		
Molybdenum phosphorodithioate	Antiwear	n/a		
T-butyl phthalonitrile	Antiwear	n/a		
Zinc dialkyldithiocarbamate	Antiwear	n/a	Yavrouian, Repar, Moran, Lawton, & Anderson, 1994	
N-phenyl-1-naphthylamine	Antioxidant	90-30-2		
Dicarboxylic acid esters	Viscosity index modifiers	n/a	Kenar et al., 2005	
Lubrizol®7653 –butylated phenol (10%–19.9%) –substituted triazole (0.5%–1.5%) –diphenylamine (0.1%–0.9%)	Viscosity index modifiers	n/a n/a n/a 122-39-4	Zhang et al., 2002	
Diamond-like coatings (DLC)	Thermal protection	n/a	Kalin & Vizintin, 2005	
Calcium alkaryl sulphonates	Detergent	n/a	Bartz, 1998; Boris & Vizintin, 2003; Kalin & Vizintin, 2005	
Calcium sulfonate	Corrosion resistance	61789-86-4	Miller, 2009	
Sodium sulfonate		61789853		
Triethanolamine (TEA)	pH Stabilizers; surfactants; corrosion or rust inhibitors	102-71-6		
Diethanolamine (DEA)		111-42-2		
Monoethanolamine (MEA)		141-43-5		
Diglycoamine (DGA) or 2-(2-Aminoethoxy)ethanol		929-06-6		
Diphenylamine		Antioxidant		n/a
Phenol	Antioxidant	n/a		
4,4'-dioctyldiphenylamine (DAT)	Antioxidant	—		Bakunjin, Kuzmina, & Parenago, 2000
N-phenyl-1-naphthylamine (PAN)	Antioxidant	—		
Triazine 1,3,5-Triazine-1,3-5 (2H, 4H, 6H)-Triethanol (9CT) and S-Triazine-1,3,5 (2H, 4H, 6H)-Triethanol (8CI)	Biocides	4719-04-4	Miller, 2009; Sollenberg & Stahlbom, 1999	
		7632-00-0		
Carbamic acid, butyl-, 3-iodo-2-propynyl ester (IPBC)		55406-53-6		
Hexahydro 1,3,5, tris (2-hydroxyethyl)-s-triazine		4719-04-4		
Hexahydro 1,3,5, tris ethyl-s-triazine		136356		
Hexahydro 1,3,5 tris (2 hydroxypropyl)-s-triazine		n/a		
Dimethoxane		828-00-2		
Methylene-bis-oxazine (4,4'-methylenedimorpholine)		—		
Polyisobutylene		Antimist		n/a
Amine borate		Alkaline reserves		63231481
1,2,4-Triazole	Detergent	288-88-0		
Sodium laureth sulfate or sodium lauryl sulfate ethoxylate	Passivator	9004-82-4		
NaNO ₂ KNO ₂	Corrosion inhibitors	7632-00-0 7758-09-0		

reveal sufficient information to identify and quantify each additive used to formulate the biobased MWF products. It is true to state that information disclosure laws in the U.S. are flawed and they should be reviewed to support sustainable development of the biobased industry. One way is to hold manufacturers liable who cannot provide consumers with the information to make informed decisions about the “greenness” of biobased MWFs. Concurrently, a more

transparent approval process for approving additives manufactured or used to formulate biobased MWFs and other related biobased products is needed. A process by the Food and Drug Administration designed to approve additives for the food industry can be adopted for the biobased industry. 🐞

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Information Management for Environmental Health
& Code Enforcement

A Survey of California Public School Districts' Ant and Weed Management Practices and a Review of Their Use of IPM

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Abstract The U.S. Environmental Protection Agency encourages school officials to adopt integrated pest management (IPM) to reduce children's exposure to potentially harmful pesticides. In California, the Healthy Schools Act of 2000 (HSA) establishes right-to-know requirements for pesticide use in public schools; requires school districts to designate an IPM coordinator; and requires the California Department of Pesticide Regulation (DPR) to collect pesticide-use information from pest control businesses, conduct IPM training workshops, and promote least-toxic pest management practices. DPR periodically surveys school districts statewide to measure compliance with the HSA and the use of least-toxic management practices compatible with IPM and to guide DPR's training and outreach efforts. Results from three surveys, conducted in 2001, 2002, and 2004, show that an increasing number of districts use ant management practices compatible with IPM; however, fewer districts use IPM-compatible weed management practices. DPR's California School IPM program plans to develop technical materials and to conduct training workshops that will provide districts with more information about how to use an IPM program to prevent and manage weeds.

Introduction

School employees and children face the health risk of exposure to pesticides in the school environment (Alarcon et al., 2005; National Research Council, 1993). California passed the Healthy Schools Act of 2000 (HSA, 2000) to provide staff, teachers, and parents with information about pesticide use and encourage integrated pest management (IPM) in schools.

The HSA establishes right-to-know requirements (e.g., notification, registry, posting, and record keeping) for pesticide use in

public schools and requires all districts to designate an IPM coordinator. The law also directs the California Department of Pesticide Regulation (DPR) to collect certain pesticide-use information from schools, conduct IPM training workshops, and support schools in their IPM efforts by providing a Web site and outreach information.

The HSA aims to reduce exposure to pesticides in schools by encouraging districts to voluntarily adopt IPM. IPM is a decision-making approach to managing pests that the law defines as preventing and suppressing

pest problems using a combination of pest population monitoring, establishing pest-damage thresholds, and using cultural and mechanical practices. Pesticides that pose the least possible hazard to human health and the environment are used only after careful monitoring and pest-damage thresholds indicate their use is necessary.

Researchers have surveyed school districts' pest management practices in several states such as Indiana (Gibb & Fournier, 2006), Nebraska (Ogg, Ogg, Hygnstrom, Campbell, & Haws, 2003), New York (Braband, Horn, & Sahr, 2002), North Carolina (Williams, Linker, Waldvogel, Leidy, & Schal, 2005), and Tennessee (Vail, 2001). Researchers also have published baseline and follow-up surveys that describe changes in school districts' pest management practices and IPM use (Nalyana & Linker, 2006; Sorgan, Enck, & Yu, 2000).

In California, DPR conducts the only statewide surveys to evaluate how public schools are implementing IPM. DPR conducted its first survey in 2001 (Babb, Hawkins, & Tootelian, 2002). Analysis of the 2001 survey responses led to clarifications in the 2002 survey and additional questions about ant and weed management practices (Geiger & Tootelian, 2005). The 2004 survey was further modified for clarity and to collect additional information about the respondent's role as designated IPM coordinator.

The 2004 and previous surveys had several objectives (Barnes & Sutherland, 2005)—this article focuses on two: (1) measuring use of various ant and weed management practices, and (2) measuring changes in those practices relative to prior surveys. This article focuses on management of ants and

TABLE 1

Ant Management Practices (2001, 2002, and 2004)

Question	Response	2001	2002	2004	p-Value ¹
Did district do anything to manage ants inside school buildings? ²	Yes	75%	83%	80%	.015
	No	25%	17%	20%	
	Total	100%	100%	100%	
	Number of cases	392	418	533	
Practices used to manage ants inside buildings ³	Insecticidal spray	60%	38%	43%	.000
	Ant baits	50%	58%	69%	.000
	Soapy water spray	18%	38%	45%	.000
	Caulk in cracks to prevent entry of ants	25%	36%	50%	.000
	Improved sanitation	N/A	63%	80%	.000
	Other	18%	22%	6%	.000
	Number of cases	296	347	429	
One method used most frequently to manage ants inside school buildings ⁴	Insecticidal spray	41%	21%	20%	.000
	Ant baits	32%	31%	36%	
	Soapy water spray	12%	12%	9%	
	Caulk in cracks to prevent entry of ants	4%	4%	2%	
	Improved sanitation	N/A	22%	21%	
	Other	11%	11%	12%	
	Total	100%	100%	100%	
	Number of cases	254	321	393	

¹Significance of Chi-square. Probabilities $\leq .05$ indicate statistically significant changes over the three survey years and are in bold for easy identification.

²There are differences in question wording across years for this item. In 2001, districts were asked whether, within the last two years, their district treated for ants inside school buildings. In 2002, districts were instructed to skip a block of questions if they had not treated for ants inside school buildings within the last year and the responses shown here were inferred from skip patterns. In 2004, districts were asked whether they had done anything to manage ants inside school buildings within the last 12 months. Because of differences in the wording of questions regarding insecticidal spray application methods, these items have been collapsed into one category for comparison across survey years. Exempt insecticidal spray from an aerosol can was a new practice added to the 2004 questionnaire, so data for previous years is not available.

³There are differences in question wording across years for this item. In 2001 and 2002, districts were asked to check off all the methods they typically use to control (2001) or manage (2002) ants in buildings. In 2004 districts were asked to answer yes or no regarding whether they used each practice to manage ants inside buildings.

⁴The 2001 questionnaire asked districts "which one method do you prefer to use for ants in school buildings?" The 2002 and 2004 questionnaires asked districts which they used most frequently. In 2004, 25 districts chose more than one answer. These responses have been dropped from the distribution shown here.

weeds from the 2004 survey because, in prior years, these were the most widely reported pest problems in California schools.

Methods

Questionnaire

In April 2004, surveys were mailed to IPM coordinators at all (972) school districts statewide. Follow-up mailings via e-mail and regular mail occurred in July and August, respectively, to improve the survey's response

rate. The 2001, 2002, and 2004 surveys were conducted similarly. The survey contained 24 questions grouped into four sections. The first section covered general pest management practices and the last section captured information about the respondent. The focus of this article is the two middle sections that covered ant management inside school buildings and weed management on school grounds.

The two sections of interest asked whether a district did anything to manage ants (or weeds) within the last 12 months, which

specific practices were used, and how effective these practices were. Both sections asked how a district decided when treatment for ants (or weeds) was necessary and which one practice the district used most frequently to manage ants (or weeds). The weed management section also asked districts to indicate the location where they had the most trouble with weeds.

School District Demographic and Geographic Variables

Geographic and demographic data describing the 972 school districts were obtained from a California Department of Education database for the 2002–2003 academic year (California Department of Education, 2003). This information was used to confirm that no systematic differences between responding and non-responding districts existed.

Statistical Analysis

Responses to individual questions were compiled and relationships among these questions quantified. A Chi-square test was used to measure the difference between characteristics of the sampled school districts and all school districts. Trends in response rates occurring since 2001 were also analyzed. For more detail about data analysis, see Barnes and Sutherland (2005).

Results

Survey Response Rate

The survey response rate was 55% of 972 school districts, an increase from 39% and 42% in the 2001 and 2002 surveys, respectively. Survey responses were a representative sample of all districts, based on a comparison of characteristics between the responding districts and the surveyed population.

Ant Management in 2004

Eighty percent ($n = 426$) of school districts did something to manage ants inside school buildings within the 12 months before the survey (Table 1). Eighty percent of districts reported using improved sanitation to manage ants inside school buildings; 69% used ant baits; 50% used caulking; and 45% used soapy water (Table 1). All these practices are compatible with IPM. Forty-three percent used insecticidal sprays (i.e., sprays that were applied using an aerosol can or another application method). These practices are not considered compatible with IPM.

Districts were more apt to perceive the less-compatible IPM practices as very effective, however: 44% rated insecticidal spray from an aerosol can as “very effective,” while 54% gave the same rating to insecticides sprayed using other application methods. Improved sanitation was a close third, with 42% rating this more IPM-compatible practice as “very effective.” A distinct minority (roughly one-third) saw caulking and ant baits as “very effective,” while 11% perceived exempt aerosol sprays and soapy sprays as “very effective.”

Among the more IPM-compatible practices, respondents saw improved sanitation as more effective than ant baits, yet when asked what one practice school districts used most frequently, the largest percentage (36%) reported ant baits (Table 1). Improved sanitation was the second most frequently used method (21%) and insecticidal sprays the third (20%). It is not surprising that soapy water sprays were rarely the “one most frequent method used” because they were rarely perceived as very effective. Fifty percent of the districts used caulking to manage ants (Table 1), although only 33% of districts perceived it as “very effective.” Caulking does not need to be done frequently, which saves districts time. This may explain why so many districts used caulking to manage ants, even though most did not perceive it as “very effective.” Although 54% of districts perceived insecticides sprayed using another application method as “very effective,” only 35% of districts used insecticidal sprays to manage ants (Table 1). When districts use insecticidal sprays, they are burdened by notification requirements of the HSA unless the spray is exempt, which may discourage districts from using them.

One can decide to control ants by several criteria: at regular time intervals, when ants are first noticed, when ant populations exceed a preestablished threshold, or after a certain number of complaints. According to an IPM philosophy, the best approach among these is to do something only when the pest population is above some threshold. Only 21% of the school districts that used any ant control method used a pest threshold, however. Seventy-nine percent of the districts decided to control ants when they first noticed ants; 45% did so at regular time intervals; and 24% did so after a certain number of complaints were made.

TABLE 2

Weed Management Practices (2001, 2002, and 2004)

Question	Response	2001	2002	2004	p-Value ¹
Did district do anything to manage weeds? ²	Yes	91%	91%	94%	.063
	No	9%	9%	6%	
	Total	100%	100%	100%	
	Number of cases	394	418	533	
Location where district typically has the most trouble with weeds ³	Athletic fields/playgrounds	32%	22%	17%	.000
	Landscaping	23%	29%	33%	
	Rights of way	7%	4%	2%	
	Fencerows	33%	32%	39%	
	Other	4%	14%	8%	
	Total	100%	100%	100%	
	Number of cases	357	298	374	
Practices used to manage weeds ⁴	Broadcast treatment with herbicides ⁵	30%	23%	38%	.000
	Spot treatment with herbicides ⁶	69%	61%	82%	.000
	Use of mulches ⁷	25%	26%	55%	.000
	Physical controls such as hand pulling, cultivating, mowing	61%	68%	91%	.000
	Flaming	8%	7%	8%	.934
	Irrigation management	N/A	17%	41%	.000
	Other	9%	10%	22%	.000
	Number of cases	359	379	503	

¹Significance of Chi-square. Probabilities ≤ .05 indicate statistically significant changes over the three survey years and are in bold for easy identification.

²There are differences in question wording across years for this item. In 2001, districts were asked whether, in the last two years, their district treated for weeds. In 2002, districts were instructed to skip a block of questions if they had not treated for weeds within the last year and the responses shown here were inferred from skip patterns. In 2004, districts were asked whether they had done anything to manage weeds within the last 12 months.

³In 2004 athletic fields and playgrounds were included as separate categories. For this comparison, they have been combined. In 2004, 25% of the districts answering this question selected more than one location. Since multiple responses were not coded in the 2001 and 2002 data files, the 124 districts that selected more than one location in the 2004 survey were dropped from the distribution presented in this table.

⁴There are differences in question wording across years for this item. In 2001 and 2002 districts were asked to check off methods typically used to control weeds. In 2004 districts were asked to answer yes or no regarding whether they used each practice to manage weeds.

⁵In 2001 and 2002 the description for this practice was “regular broadcast treatment of turf and/or landscaping with herbicides.” The label shows question wording for 2004.

⁶In 2001 and 2002 the description for this practice read “regular spot treatment of turf and/or landscaping with herbicides.” The label shows question wording for 2004.

⁷In 2004 the description for this practice was “use of mulches, ground covers, barrier cloth, or plastic.” The label shows question wording for 2001 and 2002.

Trends in Ant Management 2001–2004

More districts did something to manage ants in 2002 and 2004 than in 2001 (Table 1). When asked which one practice was used most frequently to manage ants inside school

buildings, 41% of districts in 2001 identified insecticidal spray as the most frequently used practice. In subsequent survey years, that percentage was halved. Dependence on ant baits has remained relatively constant over

the three surveys (31% to 36%), making this the dominant approach in 2002 and 2004 (Table 1).

It is important to point out, however, that with IPM, districts probably will use multiple strategies, at least initially, to manage pests. School districts are adopting IPM-compatible practices more rapidly than they are letting go of the less-compatible practices. This results in a mix of pest management strategies in the near term, which may gradually give way to a more consistent IPM-compatible approach with more training and experience.

Weed Management in 2004

In 2004, 94% of districts managed weeds (Table 2). Ninety-one percent of districts reported managing weeds by physical controls, including hand pulling, cultivating, and mowing; 82% used spot treatment with herbicides; 55% used mulches; 41% used irrigation management; 38% used broadcast treatment with herbicides; 22% used other practices (including turf selection); and 8% used flaming.

Seventy-seven percent of districts responded that spot treatment with herbicides was “very effective.” Perhaps for this reason (and to save labor), spot treatment with herbicides is the method so many districts used to manage weeds. Most districts did not perceive the nonchemical practices as “very effective.”

Weeds are such a problem for districts that a quarter of the respondents listed multiple areas when asked for the one location where they had the most trouble with weeds. Fencerows and landscaping were the most common locations where districts had trouble with weeds (Table 2). Relatively few of the respondents (17%) mentioned athletic fields and playgrounds. These locations are where the most contact between students and pesticides could occur. The department's workshops have focused training on weed management in athletic fields; however, based on this survey's results, DPR broadened its subsequent workshops to include information for fencerows and landscaping, in addition to athletic fields.

On both athletic fields and playgrounds, at least 40% of districts reported spot treatment with herbicides—an IPM-compatible practice—as the practice they used most frequently to manage weeds. One-third of

districts reported physical controls as the most frequently used weed management method, even though this IPM-compatible practice was not perceived as “very effective” by a large percentage of the sample. Broadcast treatment with herbicides, which was perceived as more effective than the two IPM-compatible practices mentioned above, was a less-common choice for the most frequently used method of managing weeds (14% for athletic fields and 6% for playgrounds). Very few districts ($\leq 3\%$) reported using the four remaining IPM-compatible practices (mulches, flaming, irrigation, and turf selection) as their most frequently used method on either athletic fields or playgrounds.

When asked how districts decided when herbicide treatments for weeds were necessary, the largest percentages responded that they used herbicide treatments at regular time intervals, whether broadcast (71%) or spot treatments (42%) were employed. Treatment at regular time intervals is not part of an IPM approach, however. Districts also used spot treatments when weeds are first noticed (30%) or when they exceed a preestablished threshold (25%), which are decisions that are compatible with IPM.

Trends in Weed Management 2001–2004

In 2001, 32% of districts identified athletic fields and playgrounds (combined) as the location where a district typically had the most trouble with weeds (Table 2). In 2002 and 2004 that percentage dropped to 22% and 17%, respectively. The percentage of districts that identified landscapes as the location where they typically had the most trouble with weeds increased, however, from 23% in 2001 to 33% in 2004, and fencerows rose from 33% in 2001 to 39% in 2004.

Over the three survey years, use of broadcast and spot treatment with herbicides increased slowly, while use of mulches and irrigation management more than doubled and use of physical controls such as hand pulling, cultivating, and mowing increased one and a half times. In 2001, spot treatment with herbicides and physical controls were the dominant methods of weed management. In 2004, most districts continued to use physical controls and spot treatment with herbicides, but over half of all districts also used mulches.

Discussion

Ants are one of the most universal indoor pests in California schools and prevention is a critical component of an ant IPM program. A comparison of the three surveys shows that California schools are making progress toward using less-hazardous pest management practices in accordance with IPM and the goals of the HSA for managing ants. The use of baits, soapy water sprays, caulking, and improved sanitation—practices compatible with IPM—all increased significantly between 2001, 2002, and 2004, while the use of insecticidal sprays decreased. These changes reflect significant improvements in ant management practices.

From 2001 to 2004, the percentages of districts using the practices to manage weeds increased as follows: broadcast treatment with herbicides, spot treatment with herbicides, use of mulches, physical controls, irrigation management, and other. Physical controls (such as hand pulling, cultivating, and mowing) and using mulches—both of which are IPM-compatible—increased, however, more than the other practices used to manage weeds over the three survey years. Managing weeds can require a lot of labor, especially at rural schools with extensive turf and landscape areas. The only practice that did not show a significant change over the survey years was flaming.

Survey results from Indiana are similar to the trends reported in this survey: the use of baits and crack and crevice treatments increased between 2002 and 2006 (Nalyanya & Linker, 2006). Survey results from New York from 1993 to 1999, however, show little change in use of pesticides indoors or outdoors (Surgan, Enck, & Yu, 2000).

Conclusion

This 2004 survey shows that California schools have continued to increase the use of ant management practices that are compatible with an IPM approach. The survey's picture of weed management practices is less clear; improving weed IPM by avoiding calendar treatment schedules may require additional attention. Increased training in methods such as weed flaming and wider use of weed barrier technologies such as cloth or mulches could improve some districts' weed management success. The locations where weeds cause

problems for schools has shifted from athletic fields and playgrounds to fencerows and landscaped areas. In the past, DPR had focused its training on athletic fields and playgrounds, since these locations are typically areas with the largest potential use of pesticides and most frequent contact with children. This shift indicates that schools

would benefit from more information on how to manage weeds using IPM in these locations. Therefore, DPR has changed its training to address this need.

DPR plans to continue to survey school districts since the surveys provide valuable information about school IPM programs and how DPR's School IPM program may best

meet the needs of school districts through its outreach and training. ☺☺

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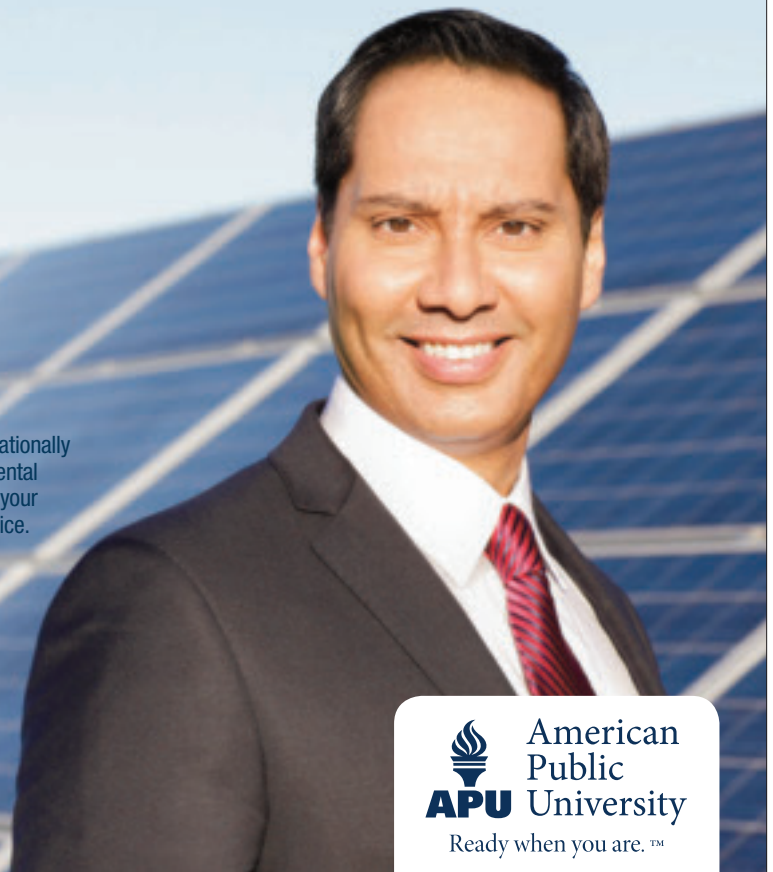
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Fish Consumption and Advisory Awareness Among the Philadelphia Asian Community: A Pilot Study

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Abstract Difficulties in the risk communication of fish consumption arise from the concept that this consumption can have both harmful and beneficial effects. This is particularly an issue among populations for which seafood is a major dietary and cultural component. Fish advisories are an important tool in preventing overconsumption of fish that have elevated concentrations of toxic contaminants. The exploratory pilot study described in this article examined fish consumption patterns and knowledge of the potential health risks associated with overconsumption of mercury-contaminated fish within a limited ($N = 34$) sample of the Philadelphia Asian-American population. Study data were used to evaluate the efficacy of state-issued advisories designed to encourage safe levels of fish consumption within the study population. Results indicate that while advisory awareness levels among study participants were greater than previously observed in Asian-American populations, consumption levels remained high. The limited findings of the authors' study, in combination with existing evidence, suggest the need for the development of more effective methods of disseminating advisory information.

Introduction

Fish is an important dietary component with documented health benefits associated with its consumption. The ability of Omega-3 fatty acids to reduce the incidence of cardiovascular disease in epidemiological and clinical trial research outcomes led the American Heart Association to incorporate at least two servings of fish per week into their dietary recommendations (Kris-Etherton, Harris, & Appel, 2003). Additionally, evidence exists to suggest that maternal fish consumption during pregnancy and post-natal consumption by infants can result in

improved cognitive development in children (Daniels, Longnecker, Rowland, & Golding, 2005). Documented health benefits and associated dietary recommendations have led many health-conscious individuals to increase their fish consumption (Burger & Gochfeld, 2005). While regular fish consumption is associated with several improved health outcomes, these benefits must be balanced against the risks associated with overconsumption of fish that have elevated levels of toxic contaminants.

The most pervasive of these contaminants is methylmercury, which was responsible

for the issuance of 3,080 fish consumption advisories in the U.S. in 2006 (U.S. Environmental Protection Agency [U.S. EPA], 2007). Mercury is a naturally occurring element found in the air, water, and soil. It exists in several forms: elemental or metallic, inorganic, and organic. Pure mercury is a readily volatile liquid metal, sometimes referred to as quicksilver. It has traditionally been used in several consumer products, such as thermometers, switches, and light bulbs.

Coal-fired power plant emissions are responsible for approximately 40% of airborne mercury in the U.S. and represent the largest source of airborne mercury in the country (Bell & Samnet, 2005). Airborne mercury eventually settles into water or onto land where it can be washed into water. Once deposited, certain microorganisms can transform elemental mercury into methylmercury, a highly toxic form that builds up in fish, shellfish, and animals that eat fish (U.S. EPA, 2006). Fish and shellfish are the main sources of methylmercury exposure to humans. Methylmercury accumulates more in some types of fish and shellfish than others. The level of methylmercury in fish and shellfish depends on what they eat, how long they live, and how high they are in the food chain (U.S. EPA, 2006). As a result of the ubiquity of mercury contamination in seafood, an understanding of the risks associated with eating various types of fish is an important public health matter.

The Food and Drug Administration (FDA) recommends that pregnant women, women of childbearing age, and young children avoid eating shark, swordfish, king mackerel, and

FIGURE 1

Study Questionnaire

Thank you for your participation in this study. Your answers will be kept confidential and anonymous. Please answer questions as truthfully as possible. Once you have completed the questionnaire, please mail back in the provided envelope as soon as possible.

Zip code:

Organization/Group/Community name:

Age:

Gender: M F

Please circle the appropriate answer(s). Where necessary, please write in your answer.

1. Do you eat fish/seafood? Y N not applicable
2. Does your family eat fish/seafood? Y N not applicable
3. On average, approximately how often do you eat seafood?

1 time per month	2 times per month	1 time per week
2 or more times per week	Everyday	Never
4. What types of fish/seafood do you eat? (Circle all that apply)

Trout	Catfish	Bass	Pike	Walleye	White sucker	Yellow Perch	Cod
Tuna	Tuna (canned)	American Eel	Carp	White sucker	Tilapia	Salmon	

Other, please specify _____
5. Where do you get your fish/seafood?

Fish market	Super market	Friend/relative	Fisherman	Other_____
-------------	--------------	-----------------	-----------	------------
6. Do you or your friends/relatives go fishing? Y N not sure
7. Do you or your friends/relatives eat what is caught? Y N not sure
8. Have you heard about mercury in fish/seafood? Y N not sure
9. In your opinion, is mercury harmful to your health? Y N not sure
10. Within the past year, have you heard of/seen a "fish advisory"? Y N not sure
 - 10a. If yes, where did you hear/see a fish advisory?

TV	Newspaper	Friend	Internet	Other_
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tilefish due to their high levels of mercury. They recommend instead consuming seafood such as shrimp, canned light tuna, salmon, pollock, or catfish (U.S. EPA, 2004). The U.S. Environmental Protection Agency (U.S. EPA) recommends no more than 2.05 µg per day or 14.35 µg per week of mercury from fish. They offer formulas and online calculators to help determine one's level of mercury consumption. For example, if a 45-pound child consumes one six-ounce can of chunk tuna in a week, they would be ingesting 52.7 µg of mercury, over three and a half times the recommended limit (Yess, 1993).

The developing nervous system is particularly sensitive to methylmercury exposure. Low-dose exposures in utero and during childhood increase the risk of inability to concentrate and memory impairment. Additionally this exposure is associated with reductions in intelligence, fine motor function, language abilities, and visual-spatial

abilities (Committee on the Toxicological Effects of Methylmercury, 2000; Hyman, 2004; Trasande, Landrigan, & Schechter, 2005). High-dose maternal exposure during pregnancy increases risk of brain damage, mental retardation, blindness, and seizures in the fetus (Williams, 2005).

Based upon the vulnerability of the developing nervous system, overconsumption of fish with elevated levels of methylmercury is a particular public health concern for pregnant women and women of childbearing age. Data from the Center for Disease Control and Prevention's (CDC's) National Health and Nutrition Examination Survey (NHANES) indicated that for the four-year period between 1999 and 2002, between 6% and 8% of women of childbearing age in the U.S. had blood mercury levels above U.S. EPA's recommended reference dose of 5.8 µg/L (Jones, Sinks, Schober, & Pickett, 2004; Schober et al., 2003). These findings

suggest that blood mercury levels among the majority of the women surveyed were generally below U.S. EPA's level of concern.

A limitation of this data, however, is that NHANES reported on blood mercury levels among large ethnic and racial groups and not minorities such as Asian-Americans (Hightower, O'Hare, & Hernandez, 2006). Due to various cultural and economic issues, Asian-American immigrants have been thought to consume greater quantities and a larger variety of seafood than the general U.S. population (Sechena et al., 2003). This assumption is supported by the findings of two recent studies (Knobeloch, Anderson, Imm, Peters, & Smith, 2005; Sechena et al., 2003).

The purposes of our current research were to evaluate fish consumption patterns within a segment of the Philadelphia Asian-American population and to evaluate knowledge of state-issued advisories that inform of potential health risks associated with overconsumption of mercury-contaminated fish.

Methods

Subjects were recruited from the memberships of several civic and business associations based in the Chinatown section of Philadelphia, Pennsylvania. A single-page, anonymous, self-administered survey was utilized as the data collection instrument for this research (Figure 1). Questionnaires and self-addressed stamped return envelopes were distributed to volunteer association members by their leadership during association meetings. Inclusion criteria for the study were residents of the Philadelphia metropolitan area between the ages of 18 and 80 who self-identified as Asian. All potential subjects who met these criteria were invited to participate in the study. A total of 80 questionnaires were distributed. The research protocol was approved by the Drexel University institutional review board.

In addition to the data collected through survey administration, data from a Pennsylvania State University report (Faulds et al., 2004) were utilized as comparison data during analysis. The Faulds study evaluated patterns of fish consumption and preparation among anglers from five ethnic groups in the Philadelphia metropolitan area. These groups were Caucasian, African-American, Puerto Rican, Vietnamese, and Cambodian (Faulds et al., 2004).

TABLE 1

Participant Fish Consumption Frequency

Frequency	%
One time per month	2.9
Two times per month	8.8
One time per week	29.4
Two or more times per week	38.2
Everyday	20.6
Never	0
Total	100

Results

Of the 80 surveys distributed, 34 were returned yielding a 42.5% response rate. Males made up 38% of respondents, 59% were female, and 3% did not indicate their gender. All participants responded affirmatively to the questions “Do you eat fish/seafood?” and “Does your family eat fish/seafood?” Of the respondents, 38.2% reported consuming fish two or more times per week and 20.6% reported consumption every day (Table 1). Fish was purchased from a super market by 76.5% of respondents, 41% of respondents purchased fish from a fish market, 8.8% obtained fish from a friend or relative, 5.9% obtained fish from a “fisherman,” and 8.8% reported “other” means of obtaining fish. The 41.2% of respondents indicating that they had seen or heard of a fish advisory within the previous year cited television (29%), newspaper (2.9%), a friend (11.8%), or other (2.9%) as sources of advisory information (Table 2). Respondents who fished recreationally or had friends and family who did so made up 52.9% of respondents. Of these, 44.1% reported that they, their friends, or their relatives consumed what was caught.

When asked what types of fish/seafood the respondents ate, all of the fish listed in the survey were selected by at least one of the respondents (Table 3). Respondents also indicated eating the following fish that were not included in the list: clams, crab, flounder, grouper, jellyfish, lobster, mussels, octopus, oysters, razor clams, scallops, shrimp, snails, squid, and whiting (Table 4).

Comparison Data

Consumption data were collected from 975 Philadelphia area anglers from five ethnic

TABLE 2

Responses to Survey Questions Related to Self-Harvesting, Mercury, and Advisory Awareness

Question	Yes	No	Not Sure	No Answer
Do you or your friends/relatives go fishing?	52.9%	44.1%	2.9%	0%
Do you or your friends/relatives eat what is caught?	44.1%	31.2%	11.8%	2.9%
Have you heard about mercury in fish/seafood?	85.3%	8.8%	2.9%	2.9%
In your opinion, is mercury harmful to your health?	88.2%	2.9%	5.9%	2.9%
Within the past year, have you heard of/seen a “fish advisory?”	41.2%	52.9%	2.9%	2.9%

TABLE 3

Types of Fish Consumed^a

Fish Type	%	Methylmercury Concentration (ppm ^b)
Trout	38.2	0.072
Catfish	32.4	0.049
Bass (Chilean)	70.6	0.386
Pike	2.9	0.63
Walleye	2.9	0.52
White sucker	2.9	0.11
Yellow perch	2.9	0.14
Cod	23.5	0.095
Tuna (fresh)	44.1	0.383
Tuna (canned)	35.3	0.353
American eel	23.5	ND ^c
Carp	2.9	0.14
Tilapia	50	0.010
Salmon	70.6	0.014
Other	29.4	—

^aMultiple answers accepted.

^bppm = parts per million.

^cND = No available data.

groups: Cambodian (*n* = 39), Vietnamese (*n* = 57), African-American (*n* = 178), Puerto Rican (*n* = 46), and Caucasian (*n* = 655). African-American anglers reported the highest level of household consumption of what was caught (43%) followed by Cambodian anglers (38%), Vietnamese anglers (29%), Puerto Rican anglers (19%), and Caucasians (8%). The highest percentage of awareness

of Pennsylvania fish consumption advisories occurred in Caucasians (52%), followed by African-Americans (31%), Puerto Ricans (19%), Cambodians (18%), and Vietnamese (10%) (Faulds, 2004).

Discussion

Our pilot study findings are consistent with the assumption that Asian-Americans

TABLE 4

“Other” Fish Consumed, as Written in by Participants

Fish Type	%	Methylmercury Concentration (ppm ^a)
Clams	8.8	ND ^b
Crab	8.8	0.060
Flounder	11.7	0.045
Grouper	2.9	0.465
Jellyfish	2.9	ND
Lobster	11.7	0.310
Mussels	2.9	ND
Octopus	5.8	0.070
Oysters	8.8	0.013
Razor clams	2.9	ND
Scallops	11.7	0.050
Shrimp	14.7	ND
Snails	2.9	ND
Squid	2.9	0.070
Whiting	2.9	ND

^appm = parts per million.^bND = No available data.

consume more fish than the general U.S. population with 100% of respondents reporting some fish consumption and 20.6% reporting consumption every day. Although this consistency was observed, it is important to note that the small size of the study population significantly limits any generalizations that can be made from our study findings. The level of consumption observed in our study is of concern for young children, pregnant women, and women of childbearing age as both U.S. EPA and FDA recommend that these individuals consume up to two twelve-ounce meals of fish and shellfish low in mercury per week (U.S. EPA, 2004). Various cultural factors may result in increased fish consumption within this population; however, overconsumption may also be a function of the lack of knowledge of associated risk.

Minorities have been observed to have lower awareness of fish advisories when compared to the white population (Burger, Pflugh, Lurig, Hagen, & Hagen, 1999; Imm et al., 2005). Asian subgroups have been observed to have some of the lowest advisory awareness of any minority group (Knobeloch et al., 2005; Silver et al., 2007). Based upon their reported lack of awareness

and elevated mercury body burdens, future outreach activities targeted at the Asian-American population have been suggested (Knobeloch et al., 2005). While the results of our pilot study are consistent with much of the literature with respect to overconsumption, a relatively high level of advisory awareness (41.2%) was reported within our study population. Additionally, 85.3% of study participants responded affirmatively to the question “Have you heard about mercury in fish/seafood?” indicating a high level of issue, but not risk, awareness.

The reported levels of fish consumption and advisory awareness within the study population suggest a lack of advisory efficacy. This may result from the nature of the advisories and the populations that they target. Fish consumption advisories have historically been targeted towards licensed recreational anglers (Anderson et al., 2004). While this group of individuals represents a potential high-risk population, most Americans obtain their fish from markets and supermarkets (Burger et al., 2004). This suggests that the targeting of licensed anglers may result in very limited information dissemination among most of the fish-consuming public.

Additionally, many state advisories have historically provided information for only sport fishing. As a result, consumption guidelines were provided for commercial species only if they were also caught by recreational anglers (Anderson et al., 2004). Due to the historical focus on sport fish safety, information on contaminant levels in commercial fish is limited and generally not accessible by the public. This compromises consumer ability to make informed decisions regarding safe fish consumption (Burger et al., 2005). Further complicating risk communication to consumers is the difficulty associated with disseminating information that effectively balances the risks and benefits of fish consumption (Knuth, Connelly, Sheeshka, & Patterson, 2003; Williams, 2005). The concept that fish can be both harmful and beneficial is a difficult one for some to understand and has led many to the extremes of either ignoring warnings or ceasing all consumption (Williams, 2005).

Conclusion

Fish consumption advisories can be an important public health tool in preventing overconsumption of high-risk seafood. The effectiveness of these advisories is a function of a number of factors including clarity of message, method of delivery, and cultural competency to the population targeted. In order to be effective the message must be received and understood by at-risk populations. Previous research has suggested that advisory awareness is low among Asian populations in the U.S. This may explain the relatively high levels of consumption reported in these populations, at least in part. The fish consumption rates in our pilot study were consistent with the high levels observed previously in spite of greater advisory awareness levels. These findings cannot be generalized to larger populations due to the limited nature of the research, however, they do provide a preliminary indication that while the message may be reaching the population, its effectiveness at addressing the risk may be limited. Based upon a combination of previous work in this field and the limited results of our pilot study, we conclude that further work is needed to assess this discrepancy and create a more effective message for these populations.

Limitations of our study include the limited number of subjects and the lack of detailed information regarding fish consumption patterns including frequency and quantity of

consumption of fish with varying levels of mercury contamination. A larger sample size of Asian-Americans as well as distributing an equivalent survey to non-Asian Philadelphians would provide more accurate comparison data, offer a more representative sample population, and aid in forming more concrete conclusions.

Another limitation is that our survey was only provided in English, resulting in the exclusion of non-English speaking members of the community. The study questionnaire was not validated, however, the questions in the survey were straightforward and validation of the survey was not deemed necessary. 🐟

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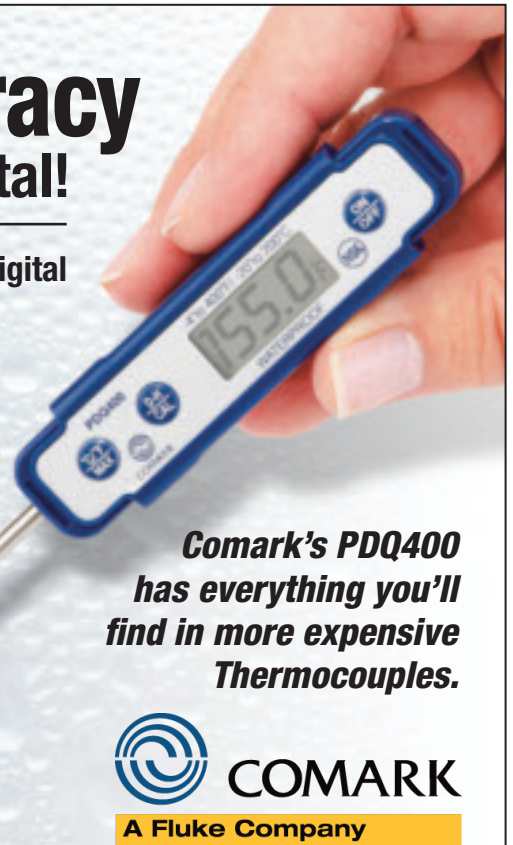
Earth Day is April 22. The first Earth Day took place on April 22, 1970. This year's theme is "Mobilize the Earth™." Earth Day enables individuals to stand united for a sustainable future and make a call for action to preserve and protect our environment. For more information on this year's Earth Day, what you can do, and how to share your events, go to earthday.org.

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Public Health Performance Management: Opportunities for Environmental Public Health

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

In this column, EHSB and guest authors from across CDC will highlight a variety of concerns, opportunities, challenges, and successes that we all share in environmental public health. EHSB's objective is to strengthen the role of state, local, and national environmental health programs and professionals to anticipate, identify, and respond to adverse environmental exposures and the consequences of these exposures for human health. The services being developed through EHSB include access to topical, relevant, and scientific information; consultation; and assistance to environmental health specialists, sanitarians, and environmental health professionals and practitioners.

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

LCDR Justin Gerding is an environmental health officer in the CDC Environmental Health Services Branch. Julianne Price is the Florida Department of Health's Statewide Protocol for Assessing Community Excellence in Environmental Health (PACE EH) coordinator and an environmental specialist at the Indian River County Department's Division of Environmental Health.

Today, profound changes are occurring in public health. Many of those changes are driven by the demand for greater efficiency and effectiveness. In response, opportunities are arising to help meet this demand. For example, the Affordable Care Act of 2010 includes among many other provisions the Prevention and Public Health Fund. That fund supports the National Public Health Improvement Initia-

tive (NPHII) with the objective to ensure public health goals are met efficiently and effectively. During its first year, the NPHII helped build health department capacity in performance management by providing \$42.5 million to 76 state, tribal, local, and territorial health departments (Centers for Disease Control and Prevention [CDC], 2010). In addition, surveys by the Association of State and Territorial Health Officials

(ASTHO, 2011) and the National Association of County and City Health Officials (NACCHO, 2010) indicate that performance management and quality improvement are priorities for a large number of state and local health agencies. Environmental public health programs are an important part of those performance and quality improvement goals. Environmental public health programs can contribute to and benefit from collaborations within agency-wide public health improvement efforts.

One important way environmental public health departments can assess and improve their own programs or systems is by using the Environmental Public Health Performance Standards (EnvPHPS). The EnvPHPS provides a set of standards that describes optimal performance and capacity with which environmental public health programs and systems can fulfill the 10 Essential Environmental Public Health Services (see sidebar). The EnvPHPS allow for in-depth analysis of services and reveal areas for quality improvement (CDC, 2011). In this way, the EnvPHPS can be utilized to increase the efficiency and effectiveness of environmental public health services. A real-world example can best show how the EnvPHPS can help initiate performance management and quality improvement activities in local-level environmental public health.

Performance Management and Quality Improvement in Indian River County

In July 2011, the Indian River County Health Department, Environmental Health Department (IRCHD EHD) in Vero Beach,

Florida, began its own performance management and quality improvement process. The process included five other Florida local environmental public health departments that facilitated EnvPHPS assessments for their respective environmental health systems. The assessments involved a wide range of participants from both public and private agencies and from specific areas such as environmental quality, laboratories, and civic organizations. Florida Department of Health NPHII funds supported the EnvPHPS assessments. Because of environmental health staff involvement in collaborative planning, a portion of the state's funds was utilized to support options for environmental health-focused quality improvement activities through use of the EnvPHPS or the Protocol for Assessing Community Excellence in Environmental Health (PACE EH).

IRCHD EHD chose to conduct an EnvPHPS assessment because it allowed a systems-based approach that considered the public and private entities, individuals, and associations that contribute to the delivery of environmental public health services. The assessment results revealed that among the 10 Essential Environmental Public Health Services, the most significant gaps were in #9: evaluate effectiveness, accessibility, and quality of personal and population-based environmental public health services and #10: research for new insights and innovative solutions to environmental public health problems. Following gap analysis, IRCHD EHD developed an action plan that identified specific areas for improvement. Here are several areas in which IRCHD EHD plans to implement quality improvement projects:

- coordinate data sharing among agencies with program overlap,
- develop relationships with higher learning and research institutions,
- share research findings from studies to which the department contributed, and
- foster increased collaboration of partners and understanding of roles and responsibilities.

The EnvPHPS assessment gave IRCHD EHD the opportunity to evaluate the quality of its services against national standards. It also provided a starting point for discussing service gaps and necessary improvements. IRCHD EHD will now use quality

10 Essential Environmental Public Health Services

1. **Monitor** environmental and health status to identify and solve community environmental public health problems.
2. **Diagnose and investigate** environmental public health problems and health hazards in the community.
3. **Inform, educate, and empower** people about environmental public health issues.
4. **Mobilize** community partnerships and actions to identify and solve environmental health problems.
5. **Develop policies and plans** that support individual and community environmental public health efforts.
6. **Enforce** laws and regulations that protect environmental public health and ensure safety.
7. **Link** people to needed environmental public health services and assure the provision of environmental public health services when otherwise unavailable.
8. **Assure** a competent environmental public health workforce.
9. **Evaluate** effectiveness, accessibility, and quality of personal and population-based environmental public health services.
10. **Research** for new insights and innovative solutions to environmental public health problems.

improvement frameworks to develop and implement projects that improve program and service quality, build capacity, and increase effectiveness and efficiency. Additionally, the EnvPHPS assessment and quality improvement activities produced benefits beyond simply identifying gaps. The EnvPHPS helped to build relationships and unite environmental public health system stakeholders and partners. Cheryl Dunn, IRCHD EHD manager, stated, "I was surprised by the assessment results that blew away my idea of how environmental health staff and other community partners perceived our system. Therefore, the assessment opened an avenue for discussion, education, and quality improvement."

As performance management in public health continues to gain momentum, more opportunities for environmental public health will arise. These opportunities provide openings to improve public health systems, environmental public health services, and ultimately community health status. Visit www.cdc.gov/nceh/ehs/envphps/ for more information about the EnvPHPS and quality improvement, including a new tool kit to help programs prepare for, conduct, and follow up on an EnvPHPS assessment. 🚗

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▶ DEMYSTIFYING THE FUTURE



Thomas Frey

28 Major Trends for 2012 and Beyond: Part 1

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 will be the keynote speaker at the NEHA 2012 AEC. He has also authored the book *Communicating with the Future*. Frey is a powerful visionary who is revolutionizing our thinking about the future.

We are in for a very exciting year ahead. 2012 is a year where many competing trends will collide, and through those collisions we will see new pathways emerge.

At the same time, many new trends are forming, some with enough steam to form entirely new movements and others that will run their course and splinter into other emerging ways of doing business.

The “new normal” is quickly becoming the “nothing normal,” and our daily routines, the things we use to maintain our own sanity, will need to morph and change if we hope to stay competitive in the emerging job market and even stay current in our own social circles.

With this in mind, I'd like to take you on a journey into some of the trends I'll be watching in 2012 as the tectonic plates of change inch their way into new positions. Here are

the first 16 of 28 major trends to watch in 2012 and beyond.

1.) **Retail 2.0**—People still like getting out of the house and being around other people, but the retail world hasn't quite figured out what people are looking for. New ways of thinking about Retail 2.0 will form around phrases like “experiential entertainment,” “active engagement,” and “interaction with experts.”

Some of the major expenses involved in traditional retail have been maintaining inventories and shelf space. Look for a new breed of retail shops that carry no inventory, only product demonstration stations with the ability to order on the spot (and receive a discount). Most will be pay-to-play product-placement stations with experts on hand to answer questions. Tech companies like Apple, Amazon, Google, and Microsoft will be paving the way for these kinds of storefronts.

2.) **Crowdfunding**—Even though some sites like Kickstarter and Quirky have been getting traction in this space, Congress's recent effort to pass official Crowdfunding legislation will unleash an entirely new Pandora's box full of options for entrepreneurs hoping to launch their latest ventures. Many start-ups are waiting on the sidelines for this new option to kick in, so look for a surge of activity to take place as an entirely new finance industry begins to take shape.

3.) **The Persistent “Big Lie” Opportunity**—Throughout history we have seen any number of cultural truisms spring to life that were simply not true. If something is repeated enough times, society will begin to believe it. With our ability to post and repost a novel concept, new cultural memes can be formed

virtually overnight. Yet at the same time, our attempts to debunk any myth with over a million mentions online often runs into a murky wall of ambivalence. For this reason, even though they have been scientifically disproven, “big lies” such as these will persist:

- “In the future everyone will have their fifteen minutes of fame.”
- “You only use 10% of your brain.”
- “The Internet is making us dumber.”
- “The more you sweat, the more calories you burn.”
- “Listening to classical music turns babies into geniuses.”
- “Alcohol kills brain cells.”
- “Being skinny means you’re fit and healthy.”
- “Your IQ is fixed and stays the same throughout your life.”

If you thought some of the statements above were true, you’re not alone. Many of us still do even though they have been proven false. Look for a new breed of services to appear that will offer solutions for globally debunking the persistent “big lies.”

4.) Emerging Data Marketplace—The data that you currently own can become far more valuable when you mix it with other data. As an example, if you add weather conditions to your customer data, chances are you will find some connection between weather patterns and your customers’ purchasing habits.

Acquiring datasets such as these is presently very time consuming, expensive, and generally a pain to do. Look for emerging big data marketplaces, such as Microsoft’s Azure, which will come complete with directories of the available datasets along with counselors who can help coach you through the maze.

5.) Smartphone Peripherals—The whole mobile apps revolution began in March 2008 when Steve Jobs announced the software developer’s kit for the Apple iPhone. When Apple’s App Store officially opened on July 11, 2008, there were a whopping 552 apps to choose from. Over 60 million apps were downloaded within the first three days and tech companies around the world began to sense a market shift, and we now have well over one million apps to choose from.

While apps have been getting tons of attention, the piece getting very little is the exploding field of smartphone peripherals that extend our current communication systems far beyond simple person-to-person communications. Virtually every object we

come into contact with has the potential for being controlled by our smartphone, and interface designers are working overtime to make this happen.

Look for literally thousands of new peripheral devices to hit the market over the coming year or two.

6.) The Coming Age of Micro-Incomers—Twitch.tv, or “Twitch,” as it’s called by founder Justin Kan, was built as a way to make professional video gamers more mainstream. It has a partner program similar to YouTube, where the most popular gamers can make money by running commercials during their live streams. Yes, people can actually make money by playing games.

While most of them will not make full-time incomes, they will find it relatively easy to become part of the emerging “micro-incomer” crowd. Here are a few other ways people can make partial and even full-time incomes online:

- sell stuff on eBay or Craigslist,
- sell photos to stock photo sites,
- Amazon’s Mechanical Turk,
- transcribe audio files,
- become a virtual assistant,
- interview people and sell the interview,
- enter online competitions, and
- write articles on eHow.com.

None of these are get-rich-quick schemes, but they can make all the difference between getting by and being destitute. Look for training centers to emerge with a “micro-incomers” kind of focus.

7.) Data Visualization Trends—“I remember seeing a terrific video on wireless power but cannot seem to find it no matter what I do.” Mental faux pas like this are all too common.

For most of us, it’s very difficult to image what information looks like, and when we save a file somewhere, it’s very often very difficult for us to find it again. Data visualization has been a problem plaguing the online world for years and will become even more pronounced as we move further into the cloud.

Data visualization provides tools for two primary functions—explanation and exploration. While business people might think of visualization as the end result, scientists are also using forms of visualization to formulate questions and for discovering new features of a dataset. More importantly, our ability to find and work with data needs to be so easy that average everyday people can work with

it. Look for a few critical new offerings in this area to revolutionize how we store and retrieve the information that will operate and manage our future selves.

8.) Regionalization of the Internet—In the 1990s the Internet was greeted as the New New Thing: It would erase national borders, give rise to communal societies that invented their own rules, and undermine the power of governments. But not so fast!

Even though the Internet began as a utopian dream of a unified world without government intervention, today’s Internet is moving towards the opposite end of the spectrum. In many cases, Internet companies not only welcome governmental restrictions; they are being used as agents of government policy.

The future Internet will see a move towards even more border sensitivity, with hyper-location based services to both improve relevancy of the user experience and also put themselves in good standing for regional business and government contracts.

9.) The End of an Era—Faster than Ever—When Dell announced it would no longer be selling netbook computers, it foretold the end of an era. The cute little laptops surged in popularity and came crashing back to earth in a time frame best measured in months, not decades. Tablet computers, starting with the Apple iPad, made them instantly obsolete.

Our increased awareness of what’s hot and what’s not gives us instant ability to turn our backs on “the old” and to begin embracing “the new.” When Netflix announced they were changing their business model, they instantly got the cold shoulder and had to reverse course. RIM’s BlackBerry, once the hottest product in the connected business marketplace, got blindsided by the iPhone and Android and has been plummeting ever since.

The speed with which new companies can emerge is also the speed with which they can become dismantled. Today’s hotness can become tomorrow’s coldness in a matter of months. So take a close look at the top 100 emerging new companies and know that less than 20% will still be around five years from now. (By the way, I just made that statistic up. Soon to be another one of the big lies.)

10.) Poor Lifestyles Hurting Long-Term Health—In the past three or so decades, women have increased their calorie intake by 22% and men by 10%, with carbohydrates

and sugar-sweetened beverages being major sources of the unnecessary calories.

The inevitable result is that more than two-thirds of U.S. adults and about one-third of children are over the ideal body weight, with the extra layers of fat putting a major strain on people's hearts. The trend is particularly concerning in children. Today, about 20% of U.S. kids are obese, compared with just 4% 30 years ago.

Neither adults nor children are exercising enough and about 21% of men and 18% of women still smoke. About 20% of high school students also have taken up the smoking habit. This means that 94% of U.S. adults, and that's almost everyone, have heightened risk factors for heart disease, diabetes, cancer, and Alzheimer's disease.

However, as always, every problem creates an opportunity, and every one of the identifiable risk factors will become a focal point of activity until each of the problems has become a thing of the past.

11.) Reversing the Obesity Trends—New research documents a 5.5% drop in the number of obese kids in K-8 classes in New York City's public schools from 2006–2007 to 2010–2011.

It's no secret that reversing the childhood obesity epidemic in the U.S. will require a long-term effort. Since 1970, the rate of childhood obesity in the U.S. has tripled. There have been hints that these rates were leveling off in New York City in recent years, but the new study reports an actual decrease. The bad part is that no one knows exactly why it's happening.

Look for a trend where researchers flock to every new community that shows progress to uncover the clues. Also look for the answers to be different than what "the experts" have been telling us in the past.

12.) Fast-Niche Online Universities—We are seeing more and more niche professions without a clear path for getting there, at least not through any traditional university programs. These include everything from social networking experts, to product evangelists, to drone operators, to business colony managers.

Through projects like Khan Academy, MIT OpenCourseWare, and iTunesU, the Internet has made it easier for anyone to be a student. Now it's also making it easier for anyone to become a teacher. Several platforms have

launched within the last couple of years that democratize teaching.

Online universities such as Udemy, Learnable, Tildee, Skillshare, and Sophia are beginning to capture market share. Look for large associations and businesses, as the early adopters, to start creating their own path-to-profession courseware to fill the demand for rebooting skills in a short time frame.

13.) Teaching Entrepreneurship and the Rise of the Accelerator—Can you teach entrepreneurship? People like Eric Ries, author of "The Lean Startup," think so. He also thinks that entrepreneurship must be taught to far more people if the American economy is to successfully pivot towards a postmanufacturing era.

But as people who have started a business know, is very difficult to teach the emotional side of business, and start-ups invariably become extremely emotional at one time or another. And the only good counseling for a person going through the trials of getting a business off the ground are other well-seasoned entrepreneurs. That's why accelerators like Techstars and Y-Combinator have been gaining so much attention.

With their rapid incubation processes, Techstars and Y-Combinator have quickly become a natural farm club for VCs (venture capitalists) in the high tech arena. Look for a variety of other vertical niche accelerators to materialize in fields like health care, education, finance, and other sectors.

14.) Information Doesn't Want to be Free—In 1984 at a Hackers Conference, Silicon Valley futurist Stuart Brand was the first to use the phrase "Information wants to be free" in response to a point made by Apple cofounder Steve Wozniak but continued, "On the other hand, information wants to be expensive, because it's so valuable. The right information in the right place just changes your life."

John Perry Barlow, lyricist for the Grateful Dead, keyed in on the first half of the phrase, "Information wants to be free" in a keynote speech at an Open Source Internet Symposium in 1992. This set the stage for an entirely new era of free-thinking "free" advocates. This became another one of society's "big lies."

There is always a cost to "free." While it may not extract a payment from your bank account, there is always a "time" cost involved. Without some amount of friction,

the volume of information you have to sift through skyrockets and even with good search technology, your time-costs climb dramatically.

The days of "free" thinking are numbered. Look for this mindset to shift over the coming years.

15.) Exploding Smartphone Industry—With a global population exceeding seven billion people, we have seen the mobile phone industry mushroom to include over five billion members. Smartphones remain a small subset, owned by around 10% of all those with mobile phones. But not for much longer. We are about to see virtually all communication devices replaced with smartphones over the coming decade.

Leading the charge is Google with over 700,000 Android devices being activated daily. Over the past year, Google activated more than 255 million devices compared to 105 million Apple activations. Admittedly, this isn't a true apples-to-apples comparison (no pun intended) because Google doesn't make their own phones and Apple does.

As smartphones and other devices evolve in this exploding market, look for a near-term push into near-field communications, 4G, and flexible bendable devices.

Critical to the growth of this mobile device market is the global supply of rare earth metals, of which China currently controls 95% of known reserves. Looking out for its own self-interests, China has been ratcheting down exports of these metals by 12% per year for the past five years. Their reluctance to export enough to meet global demand has touched off a worldwide hunt for new sources with promising finds being uncovered in Canada, Argentina, South Korea, and California. Look for several new mines to come online in coming years and China's stranglehold on the industry to plummet.

16.) Hyper-Local Urban Farming Going Underground—A few years ago, a study by the Leopold Center for Sustainable Agriculture at Iowa State University reported that between 1980 and 2001, the distance food traveled from farm-to-table increased 25%, ranging from 1,500 to 3,000 miles. Since then we have seen a strong push to localize and even hyper-localize the growing of food supplies.

The drive to make all food supplies local has touched off a number of battles to rewrite municipal codes to accommodate everything

from rooftop gardens, to backyard cows and chickens, to aquaponic and aquaculture projects, to experimental vertical farms. The next shift will see crops grown underground.

Dutch-based PlantLab recently announced it has figured out how to triple plant yield in a sunless, rainless environment housed in their underground research facilities. PlantLab uses artificial light and only 10% of the water typically needed. Using the correct spectrum from their LED lighting system has increased

photosynthesis efficiency to 12%–15% from sunlight's 9% range.

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Next month's column: Trends 17–28
Interested in sharing your thoughts? Go to www.FuturistSpeaker.com.

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▶ LEGAL BRIEFS



Dave Babcock, JD

Public Health Records That Stand Up in Court

Editor's Note: The *Journal* recognizes the importance of providing readers with practical and relevant legal information and is pleased to bring back 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.

Since joining Marler Clark in 2001, Dave Babcock's practice has focused on multiple party complex litigation, most commonly related to foodborne illness outbreaks. He has litigated against large corporations such as McDonald's, Cargill, and Yum Brands/Taco Bell, and on nationwide outbreaks including *Salmonella* in PCA peanut butter products (2008–2009) and *Salmonella* in Iowa eggs (2010). Representing children and the elderly is a central focus of Mr. Babcock's practice.

Mr. Babcock is a frequent speaker on foodborne illness and the law. He has addressed environmental health conferences, food manufacturer associations, and food safety organizations nationwide.

An environmental health inspector is writing up his or her restaurant inspection report. An epidemiologist is logging food history with an ill member of the public. In either case, the possibility that the document may someday be held to close legal scrutiny may be the furthest thing from their minds. But, while an exceedingly small percentage of food poisoning cases become legal matters, it does happen. And when it does, the documents generated by local health agencies are often front and center.

The public health documents your agency creates are most likely the most accurate

collection of information—the closest thing to “the truth” that a judge or jury may get access to. Thus, making sure that those records will be admitted, and stand up to scrutiny from both sides of a legal case, is an important task.¹

Step one is making sure that the documents are admissible—meaning that the judge will allow the jury to consider them as part of the evidence in the case. Getting into a full discussion of admissibility would require a dissection of an evidence rule, the “hearsay” rule. Each state has its own hearsay rules, but the Federal Rule, Rule 801 et. seq. serves as a workable example. Hearsay is a

term that is used more often than it is understood, and this forum is not the place to delve into its finer points. In short, legal rules of evidence are designed to admit evidence deemed reliable and preclude that which is deemed unreliable. The underlying idea of the hearsay rule is that statements made out of court, orally or in writing, are generally unreliable, and therefore inadmissible.²

What does this mean for that environmental health inspection report, or the food history taken down by an epidemiologist? It could mean that the admissibility of these documents can be challenged in court as an out of court statement, as hearsay. Thankfully, there are a number of well-settled exceptions to the hearsay rule that will generally allow documents generated in public health investigations to be admitted. Under the Federal Rule, the most likely used enumerated exceptions would be exception No. (6) Records of regularly conducted business activity and exception No. (8) Public records and reports. Thus, a lawyer who is trying to use public health documents as evidence in court will need to convince a judge that one of these or some other exception to the hearsay rule will apply.

Once the document is in evidence, there is still the matter of its impact on the jury. There are several recommendations to be made in this regard. My first suggestion is to involve photographs wherever possible to supplement reports. For example, our firm handled a case involving an *E. coli* O157:H7 outbreak at a buffet-style restaurant. The buffet style of the restaurant complicated the isolation of a single suspect food. Environmental health inspectors, though, documented raw meat being stored above a ready-to-eat dessert that was one of the foods showing statistical

significance as a potential source of the illnesses. A quick photograph of the condition of the walk-in cooler would have greatly reduced any confusion or dispute about the accuracy of this portion of the report. It is also particularly useful to document the gathering for testing of samples from a restaurant or home with photographs of each sample, both prior to and after proper cataloging of the samples.

Another method of increasing juror confidence in the accuracy of your agency's work is to make sure to record the author, date, and time of any notes in the file. For example, an ill person in an outbreak is likely to be questioned more than once about his or her food and exposure history. If that is the

case, it is very helpful to be able to identify the date and times of those conversations, as well as the person who conducted the questioning. Not only does this data make the information uncovered more reliable, it allows for more efficient follow-up questioning, as the person with the most knowledge can be readily identified.

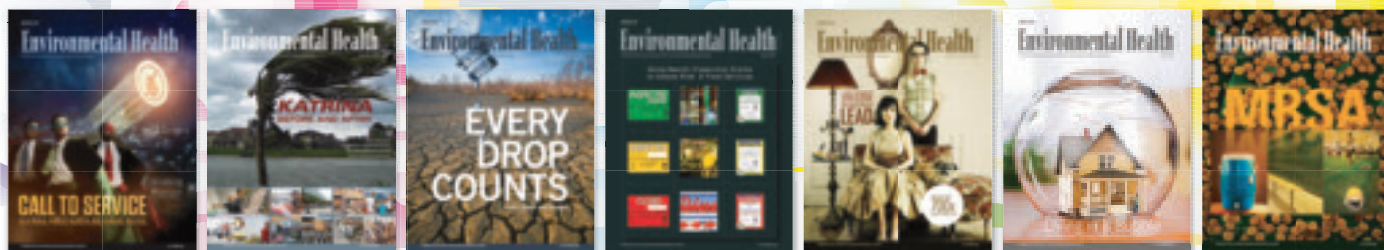
A final suggestion is to document clearly which personnel worked on a particular investigation, in what roles, and at what times. In this manner, the jury can get a full understanding of the thorough, careful, and coordinated work done by your agency.

It is true, and probably a relief, that only the slightest percentage of public health inspections

and investigations will ever be carefully reviewed by a judge and jury. When this occurs, however, giving that judge and jury a clear, accurate, and reliable reflection of the findings your agency has made is essential. 🐞

¹For more information on what types of public health documents are used at trial, and why and how the documents are used, please see "The Use of Public Health Data and Documents in Foodborne-Illness Litigation," *Journal of Environmental Health*, 69(2), 37-38.

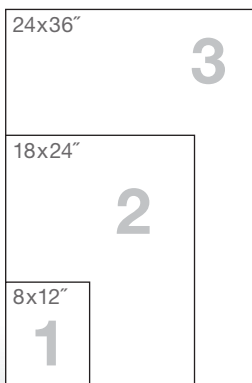
²An out of court statement is actually only admissible when offered "to prove the matter asserted." This is an important, if subtle, caveat.



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June 6, 2012: 2012 Annual Education Conference, sponsored by the Alabama Environmental Health Association, Alabama 4H Youth Development Center, Columbiana, AL. For more information, visit www.aeha-online.com/5522.html.

California

April 2–5, 2012: 2012 Annual Educational Symposium, sponsored by the California Environmental Health Association, Sacramento, CA. For more information, visit www.ceha.org.

Georgia

July 11, 2012: 2012 GEHA Annual Education Conference, sponsored by the Georgia Environmental Health Association. For more information, visit www.geha-online.org.

Illinois

April 2–3, 2012: North Chapter Annual Educational Conference, sponsored by the Illinois Environmental Health Association, Elgin Community College, Elgin, IL. For more information, visit www.iehaonline.org.

Indiana

April 25, 2012: IEHA Spring Educational Conference, sponsored by the Indiana Environmental Health Association, Inc., Fort Harrison State Park Inn and Conference Center, Indianapolis, IN. For more information, visit www.iehaind.org.

Minnesota

May 9–11, 2012: 2012 Annual Spring Conference, sponsored by the Minnesota Environmental Health Association, Ruttger's Bay Lake Conference Center, Deerwood, MN. For more information, visit www.mehaonline.org/events.

Missouri

April 10–13, 2012: Annual Educational Conference, sponsored by the Missouri Milk, Food, and Environmental Health Association, Stoney Creek Inn and Conference Center, Columbia, MO. For more information, visit www.mmfeha.org.

North Carolina

July 18–20, 2012: 66th Annual Interstate Environmental Health Seminar, hosted by the North Carolina Environmental Health Association, Fontana Village Resort, NC. For more information, visit www.wvdhhr.org/wvas/IEHS/index.asp.

Ohio

April 16–18, 2012: Spring AEC, sponsored by the Ohio Environmental Health Association, Doubletree Hotel, Worthington/Columbus, OH. For more information, visit www.ohioeha.org/AnnualEducationalConference.aspx.

TOPICAL LISTINGS

Children's Environmental Health

May 30–June 1, 2012: 2012 Research Conference—The Contribution of Epigenetics in Pediatric Environmental Health, sponsored by the Children's Environmental Health Network, San Francisco, CA. For more information, visit www.regonline.com/cehn.

INTERNATIONAL LISTINGS

May 21–27, 2012: 12th IFEH World Congress on Environmental Health, sponsored by the International Federation of Environmental Health and the Lithuanian Union of Hygienists and Epidemiologists, Vilnius, Lithuania. For more information, visit www.ifeh2012.org/welcome.

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Marc L. Lame (2005)



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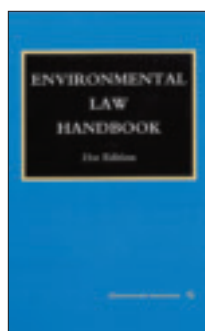
communities, this is the first book to address the same basic concerns in schools. Each section of this book addresses a different environmental health concern facing schools today. The entire book is evidence-based, readable, generously illustrated, and practical—an indispensable resource for parents, school staff, administrators, government officials, and health professionals.

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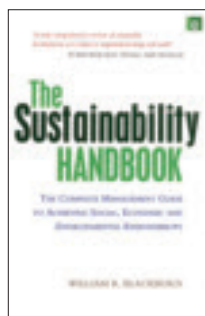
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NEHA NEWS

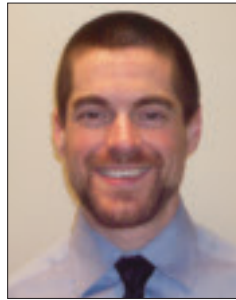


Elizabeth Landeen Promoted to Assistant Manager of Research and Development

Elizabeth Landeen has been promoted to the position of assistant manager of NEHA's Research and Development (R&D) department. This position was previously staffed by Tom Dickey, who retired in February. Elizabeth has

worked as a project coordinator in the R&D department for four years. She has primarily managed and coordinated the Epi-Ready: Foodborne Illness Response Strategies Team Training program, which is funded largely through grants from the Centers for Disease Control and Prevention. Under Elizabeth's supervision, this program has expanded into a variety of areas via collaborative efforts with various federal partners, as well as through the creation of the Industry-Foodborne Illness Investigation Training (I-FIIT), which is geared towards the retail food industry. She was also actively involved in the revision process for developing a new and improved version of the Epi-Ready training program scheduled to pilot in early April.

As Elizabeth transitions into her new role as assistant manager, she is looking forward to working more closely with each of R&D's programs, establishing new connections, and strengthening current relationships with various federal, state, local, academic, and industry partners. She would like to thank the Epi-Ready, I-FIIT, R&D, and NEHA teams for their support and hard work. Elizabeth would also like to thank Tom Dickey for his dedication to the environmental health profession, his unwavering sincerity and kindness, and for his mentoring and friendship. Please join NEHA in congratulating Elizabeth on her promotion and wishing her great success in this position.



Staff Profile: Andrew Brissette

NEHA's office is 7.5 miles down a river bike path from my apartment, which enables me to bike to work over two-thirds of the year. I am very happy to have a career in Denver. I provide training and sales support for NEHA's Entrepreneurial Zone, which has presented me with many new and inter-

esting challenges. My role in NEHA allows me to support the work of over 650 food safety trainers in 17 countries. I enjoy being of service to our trainers and members, and will continue to work towards improving the overall member, trainer, and customer experience at NEHA. It is very satisfying to work with large and diverse groups of people who are working towards a common and noble goal.

My past experience has been mainly in design and construction. I coordinated the largest trauma center construction in southern California—Huntington Hospital in Pasadena—solving over 500 design errors before construction. Drawing from this past experience, I enjoy making any operation run more smoothly.

On a personal level, I am extremely passionate about food cultivation and preparation, sustainable agricultural methods, soil science, and organic fertilizer design and technique. I love growing plants outdoors from the first thaw to the first freeze, and certainly on every windowsill inside my home during winter. Denver has over 300 days of sunshine per year—what a great place to work and live for someone who is a gardener, bicyclist, snowboarder, and mountaineer! I love Colorado and am very happy to be a part of NEHA. 🏔️

IN MEMORIAM

Paul Taloff

NEHA would like to extend its sympathies to the family and friends of Paul Taloff and recognize the passing of an individual who made a difference in environmental health through his professionalism and service. Paul Taloff was president of NEHA from 1978 to 1979. Prior to that, he served as president of the California Environmental Health Association from 1971 to 1972. Taloff served in the U.S. Navy during World War II as a corpsman in the

South Pacific aboard the U.S.S. Nashville. After his tour of duty in 1947, he enrolled at the University of California, Los Angeles, and graduated in 1951 with a degree in public health. He worked as a registered sanitarian for both the Los Angeles and Placer county public health departments. Taloff started working for the University of California, Davis's Department of Environmental Health and Safety in 1967 and retired from there in 1982. 🏔️

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Managing Editor's Desk

continued from page 62

NEHA, I had both the pleasure and privilege of participating on a small committee that interacted with the researchers as they went about their work.

This project started from a most interesting place. The research company hired to do this work (the FrameWorks Institute) begins a project like this from the fundamental belief that depending on our culture, our position, our history, etc., we all come to issues from different places and perspectives. To be more precise, we process and filter information from different frames of reference or “frameworks.” Unless and until we understand the frameworks that different people have, an eon of time wouldn't be enough to ensure that our messages get through—no matter how many words we used or how long we talked!

Depending on the particular framework (and filters) that a person (or class of people) has, some information will get through, some won't. Some information will get distorted, some won't. And some information will likely prompt a favorable reaction, no reaction, or very unfavorable reactions!

This concept becomes very meaningful to all of us very quickly when we think of the challenge before us to persuade the public that even in these restricting economic times, environmental health is important and worthy of their political and funding support. If we are serious about making progress on this front, then it is incumbent on us to better understand the frameworks that the public uses when considering the environmental health issue in all of its aspects. Otherwise, we court the risk of not being heard or even worse, rejected.

The objective to better understand the public's frameworks is what drove the research that I found so fascinating. The basic idea was that if we could better understand the frameworks that are generally used by the public, we could talk to them in ways that more enabled our messages to both get through and elicit favorable responses. (This idea mirrors Covey's admonition that communication works best when the effort is made to understand before seeking to be understood.) If we don't take the time to study and understand those with whom we are speaking, we invite conversations that feature

precious little engagement and plenty of talking past each other.

After about a year of intense interviews with both environmental health experts and segments of the public, a final report on this research was just recently released. For any environmental health professional interested in learning how to improve their communication with the public and cultivate a deeper appreciation for this profession (which I hope covers just about everyone reading this!) I would highly recommend looking at this report. It can be found at www.frameworksinstitute.org/environmental_health.html. (NEHA will also publish the link to this report in several of our upcoming E-News issues.)

To give you a feel for some of the eye-opening results that came from this research, I am happy to present here, but a few of the report's highlights. I will also share that this is one of the best commentaries on this profession that I have ever read—which is why I chose to make it the topic for my column this month. Some report highlights are as follows.

- The public believes that environmental health threats are real and concerning. However, they also believe that environmental health work is unimportant! (As noted below, this derives in part from the public's view that the locus for environmental health is on the personal and household level and not the community level.)
- Environmental health experts see a clear distinction between environmental health and the environmentalist movement. The public does not.
- The “contaminant model” of thinking dominates the public's perception of environmental health. They structure their understanding of environmental health through the idea that environmental health is about particular agents (such as toxic chemicals) that can impact their health. More importantly, the public believes that the responsibility for protecting against such agents is personal and that these exposures generally occur within one's home and/or lifestyle and are therefore preventable through the exercise of personal responsibility. The idea of a community-wide program of environmental health or the thought that issues like the built environment represents an environmental health concern are concepts that

lie outside the contaminant model and are therefore not entertained by the public.

- The resolution of environmental health issues is largely seen by the public as a matter that takes place on a personal and household level, not a community one.
 - (As has been documented before, such as by the Institute of Medicine), the public links public health to medical care for the indigent. As long as we attach ourselves to public health, we make it more difficult to enlist public understanding of what environmental health actually is. (As an aside, we are picking up that same message through the work of our Center for Priority Based Budgeting. We are quickly learning that the more that we can attach environmental health to public safety, the more attention and the higher the priority we can get from local policy makers.)
 - In contrast to the public's perception that environmental health was largely a personal matter, experts in environmental health looked to public policy and population-level interventions as the primary locus for solutions to environmental health concerns.
 - The experts also believed that at its core, environmental health was about shaping, building, and sustaining environmental conditions that are conducive to population health for current and future generations.
 - Environmental health would get a better public reception if we reframed our messages away from disease prevention and toward creating conditions for health.
 - The public avoids thinking about all the environmental threats to health because it is overwhelming to contemplate. We would be well advised to cultivate a proactive and preventative modeling of safety that goes beyond definitions of risk.
 - The term “environmental” triggers thoughts about the environment (and environmentalism) and confuses people when it is linked to the term health.
 - The public processes the term environmental health in a negative way because the term triggers thoughts of threats, dangers, and risks to health. More positive models of proactive health maximization and promotion do not occur to the public.
- I could fill pages with highlights from this incredibly illuminating study. Instead, I'll leave to you the reading of this report.

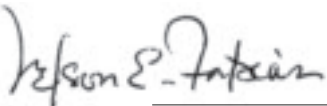
The report makes clear that the public and the experts (in environmental health) speak two different languages as certainly as that gas station clerk in Italy and I did. Perhaps more telling, we see the world through very different frameworks. Until we find ways to overcome this communication barrier, environmental health is going to have no more success with the public than I had with that woman at the gas station.

We need to recognize the fact that we and the public speak different languages and use different frameworks if we are to enhance our communication (and ultimately our perceived value) with both the public and their policy makers. Moreover, since the onus is on us to explain ourselves, we are the ones (not the public) who need to walk around the table to see the world from the public's point of view. We need to understand their frameworks. If we wish to improve our communication and get our messages to stick, we need to take the time to learn about these different frameworks and then use them to our advantage. To expect the public and their policy makers to understand and appreciate us simply by engaging in nonstop talking is a recipe for blank stares and a further erosion of public support for the work we do.

For years, an element within our ranks has complained that we are the invisible profession. Long ago, I tossed that metaphor aside as it positioned us as victims and invited us to adopt a victim mentality. This research gives us a tremendous opportunity to take much more of an activist role in advancing our work, our identity, and of course, our importance. It also presents a compelling argument for talking less and listening more and in the process, learning how to talk in effective ways to the people we serve.

With that in mind, it seems fitting to end with a pearl of wisdom left to us by the legendary basketball coach, John Wooden. Hanging on his wall was the following sage advice:

A wise old owl lived in an oak
 The more he saw the less he spoke
 The less he spoke the more he heard
 Why can't we all be like that wise old bird? 🦉



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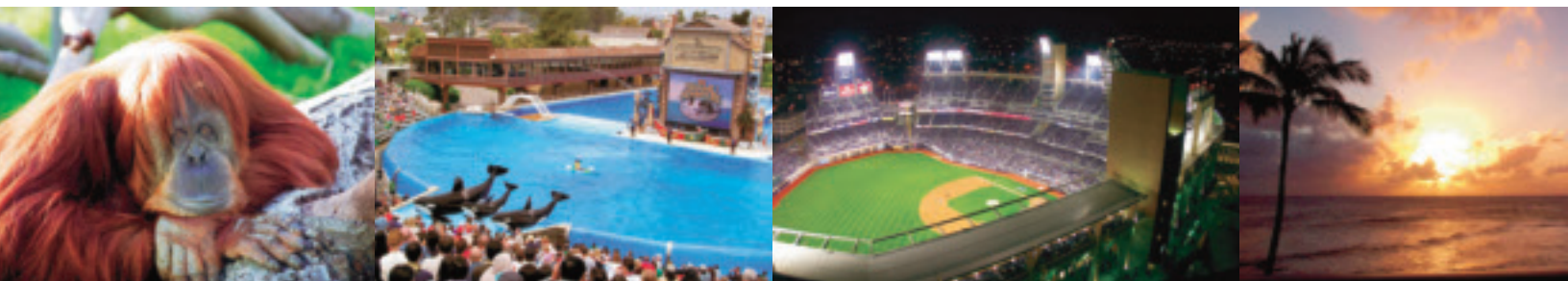
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Did You Know?

You can give back to the host city of the NEHA 2012 AEC by participating in the Community Volunteer Event. The event will be held at San Diego's Balboa Park. Check out the NEHA 2012 AEC promo in this issue (page 58) for more details.

Register for the NEHA AEC June 28-30, 2012

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	Member	Non-Member
Full Conference Registration	\$565	\$725
One Day Registration	\$305	\$355
Student/Retired Registration	\$155	\$225

Registration pricing will increase after May 24, 2012.

Registration pricing for Pre-Conference Workshops, Credential Courses and Exams, special events, and the Virtual AEC are available at neha2012aec.org/register.html.

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See website for room availability within the NEHA block.

*Taxes and fees also apply. To receive the discounted rate of \$149/night, you must book your hotel room within the NEHA block. Discounted rooms are available on a first-come, first-serve basis. Rooms with a bay view are also available at \$169/night plus taxes and fees.



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LEARNING LAB SESSIONS

Engage in interactive, dynamic, and self-driven sessions, which will provide you with hands-on training and real-world experience to help you cultivate new skills and bolster your proficiency to increase your productivity as an environmental health professional.

EH Health Impact Assessments (HIA)

- Designing an HIA: You Take the Lead
- Tox in a Box: A Concise Training on the Health Assessment of Environmental Hazards

Food Protection and Defense

- My Restaurant Did What?!
Session sponsored by Decade Software Company
- ROP HACCP: Hazards, Preventive Measures, and Educational Opportunities

General EH

- Business Networking 101
- Radiological Tales: Lessons Learned for the EH Professional
- Tracking in Action: Using the Tracking Network to Impact Environmental & Public Health Programs

Informatics/Leadership/Management

- Making the Message Stick

- Wake Up to the Social Media Planning Challenge
- Woodstock to WWF: How to Benefit from Generational Differences in the Workplace

Onsite Wastewater

- (Field Trip) Tour of an Ecological Wastewater Treatment and Reuse: Decentralized Model
Session sponsored by Living Machine Systems

Technology and EH

- Mobile Phone Usage: More, More, More or Less, Less, Less?
- There's an App for That
- (Field Trip) University of California, San Diego: California Institute for Telecommunications and Information Technology—Cal-(IT)2 Tour

Terrorism/All-Hazards Preparedness

- Using Community-Based Participatory Research to Build Capacity for Environmental Emergency Preparedness and Disaster Resilience

The sessions below are a special group of Learning Labs that are scheduled for several hours each day during the AEC. 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

- Sanitation in Classroom and Food Preparation Areas in Child Care Facilities from North and South Carolina

Food Protection and Defense

- Food Establishment Resource Library (FERL) on the Southern Nevada Health District Website
- What's Cooking? Ethnic Foods 101

Healthy Homes and Communities

- The Effects of Indoor Air Pollutants on the Lung Health of Asthmatic Patients

EDUCATION

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LECTURE SESSIONS

Acquire comprehensive information from environmental health subject matter experts and industry leaders, and learn from your peers as you share stories and best practices to address common challenges.

Children's EH

- Effectiveness of Local Lead Poisoning Prevention Laws
- Food Safety Risk, Response, and Resources: A School Food Service Action Guide
- Lead Guidelines for Children's Play Areas: The Need for Clean Soil Policies to Protect Children
- Methamphetamine Contamination Closes West Virginia School
- Pediatrician's Perceptions on Child Lead Poisoning

- Protecting Children: Tools to Improve Environmental Health in Child Care Settings
- What Got Into the Kids?

EH Health Impact Assessments (HIA)

- Community Engagement and Health Impact Assessments
- Environmental Impact Assessment: An Unrealized Opportunity for Environmental Health
- Using Health Impact Assessments for Comprehensive Plan Updates

Emerging EH Issues

- Medical Marijuana in California: Legal Standing and Dealing with Edible Products
- The Role of Public Health in Promoting a Food System that Is Safe, Secure, and Sustainable: S3
- What Is the Matter with Raw Milk?

Food Protection and Defense

- Addressing Illegal Food Vending and Food Defense with Education and Innovation
- Are You on the Cutting Edge?

- (Food Safety Focus) FSMA: What it Signifies for the Training and Certification of Regulatory Personnel
Session sponsored by MindLeaders and Prometric
- (Food Safety Focus) What Does it Mean to be Epi-Ready? How the Emergency Response Network Works
Session sponsored by MindLeaders and Prometric
- Impact of Internet Posting of Restaurant Inspection Scores on Critical Violations
Session sponsored by Decade Software Company
- New Deli Slicer Standards in Food Safety
- Pets in Retail Food Outlets: A Literature Review
- Scores and More: Can You be Sued for Giving a Restaurant a Good Grade?
- The Fight Against Food Allergens: What Regulators and Industry Need to Know
Session sponsored by San Jamar
- The Role of Rapid Cycle Improvement in Addressing Recurrent Critical Violations in Restaurants
- What's Hiding in Your Sandwich?
Session sponsored by San Jamar

General EH

- Effective Strategies to Reduce Motor Vehicle Injuries in Native American Communities
- How an Agricultural Field Toilet Inspection Program Reduced Food Contamination Risk and Improved Farm Worker Health
- Human Mercury and Antibiotic Resistant Bacterial Sampling Along the Indian River Lagoon, FL: Dolphin and Human Health
- Nanomaterials for Environmental Remediation: Nanoinformatics for State Agencies' Safety and Health Regulatory and Oversight
- Outdoor Air Quality Impacts at Hydraulic Fracturing ("Fracking") Sites in Fort Worth
- Rat Hoarder Case
Session sponsored by Orkin

Hazardous Materials and Toxic Substances

- California's Unified Approach to Hazardous Material Programs
- Interagency Cooperation Helps Solve Mercury Mystery Threatening Children in Twin Falls, Idaho
- Methamphetamine Lab Contamination: A Different Look at the Impact of the Meth Epidemic
- Responding to Mercury Incidents
- San Bruno—Restoring a Community
- What Do You Do When You Have a Bomb Factory in Your Neighborhood?
- What Goes Up Must Come Down: Lessons Learned from Emergency Air Monitoring During the Escondido Bomb House Burn

Healthy Homes and Communities

- Home Is Where the Hazards Are
- Indoor Air Quality in Rural Alaskan Homes
- Preserving Our Past to Protect Our Future
- The Fungus Among Us: Blasto Isolated in the Home Environment
- The Inspector's Guide to Indoor Pool Air Quality

- "Why Don't People Walk?!" A Case Study of Active Travel at a Sustainable University

Informatics/Leadership/Management

- Cross Community Collaborations for Environmental Health
- EPH & Priority Based Budgeting—This Happened to Me!
- Look Inside a Statewide Environmental Reporting System Project
Session sponsored by Decade Software Company
- State Environmental Health Policy
- Sustainable Policy in Environmental Public Health
- Using Dashboards to Make More Sense of Your Data
- Using Environmental Public Health Tracking Data to Assess State Public Health Laws

International EH

- Contents of Heavy Metals in Arable Soils and Birth Defect Risks in Shanxi, China: A Small-Area Level Geographical Study
- Implication of E-Waste Trafficking on Human Health
- Rapid Evaluation and Improvement of Drinking Water Supplies in Africa
- Understanding Team Organizational and Incident Command Challenges: Practice and Application During Two Different International Outbreak Responses

Onsite Wastewater

- Ecological Wastewater Treatment and Reuse: The Decentralized Model
Session sponsored by Living Machine Systems
- Recycled Coconuts as an Onsite Wastewater Technology?

The following sessions are being presented by the California Onsite Wastewater Association (COWA):

- Conducting a Small Community Assessment for Wastewater Infrastructure Improvements
- Contracts: Managing Expectations
- OWTS Inspections
- OWTS Management, Operations, Maintenance & Monitoring
- Principles of Plan Checking
- Technology Approval
- Writing a Successful Grant

Additional sessions will also be offered by the State Onsite Regulators Alliance (SORA).

Pathogens and Outbreaks

- Collaboration Between FDA and Local Agencies to Assess the 2011 Multistate Cantaloupe *Listeria monocytogenes* Outbreak
- Legionnaires' Disease Outbreak at a Long-Term Care Facility: Environmental Health Considerations
- Passing Parasites: A Rare Foodborne Giardiasis Outbreak at a Restaurant
- Rapid Response Teams and the FDA CORE Network: Improving Foodborne Outbreak Responses
- Severe Brain Infections and the Environment: The Changing Epidemiology of *Naegleria fowleri* Infections

- Water and Foodborne Enteric Protozoa: Current Considerations for Environmental Health
- Zygomycosis Issue Following the Joplin Tornado

Recreational Waters

- A Potpourri of New Standards You Need to Know about for Pool and Spa Inspections
- Biofilms in Recreational Water: What Makes Them So Hard to Treat?
- Building an Aquatic Health Program of Excellence
- National Swimming Pool Codes—Junction of Health and Building Officials
- Pool Safety: From Construction to Technology
- Ultraviolet for Aquatics & Spray Parks: Air Quality and *Cryptosporidium*

Sustainability/Climate Change

- Climate Change Impacts on the Built Environment and Public Health
- Confronting Climate Change Health Risks in the Pacific Northwest
- Environmental Health, Sustainability, and Land Use Planning—A Perfect Trifecta
- Innovative Solid Waste Permitting, Organics Diversion, and Sustainability in the Napa Valley
- Wildfire Particulate Emissions and Respiratory Health Under Climate Change Scenarios: Project Overview and Results

Terrorism/All-Hazards Preparedness

- A Day of Disaster: The Environmental Health Impact of the April 2011 Tornadoes in Alabama
- Functional Assessment Service Teams (FAST): Emergency Sheltering for People with Access and Functional Needs
- National Preparedness Measures and Their Implications for Environmental Health
- Response to Hurricane Irene
- Riverwatch 2011: An Environmental Public Health Response to a Major Flood Event
- Riverwatch 2011: How a Local Environmental Public Health Agency Implemented Health Codes to Condemn Private Residences
- Understanding Water Issues During Selected Natural Disasters

Vector Control and Zoonotic Diseases

Session track sponsored by Orkin

- Bed Bugs: A Re-Emerging Public Health Challenge
- Environmental Risk Factors for Re-Emerging Epidemic Typhus
- What Is the Buzz about PCRs?
- Where Have All the Vector Programs Gone?

Water Quality

- An Evaluation of Dual Bacteria Indicators for Urban Stormwater Control
- Minnesota's Assessment Source Water Monitoring Study
- Toolbox Approach of Source Tracking Human Sewage in Storm Drains

Pre-Conference Workshops

EHTER Emergency Response Training

► **Tuesday & Wednesday, June 26 & 27, 8:00am–5:00pm**

California Department of Public Health Center for Environmental Health, CDC, and NEHA are pleased to offer the Environmental Health Training in Emergency Response (EHTER) Awareness Level training course for environmental health professionals. This two-day EHTER Awareness Level course provides an overview of the environmental health roles and responsibilities, issues, and challenges faced during emergency response. 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/SEMS trainings prior to attendance.

This course offers sixteen hours of continuing education credit for California Registered Environmental Health Specialists.

*Cost is \$99 for members and \$199 for non-members.
Limit 55 people.*

Epi-Ready Team Training: Foodborne Illness Response Strategies Workshop

► **Tuesday & Wednesday, June 26 & 27, 8:00am-5:00pm**

NEHA is offering this training opportunity for environmental health professionals, epidemiologists, laboratorians, and public health nurses involved in conducting foodborne disease outbreak investigations. This two-day workshop is composed of interactive group exercises, Q&A sessions, and lectures spanning the scope of an investigation.

Workshop cost includes the Communicable Diseases book, IAFF's Procedures to Investigate Foodborne Illness, the course manual, and the Physician's Primer, which is a value of over \$70.

*Cost is \$149 for members and \$249 for non-members.
Limit 40 people.*

Industry-Foodborne Illness Investigation Training (I-FIIT) Workshop

► **Wednesday, June 27, 8:00am–5:00pm**

I-FIIT is a one-day face-to-face workshop designed to bring together retail food service representatives and 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. Additionally, the workshop provides a better understanding and clarification of the investigation process by identifying roles and responsibilities, discussing early detection strategies and establishing and implementing control measures based on model practices. By providing this training, I-FIIT

aims to assist industry and regulatory officials in producing a more rapid, efficient and effective, response to foodborne illness incidents.

Applicants should be mid- to upper-level management from retail food service stores and restaurants. Deadline to submit an application is May 4, 2012. Applicants will be notified of their acceptance no later than May 16, 2012. For more information and a registration form, please visit neha2012aec.org.

*Cost is \$299 per person.
Limit 30 people.*

Commercial Cooking Ventilation Requirements

► **Wednesday, June 27, 8:00am–12:00noon**

Mechanical Code and NFPA 96. This workshop will include information on recirculating systems—referred to as “ductless hoods”—and cooking appliances that do not require exhaust hoods. Information will be provided on key installation concerns, proper sizing of hoods, sanitation issues, and the scope and limitations of the listed products used in the commercial kitchen exhaust systems. This workshop will identify resources available to assist in plan checking and inspecting installations.

*Cost is \$109 for members and \$159 for non-members.
Limit 24 people.*

NSF Training Course “Plan Review for Food Establishments”

► **Thursday, June 28, 8:00am–5:00pm**

NSF International's Center for Public Health Education is pleased to announce a new training course entitled “Plan Review for Food Establishments.” This course was developed by NSF International's leading environmental health professionals and represents the latest plan review information in a dynamic and interactive format. Whether you are a regulator or an industry professional hoping to build knowledge of the plan review process, the course will provide key information that ensures accordance with current U.S. Food and Drug Administration (FDA) guidelines. This one-day workshop will cover the Plan Review application process; regulatory authority compliance; design, installation and construction of a food establishment; compliance with Hazard Analysis Critical Control Points (HACCP) and Good Manufacturing Practices (GMPs); and a plan review outline as it pertains to the current food code. Students should bring a set of plans to work with and students will be provided with a copy of the year 2000 FDA/CFP Plan Review Blue Book.

“Plan Review for Food Establishments” is strongly recommended for sanitarians, consultants, local and state regulatory officials, industry professionals responsible for the preparation, design and approval of food establishment plans.

*Cost is \$109 for members and \$159 for non-members.
Limit 30 people.*

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 neha2012aec.org.

Certified Professional of Food Safety (CP-FS)

Review Course: Tuesday, June 26, 8:00am–5:00pm & Wednesday, June 27, 8:00am–12:00noon

Cost: \$299 for members and \$399 for non-members, which includes the CP-FS Study Package (CP-FS Study Guide 2010 Edition, NEHA's Certified Professional Food Manager course book, 2005 and 2009 Food Code on CDs), a \$145 value. *Limit 36 people.*

Exam: Wednesday, June 27, 1:00–3:00pm

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

Review Course: Tuesday & Wednesday, June 26 & 27, 8:00am–5:00pm and Thursday, June 28, 8:00am–12:00noon

Cost: \$459 for members and \$559 for non-members, which includes the REHS/RS Study Guide, a \$179 value. *Limit 55 people.*

Exam: Friday, June 29, 8:00am–12:00noon

HACCP Manager Certification Course

Previous training with a minimum of Certified Professional Food Manager is highly recommended.

Review Course: Wednesday, June 27, 8:00am–5:00pm

Cost: \$249 for members and \$299 for non-members, which includes the NEHA textbook, HACCP: Managing Food Safety Hazards. *Limit 36 people.*

Exam: Thursday, June 28, 8:00–10:00am

NAWT Installer Training + NEHA CIOWTS Installer Exam (Basic)

Review Course: Wednesday, June 27, 8:00am–5:00pm. *Limit 40 people.*

Cost: \$299 for members and \$399 for non-members.

Exam: Thursday, June 28, 8:00am–12:00noon

CONTINUING EDUCATION CREDITS

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

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

For specific information about obtaining CEs at the AEC, visit neha2012aec.org. CE units have also been related for correlating portions of the AEC from the American Association of Radon Scientists and Technologists (AARST); American Board of Industrial Hygiene (ABIH); and National Center for Healthy Housing (NCHH).

Attention California Registered Environmental Health Specialists:

NEHA is designated by the California Department of Public Health as a continuing education accreditation agency for Registered Environmental Health Specialists.

Fulfill your continuing education requirement by attending the NEHA 2012 AEC. Attending will count towards completion of your continuing education requirement with up to 24 CEs being awarded for attending the educational sessions and other events. To obtain CEs, a separate application and fee must accompany your AEC registration. For complete details, visit neha2012aec.org/CA_REHS.html.

Friends. Contacts. Connections.

Networking

The NEHA AEC offers several special events to network with your environmental health peers and other experts and professionals from across government and related industries. Visit neha2012aec.org for a listing of all of the special events that will be taking place.



The Annual UL Event will be held Wednesday, June 27, 2012, from 6:30 to 10:00 pm.

Special Events at NEHA AEC

ANNUAL UL EVENT Aboard the USS Midway

Come aboard the USS Midway Museum and prepare yourself for a lifetime memory! At the Annual UL Event, you'll explore a floating city at sea and relive nearly 50 years of world history aboard the longest-serving Navy aircraft carrier of the 20th century. During the Annual UL Event you'll enjoy a tour of the historic aircraft carrier, a delicious catered dinner on the hangar deck, and other entertaining features such as private access to the flight deck to tour at your leisure. Don't miss the opportunity to see this fascinating piece of history!



The Community Volunteer Event will be held from 1:00 to 4:30 pm on Wednesday, June 27, 2012.

COMMUNITY VOLUNTEER EVENT Balboa Park

NEHA will be holding a Community Volunteer Event as part of the 2012 AEC. This is the second year that NEHA has organized a Community Volunteer Event as part of our efforts to "green" the AEC, and to give back to the host city in which the AEC is held.

The event will be held at San Diego's Balboa Park. Balboa Park is the nation's largest urban cultural park. It is home to 15 major museums, renowned performing arts venues, beautiful gardens, and the San Diego Zoo. In addition, the Park has an ever-changing calendar of museum exhibitions, plays, musicals, concerts, and classes—all in the beautiful and timeless setting of this must-see San Diego attraction.

Volunteers will be working with Park Ranger Carole to help maintain and improve the park for future visitors. Projects will include planting, trail restoration, painting, and other physical activities. Volunteers will receive a \$25 gift card to pay for lunch. A release form will also be required to participate.

Space is limited so make sure to sign up today! For more details and to sign up as a volunteer, visit neha2012aec.org.

Perspective. Leadership. Excellence.

Motivation and Inspiration



The Awards Ceremony & Keynote Address will be held Thursday, June 28, 2012, from 1:00 to 2:50 pm.

“The future is truly a magical place. I have been there and would love to have you join me on my next journey.”

– Thomas Frey

KEYNOTE SPEAKER

Be Motivated and Inspired by Senior Futurist, Thomas Frey



The keynote speaker is sponsored by NSF International.

As things continue to change across our communities, there are “new normals” emerging. So what will the future world of work – and a profession like environmental health – look like? Attend the Keynote Address at the NEHA 2012 AEC for answers as Frey’s presentation continues the discussion of “new normals” that began at the 2011 AEC, and explores where things are likely to go in the future.

Thomas Frey is Google’s top-rated futurist and author of “Communicating with the Future: How Re-engineering Intentions Will Alter the Master Code of Our Future”. He is Executive Director and Senior Futurist at the DaVinci Institute, and his keynote talks on futurist topics have captivated people ranging from high-level government officials to executives in Fortune 500 companies including NASA, IBM, AT&T, GE, Hewlett-Packard, Visa, Ford Motor Company, Lucent Technologies, Boeing, Capital One, Bell Canada, Times of India, Leaders in Dubai, and many more.

Frey’s presentation will motivate and inspire you with provocative knowledge, humor, and tantalizing information bits that you can immediately put to use to help environmental health be effective in our communities in the future.

SCHEDULE OVERVIEW

Tuesday // June 26	Wednesday // June 27	Thursday // June 28	Friday // June 29	Saturday // June 30
Pre-Conference Workshops	Pre-Conference Workshops	1st Time Attendee Workshop	Breakfast and Town Hall Assembly	Educational Sessions
Credential Review Courses	Credential Review Courses	Educational Sessions	Exhibition Open	Networking Luncheon
	Credential Exams	Awards Ceremony & Keynote Address	Poster Session	President’s Banquet
	Golf Tournament	Exhibition Grand Opening & Party	Silent Auction	
	Community Volunteer Event		Educational Sessions	
	Annual UL Event			

neha2012aec.org



Reasons Why

Attending the NEHA AEC Is a Wise Investment for You and Your Organization

Difficult times make it more important than ever that you NOT miss the skills, knowledge, and expertise that can be derived from the NEHA AEC, which can help you and your organization build for a better tomorrow.

1. The NEHA AEC is a unique opportunity for you to gain the skills, knowledge, and expertise needed to help solve your environmental health organization's daily and strategic challenges, and to make recommendations to help improve your bottom-line results.
2. NEHA's AEC is the most comprehensive training and education investment your organization can make all year.
3. Your attendance at the NEHA AEC is a solid investment in your organization that will result in immediate and longer-term benefits.
4. You can earn Continuing Education (CE) credit to maintain your professional credential(s).
5. NEHA provides a return on the investment made for you to attend the AEC.

Need additional reasons why you should attend?

Check out the videos on neha2012aec.org to hear what other environmental health professionals are saying about the NEHA 2012 AEC.

Enjoyment of the Destination

San Diego is a destination you don't want to miss! It is California's second largest city, where blue skies keep watch over 70 miles of pristine beaches and a gentle Mediterranean climate means paradise every day.

San Diego County's 4,200 square miles offer immense options for business and pleasure. San Diego is renowned for a dazzling array of world-class family attractions including the world-famous San Diego Zoo and San Diego Zoo Safari Park, Sea World San Diego, and LEGOLAND California. The city offers an expansive variety of things to see and do, appealing to guests of all ages from around the world!

Stay at the NEHA AEC designated hotel (the San Diego Marriott Marquis & Marina) and enjoy access to all there is to see and do in San Diego. The enchanting waterfront location of the hotel makes it easy to walk to areas like the Gaslamp Quarter—a 16-block historic district filled with restaurants, specialty shops, and more!

Visit neha2012aec.org and click on "About San Diego" to plan how you're going to enjoy the NEHA 2012 AEC destination!



The Virtual Experience

Engaging in the Virtual AEC enhances your learning experience whether you attend the AEC in San Diego or participate online from your home or office via the Internet. The Virtual AEC provides you opportunities to participate in education and to network with other environmental health professionals, speakers, and exhibitors. It also serves as a resource for you beyond the dates of the live AEC — continue networking and conversing with others and use the Virtual AEC to review valuable educational content over and over again!

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

- (For virtual attendees only) View over 20 educational sessions **live** as they happen in San Diego
- (For virtual attendees only) 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
- Access video archives of educational sessions, as well as, speaker presentations and other materials
- Earn continuing education credits

The logo for the Virtual AEC, featuring a stylized starburst shape with the text "VIRTUAL AEC" inside.

VIRTUAL AEC

Already registered to attend the NEHA 2012 AEC in San Diego? The Virtual AEC is included in your registration as a free benefit. Once your registration is processed, you will receive an e-mail from admin@zerista.com inviting you to participate in the Virtual AEC. If you do not receive this e-mail, please contact NEHA Customer Service at 866.956.2258.

▶ MANAGING EDITOR'S DESK



Nelson Fabian, MS

Wisdom From the Wise Old Owl

Several years ago I was in a gas station in Italy, looking to get help with my directions. The only person around was the cashier—who spoke absolutely no English. Despite hand drawings and sign language, I got nowhere fast! It was truly two people speaking different languages and never the twain could meet.

I've never forgotten that experience. It continues to remind me of what it is like when a communication impasse occurs. Even more informing is that I have come to see how common such impasses are—even when people are supposedly speaking the same language—but in fact, aren't.

This awareness came to mind again as I read the absolutely fascinating report: "People, Polar Bears, and Potato Salad: Mapping the Gaps Between Expert and Public Understandings of Environmental Health" (and by the way—don't ask me to explain the title—I can't!). The report is the product of some intriguing research that explored the gaps between how the public and this profession understands environmental health. I thought of my experience in Italy many times as I read page after page that essentially argued that environmental health professionals speak one language while the public speaks quite another. Not surprisingly, the twain (two) seldom meet! When seen from that perspective, it's hardly surprising that the experts and the public differ in their understanding of environmental health and the very programs we conduct.

Before I continue with more commentary on this report, please allow me a short but crucial digression. For my column to make

Once we understand someone else, the task of talking to them in meaningful ways becomes so much easier and effective.

sense, I need to address an issue that has long bothered me but which seldom seems to get anyone's attention.

I don't think that a day goes by in which I am not seeing someone (and usually many people) advancing their opinions and positions by "pushing" their ideas onto someone else. We talk, justify, and persuade as we attempt to convince someone of the rightness of our ideas and positions—as if each of us was a Cicero and convinced that our oratory skills were all that was needed to win the day. By contrast, what I seldom see is any authentic effort (even among sales people—which is unforgivable) to listen to the other person and to make the effort to understand the world from their perspective. Instead of learning what the buttons and sensitivities of the other person are so that we can couch things in

terms that the other person is more likely to positively respond to, we blithely carry on confident that our oratory skills are so good that all we need to do is talk to win the day or argument.

I say this to make the following point. In those rare instances where I've actually seen a person first study someone else, I've observed not only greater success but deeper success. The buy in is more real and ... lasting. So too is the bond between the idea seller and the idea buyer. The lesson seems simple and clear. By taking the time and making the effort to understand the other person, their priorities *and their language*, the odds that a connection gets made increases ... and it increases a lot!

I'll never forget from Stephen R. Covey's famous book, *The 7 Habits of Highly Effective People*, the maxim: "Seek first to understand and only then to be understood." Once we understand someone else, the task of talking to them in meaningful ways becomes so much easier and effective. To that I would add, communication becomes much more life enriching. Please keep this thought in mind as I now continue.

Over this past year and with funding support from the CDC National Center for Environmental Health, several NGOs (American Public Health Association, Association of Public Health Labs, and Association of State and Territorial Health Officials) oversaw the fascinating research that culminated with the publication of the "People, Polar Bears, and Potato Salad" report. On behalf of

continued on page 50



Seize the opportunity.

Change is inevitable. How you prepare your organization to take advantage of technology will determine how well your agency manages change. There's never been a better time to put the power of information on your side.

Let us help you embrace the forces facing all of us in environmental health. Call us today or visit www.decadesoftware.com/adapt



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