

National Drinking Water Advisory Council

Recommendations Resulting from a Meeting held November 2-4, 1999

Baltimore, Maryland

The National Drinking Water Advisory Council (NDWAC) met at the Tremont Plaza Hotel, Baltimore, Maryland, November 2-4, 1999. The main focus of the meeting was alternative drinking water sources, i.e., bottled water and Point-of-Use/Point-of-Entry (POU/POE) devices. The Council also received the final reports of the Right-to-Know and Health Care Providers Outreach and Education Working Groups. After hearing presentations from the Food and Drug Administration, International Bottled Water Association, NSF International and the Water Quality Association, the Council formulated recommendations reflecting their thoughts and concerns regarding bottled water and point-of-use/point-of-entry issues.

Recommendations are also being forwarded that complete the work of two of NDWAC's Working Groups. Finally, a continuing concern and need for coordinated action between EPA water programs and the state departments of health to address the microbiological contribution to watersheds from a variety of sources, resulted in a recommendation.

BOTTLED WATER

Clean and safe drinking water is essential to every American. Assuring high quality drinking water in this country depends upon setting strict standards, vigilantly monitoring current operations, and improving public awareness.

The Safe Drinking Water Act sets these high standards for treatment, testing, and reporting for drinking water for public water systems. However, a large and ever-increasing portion of the American population are using bottled water to meet their daily drinking water needs. The EPA, in special circumstances, has recommended the consumption of bottled water (in lieu of tap water) when there may be unacceptable risks associated with the consumption of public drinking water. The National Drinking Water Advisory Council (NDWAC) is concerned that quality assurance of bottled water - through testing and reporting - may not be adequate to protect public health. Our concerns include, but are not limited to:

- *Labeling.* We believe that some bottlers do not accurately identify the source and treatment of the water. Additionally, some bottlers may claim that water is free of protozoa when it is unlikely to be accurate in all cases, leaving immune compromised people in an "at-risk" situation;
- *Shelf life.* Bottled waters, unlike most processed food products, are not required to publicize a shelf life, yet it is likely that their quality diminishes over time. Many water bottlers do explicitly state an expiration date for their product, indicating that the issue of shelf life is a legitimate one. Related to this concern, questions have been raised about the safety of some packaging when bottled waters are not consumed within a defined period.
- *Tracking of distribution of bottled waters.* The labeling of bottled water often does not track sales in a way that would permit location and identification of lots that may (retrospectively) be identified as contaminated.
- *Monitoring of compliance with public health standards.* Public health safety is in part assured by frequent testing of public drinking water, and the reporting and monitoring of this data by governmental authorities. Based upon FDA and industry representations made to NDWAC, the harmonization between public drinking water and bottled waters of testing requirements, may be beneficial. For instance, there is no requirement that bottlers test their water for some contaminants on a basis more frequently than yearly. We are aware that bottlers are only infrequently inspected by the FDA, and aware that specific testing for *Cryptosporidium* with

advanced methods (such as EPA Method 1623) is not routinely performed. Lastly, the FDA does not currently have a centralized database of bottled water compliance, nor actively monitors State information.

- *Consumer Right-to-Know.* Consumers have a right to know what is in a product, and should have a clear and reasonable way for obtaining information about a product that may be deficient, or inappropriate given their health concerns. Consumers in the United States are provided with detailed information about their public drinking water supply on an annual basis. In contrast, the current process for meeting consumer information needs regarding bottled waters is, in our opinion, deficient and does not meet consumer needs.
- *Intrastate Bottlers.* It appears that there is almost no oversight or monitoring of bottlers whose operations fall entirely within a state that does not have a specific state-based bottled water monitoring program. Moreover, it appears that many states have only minimally staffed oversight and monitoring programs for bottled water.
- *International Bottlers.* It appears FDA does not do any inspections of International bottlers.

Recommendations

Therefore, NDWAC recommends to the Administrator that EPA work closely with FDA to assure that bottled water quality meet public health standards through testing, monitoring, and reporting procedures that are at least as stringent as the requirements for public water supplies. NDWAC further recommends that coordination might best be accomplished through a joint EPA/FDA stakeholder working group or a Memorandum of Understanding to develop the specifics of a quality assurance and reporting program.

POE/POU DEVICES

The use of centralized water treatment is becoming an increasingly costly option for some small water systems as they struggle to provide water that meets national primary drinking water regulations (NPDWR). The use of point of entry (POE) and point of use (POU) devices may be a solution for certain small water systems in meeting the NPDWR. The identification of cost effective POE/POU devices is a critical issue that needs to be addressed.

Recommendations:

The NDWAC recommends that EPA continue to undertake and support research that will identify affordable POE/POU devices. The focus of this research should not be limited to chemical contaminants, but should include research on POE devices that can be used to comply with standards for microbial contaminants such as the surface water treatment rule.

The use of POE/POU devices may also have application for use by certain sub-populations that could be susceptible to contaminants, particularly microbial, in drinking water that is meeting NPDWR. NDWAC recommends that EPA should evaluate the viability of using POE/POU devices to protect these sub-populations. This evaluation should be carried out under the assumption that the operation, maintenance and monitoring of these devices is under the purview of the public water system.

NDWAC recommends that EPA should clearly differentiate between POE/POU devices which are "add-ons" to existing treatment to meet NPDWR and those which are used solely to meet NPDWR.

MICROBIOLOGICAL CONTRIBUTIONS TO WATERSHEDS

Recommendation:

NDWAC recommends that EPA plan and conduct a national forum/workshop which includes internal agency staff from each region and state involved in NPDES permitting/ water quality standards (and

beneficial uses development) and Safe Drinking Water Act implementation, along with Department of Health Services (DOHS) state representatives. The purpose of this forum is to focus attention on the microbiological contribution to watersheds from wastewater discharges, reclamation projects and non-point permitted sources and their impact on drinking water quality. Disinfection processes, regulatory discharge standards, monitoring requirements, dilution criteria, discharge siting, and mass emission limits should be reviewed for their effectiveness and applicability to not only control traditional pathogens and indicators, but to emerging and/or currently proposed for regulation pathogens, such as, Giardia and Cryptosporidium. Results of this forum should be published and submitted to EPA and State Health staff as a guidance document.

CONSOLIDATION OF WATER SYSTEMS

Following the presentation of a status report from the NDWAC Small Systems Implementation Working Group, the Council offered the following recommendation. This working group will wrap up its mission within a few months, sending its final report to NDWAC for consideration.

Recommendation:

NDWAC recommends that EPA investigate a federal economic incentive program aimed at consolidation of water systems through creation of rates of return, buy out subsidies or rate payer relief that encourages utilities to consolidate through a market based approach.

REPORT OF THE RIGHT-TO-KNOW WORKING GROUP

After completing its mission, the Right-to-Know Working Group submitted its final report to the Council. The following recommendations are forwarded to the Agency:

RECOMMENDATIONS

Evaluate Consumer Confidence Reports

1. NDWAC recommends that EPA evaluate Consumer Confidence Reports on their effectiveness as a communication tool.

Coordinate Development of Materials and Outreach to Health Care Providers

2. NDWAC recommends that the **EPA work with other federal agencies** (to include the Departments of Health and Human Services' Agency for Toxic Substances and Disease Registry, Centers for Disease Control, Food and Drug Administration; and the Departments of Education, Transportation, Agriculture, Labor, Interior, and Defense) **to encourage integration of environmental health** into Health Care Provider professionals' practice in the areas of **practice, education, and research**.

3. NDWAC recommends that **EPA coordinate its internal efforts** (such as in the areas of water, pesticides, and children's health) **to educate and provide outreach to the Primary Health Care Provider (HCP) community** - particularly nurses and physicians. It is recommended that, **in consultation with HCP professionals, the EPA develop a coordinated approach to communicating environmental health information to the Health Care Providers. Further, it is recommended that the Agency develop a guiding principle** regarding the Agency's approach to HCPs. This principle would include guidance on **determining Agency priorities, messages, and materials**.

Continue good progress on development and distribution of messages and materials to support Consumer Confidence Reports, as recommended by NDWAC at its November, 1998, and May, 1999 meetings.

4. NDWAC commends the EPA on its progress in developing messages and materials to alert many audiences to the fact that Consumer Confidence Reports are coming, to help them to read and understand the reports, and to assure that they know where to go for further information or to get involved. **NDWAC recommends that EPA complete the products which are in development**, as recommended by the Right-to-Know Working Group **and that EPA expedite distribution** of these materials via the web site, print copy distribution, and through conferences and meetings.

Attachment A to National Drinking Water Advisory Council recommendations:

REPORT OF THE HEALTH CARE PROVIDER OUTREACH AND EDUCATION WORKING GROUP

This following recommendation completes the mission of the Health Care Provider Outreach and Education Working Group:

RECOMMENDATION:

The National Drinking Water Advisory Council forwards to the Administrator of EPA the attached "Strategic Assessment and Recommendations." This strategy will help shape the Agency's efforts on this topic in cooperation with other government and non-government partners. The Council considers this report the principal product of the Working Group, meeting all the goals of its Mission Statement. It is the sense of the NDWAC that the Agency should brief them on the implementation of this strategy on an annual basis.

Attachment:

"Strategic Assessment and Recommendations"

Attachment A:

**National Drinking Water Advisory Council
Strategic Assessment and Recommendations**

Overview of Findings

The National Drinking Water Advisory Council (NDWAC) serves an advisory role to the Administrator of the U.S. Environmental Protection Agency (EPA) on the implementation of the Safe Drinking Water Act (SDWA). At its Spring 1998 meeting, NDWAC discussed the strategic need to forge better links with the community of doctors, nurses, and other health care providers on drinking water concerns. NDWAC called for the establishment of a Working Group on this topic, not to make specific regulatory recommendations, but to examine from a broad strategic perspective whether the health care provider community needs to become better educated on drinking water issues, and how such an effort might be structured. The Health Care Provider Outreach and Education Working Group deliberated on this matter from December 1998 through October 1999, and made several critical observations and recommendations, including:

- Although the risk of waterborne disease due to contaminants in drinking water is perceived to be far less a problem than in decades past, public concern for the safety of their tap water remains a major issue. The public has considerable trust in their doctors, nurses, and other health care providers (HCPs), yet these professionals receive very little information on drinking water. HCPs who see patients experiencing gastrointestinal illness, for example, may not recognize that the illness could be from contaminated drinking water. The correct diagnostic tests may not be ordered, treatment might be inappropriate for the illness, and possible waterborne disease

outbreaks may be missed. Short and longer-term outreach and education efforts to HCPs would help to remedy this problem.

- The first need is to better equip HCPs to answer general questions that their patients may have on the overall safety of their drinking water, or on particular risk-avoidance behavior they might take given their personal health profile. The Working Group believes that Federal efforts to meet this need can build upon those already underway; for example relating to implementation of the Consumer Confidence Reports. Information products should include those tailored to specific sub-populations such as the immune-compromised and infants. Health effects and avoidance-behavior language used in these products should be as clear, unambiguous, and succinct as possible.
- The next need is to assure that practicing HCPs have the necessary tools to recognize, report, and treat illness that might have been caused by contaminants in drinking water. These tools could include, for example, clinical practice guidelines which recognize drinking water as an environmental health pathway, increased diagnostic testing by laboratories to differentiate pathogens that might contaminate drinking water or cause illness, and awareness of the importance of reporting outbreaks of diarrheal disease or other conditions that could be caused by contaminated drinking water.
- The Working Group is particularly concerned about the very limited attention that medical and nursing schools give to environmental health issues generally. This is a recognized deficiency in training which should be addressed by a broad partnership within EPA, as well as among Federal agencies and professional organizations. Efforts to improve basic curricular knowledge on drinking water will only succeed if they are tackled from a multi-media perspective.
- The Working Group recognizes that HCPs are challenged with information on an enormous range of medical and administrative matters. Outreach and education products for widespread distribution need to be succinct and clearly focused. Opportunities through, for example, the Internet or professional networks, to direct interested HCPs (and their patients) to a full range of studies and resources, are encouraged.
- The Working Group is enthusiastic over the longer term benefits of collaboration between the HCP community and EPA on drinking water issues. Apart from meeting the SDWA direction to EPA and CDC on HCP education and training, such collaboration will support all aspects of regulatory development, research and implementation.
- Several possible pilot projects have been outlined which can help EPA and its partner organizations meet these near to longer-term needs.

2.0 Introduction

2.1 Background

Waterborne disease is no longer the major cause of severe illness and death in the United States that it was in the 1800's, due to the introduction of modern drinking water treatment technologies, and management and regulatory programs for public water supplies. Despite these advances, a 1998 national survey on drinking water⁽¹⁾ found that there is still a significant concern and interest among the public regarding the safety of their tap water. The survey also found that few adults seek information from their doctors or other health care professionals, despite the fact that they are probably the most trusted information source. This mirrored the feeling among many drinking water experts that doctors, nurses, and others in the health care provider (HCP) community may be unfamiliar with how to recognize waterborne illness when it occurs, or be able to fully respond to their patients who have questions on drinking water. Patients may be particularly sensitized to drinking water this year due to the SDWA-mandated release of Consumer Confidence Reports by water suppliers. Media coverage of foodborne and waterborne disease outbreaks in 1998 and 1999 have also raised questions in the minds of the public.

The 1996 Amendments to the Safe Drinking Water Act (SDWA) continued to stress the link between health and regulatory safeguards which served as the underpinning of the Nation's drinking water laws for many decades. The Amendments were debated and passed following the outbreak of cryptosporidiosis in

Milwaukee, the largest reported waterborne disease outbreak in U.S. history. Many technical and policy specialists were also concerned over the wide range in estimates regarding the extent of endemic (i.e. background levels) of waterborne disease. The Milwaukee outbreak, media attention to drinking water problems, and advertisements for bottled water and filters were perceived as factors requiring a renewed federal focus on research, education and outreach. One consequence of these conditions was the inclusion of section 1458(d)(2) in SDWA, requiring that the U.S. Environmental Protection Agency (EPA) and U.S. Centers for Disease Control and Prevention (CDC) prepare a national estimate of waterborne disease, and an education and outreach effort for the general public and health care providers. The second of these provisions relates to the effort of this Working Group.

(2) TRAINING AND EDUCATION. The Director and Administrator shall jointly establish a national health care provider training and public education campaign to inform both the professional health care provider community and the general public about waterborne disease and the symptoms that may be caused by infectious agents, including microbial contaminants. In developing such a campaign, they shall seek comment from interested groups and individuals, including scientists, physicians, state and local governments, environmental groups, public water systems, and vulnerable populations.

EPA has been able to direct funds and work collaboratively with CDC on the national estimate, and has made progress on education of the general public with regards to drinking water issues. Uncertainty on what is needed by the health care provider community, as well as funding constraints, however, delayed attention to the health care provider education and outreach. The National Drinking Water Advisory Council (NDWAC) felt that EPA (and CDC) needed to approach health care provider outreach and education from a strategic perspective, dealing with both short term and longer term needs. NDWAC requested at its Spring 1998 meeting that EPA assist in forming a Working Group to advise NDWAC on its recommendations to EPA in this regard. Mirroring the language of the statute, the Working Group was to draw from a wide range of stakeholders.

2.2 The Health Care Provider Outreach and Education Working Group

The National Drinking Water Advisory Council serves an advisory role to the Administrator of the U.S. Environmental Protection Agency (EPA) on the implementation of the Safe Drinking Water Act (SDWA). At its Spring 1998 meeting, NDWAC discussed the need to forge better links with the community of doctors, nurses, and other health care providers on drinking water concerns. NDWAC called for the establishment of a Working Group on this topic, not to make specific regulatory recommendations, but to examine from a strategic perspective whether the health care provider community needs to become better educated on drinking water issues, and how such an effort might be structured.

EPA posted a notice in the *Federal Register* on May 18, 1998, requesting nominations to four NDWAC working groups, including one on "Waterborne Disease Education". In discussions with the nominees and several sponsoring organizations, there was some concern with overlap on audience and mission with another new NDWAC working group, that on Public Right-to-Know. This led to a clarification of the first group to cover strategic recommendations regarding "Health Care Provider Education and Outreach". Membership on this Working Group was sought from a wide range in specialties and organizations over the August through October, 1998 period. Representation was sought from the local and State public health and drinking water fields, water utilities and trade/professional associations, primary care physicians and nurses, medical research, and health care communications. Invitations to the final nominees to serve on the Working Group were sent from Cynthia Dougherty, Director of the EPA Office of Ground Water and Drinking Water in late October, 1998. The composition of the Working Group and its draft Mission Statement were reviewed and ratified by the full NDWAC on November 17, 1998, at its meeting in Arlington, Virginia.

The Working Group held face-to-face meetings in Washington, DC on December 2-3, 1998 and June 1-2, 1999. Full group conference calls were held on January 26, 1999, April 16, 1999, and September 27, 1999. Public notices of all these full meetings were published in the *Federal Register*, and meeting

summaries are available from OGWDW. A number of sub-groups worked on draft assessments, recommendations and interim products; these groups communicated by E-mail and conference calls.

2.3 Working Group Roster and Mission

The current roster of Working Group members is included as Attachment 1. The final Mission Statement was approved by the Working Group at its January 26, 1999 conference call to read:

Prepare an integrated strategy, for consideration by the NDWAC, as to how the U.S. EPA and CDC should inform and educate health care providers in their efforts to: 1) counsel persons about the quality of their drinking water; and 2) recognize, report, treat, and prevent adverse health effects that can be caused by infectious and non-infectious agents that could be acquired from drinking water.

2.4 The Health Care Provider Community

One of the first issues faced by the Working Group was the definition of the audience for the strategy. The U.S. Bureau of Labor estimated that in June 1999, 9.98 million people were employed in the U.S. in the broadest Health Services category⁽²⁾. This includes, for example, 1.87 million employees in offices and clinics of medical doctors, and 1.75 million employees in nursing and personal health care facilities. Apart from the size of the audience, the Working Group was intimately familiar with the very wide range in expertise and specialization. No one strategy, outreach product, or communications approach can be ideal for all these groups. After several discussions, the Working Group suggested several tiers:

Primary audience: general health care providers (e.g., internists, nurses, general practitioners, nurse practitioners and physicians' assistants), health advisors to sensitive subpopulations, and laboratory scientists.

Secondary audience: hospital and HMO administrators, dietitians, emergency room staff, advocacy groups, dentists, pharmacists, and other health care staff working in schools.

3.0 Key Issues for Strategic Attention

The Working Group discussed the underlying need for HCP outreach and education, and the best approach from a strategic perspective for meeting this need. These are outlined in Sections 3.1 through 3.4. Specific projects which mirror this philosophy and direction are outlined in Sections 4.1 through 4.3.

3.1 Health Care Providers Could Use Information to Better Counsel Their Patients on Drinking Water and Health

The NDWAC Health Care Provider Working Group believes that many HCPs have only limited information to answer patient questions and concerns about drinking water and health. Such questions may arise from any number of sources, including media reports on drinking water system problems, the issuance of boil-water notices by health officials, or patient interest in specific findings shown in Consumer Confidence Reports being issued by water utilities this year. While the Working Group noted that EPA provides much information which is available to the general public, such information may need to be revised and structured to be of most benefit to HCPs as guidance on patient counseling.

3.1.1 Basic Principles

The Working Group suggests that EPA⁽³⁾ consider the following basic principals in developing such anticipatory guidance.

- *Health care providers would benefit from information on the basics on drinking water and health.* A knowledge of the linkages between drinking water quality and both acute and chronic health effects caused by infectious and non-infectious agents would be of benefit to many HCPs. Such understanding would assist in effective diagnosis, treatment and prevention in certain routinely occurring situations (e.g. patient with gastrointestinal illness⁽⁴⁾).
- *A wide range in information sources would be useful for HCPs.* Health care providers need information on how and where to find answers to patient questions about drinking water and health. The information sources could include those from EPA, CDC, HCP professional associations, advocacy groups, and others. These sources can cover the full spectrum of information; from applied solutions to ongoing research.
- *Health care providers can serve many roles.* Information and outreach materials can assist HCPs who are interested in serving in a proactive role with their patients/clients. With such materials, HCPs could more routinely pose questions to their patients that could tease out problems with local drinking water sources, and consider such information in diagnosis, treatment and counseling.

3.1.2 Key Points for Anticipatory Guidance

The working group identified a number of more specific areas which could be encompassed by outreach efforts directed at HCPs:

- *Basic Water Safety:* HCPs should note that drinking water served by public systems in the United States (i.e. those that fall within the SDWA definition) is generally considered safe⁽⁵⁾ for most people most of the time. Information on the compliance of local water utilities with laws and regulations would help provide data to HCPs; such information will be available in CCRs.
- *Vulnerable Populations:* Some segments of the population are more at risk from possible illness from drinking water⁽⁶⁾; in some cases even drinking water that meets applicable federal and state standards. HCPs need to be aware of who those populations are and take steps to advise them of these risks.
- *Outbreak Recognition:* Outbreaks of waterborne illnesses do periodically occur. If drinking water is not routinely considered as a possible etiology (causative factor) by HCPs during diagnosis, recognition of an outbreak could be delayed or possibly missed altogether. The outbreak could then afflict more people than would otherwise be the case. Clinicians, laboratory staff, and pharmacists can each be the first to recognize an increase in background rate of diarrheal disease which could be attributed to an outbreak.
- *Acute and Chronic Effects:* Potential drinking water health effects are not limited to acute disease effects, such as gastrointestinal illness associated with microbiological pathogens. Outbreaks associated with chemical contaminants have occurred, and longer term exposure to chemical contaminants such as arsenic and radon are of concern. While research to date is inconclusive, many patients are concerned about longer term health effects from the byproducts of drinking water disinfection. Information and guidance to HCPs would help them respond to such specific issues.
- *Laws and Regulations:* While some HCPs might appreciate knowing about basic federal and state drinking water laws, they would be more concerned if there are deficiencies or violations of drinking water systems which serve their clients. Any local training or outreach to HCPs should mention these issues as well as suggest a possible response to patient concerns.

- *HCPs as Community Leaders:* Many HCPs are community leaders and can serve in roles beyond patient/client outreach and education. These include providing peer education with HCP colleagues and organizations, involvement in community education, participation in Source Water Assessment/Protection programs, and active engagement with local water providers and public health agencies in assessing needs for infrastructure investments in supply and treatment technologies. HCPs can also play a more proactive role in smaller communities where CCRs are not distributed by mail.
- *Other Water Sources:* Water from private wells and certain smaller water supply systems may not be covered by federal or state safety requirements. The burden of testing and treatment may fall on the homeowner or property owner. HCPs should be aware of testing and treatment options available to patients/clients in these situations.
- *Alternatives to Tap Water:* Since bottled water and home treatment devices are considered by many consumers as alternatives to tap water, HCPs need to understand the benefits and shortcomings of these alternatives. HCPs need to be able to provide or to direct patients/clients to reliable information on different point-of-use device performance, other treatment alternatives (e.g., boiling water), and bottled water safety. Such information should accommodate contaminant-specific concerns.
- *Other Paths of Exposure to Contaminants:* Contaminants may be transmitted by a variety of means in addition to drinking water. HCP communication should address disease prevention comprehensively for these contaminants (i.e., in the case of *Cryptosporidium* include drinking water, recreational water, food, contact with animals, and sexual/hygiene practices).
- *Needs and Opportunities for Disease Monitoring and Reporting by HCPs:* It would be beneficial if HCPs are sensitized to the importance of appropriate testing and reporting of illnesses which might be linked to drinking water system problems. Interested HCPs can play an important role in helping public officials strengthen disease surveillance and reporting efforts, and build better ties between health officials and water utilities. Clinicians, laboratory staff, and pharmacists have important data which can be shared and used to establish a baseline rate of diarrheal disease in a community.

3.2 Basic Health Care Provider Training on Environmental Health Should be Strengthened to Include Drinking Water

Section 3.1 of this report presents a number of principals and actions which can help inform practicing HCPs on drinking water in their day-to-day role as health care counsels. It has been made known to the Working Group that a fundamental issue is the need to improve the knowledge base for doctors, nurses, and other HCPs on environmental health issues, including drinking water. Training in schools, and for practicing HCPs in continuing education and re-certification programs, is key to changing key clinical practice behavior relevant to drinking water. These approaches offer the most lasting response to help HCPs reduce the adverse health impact of drinking unsafe water. The Working Group supports strengthening this basic understanding, and suggests that this issue should be addressed on a multi-media, multi-problem basis.

To meet these overall goals, education and training programs to inform health care providers about waterborne illness should be designed for three specific stages in the clinical process: 1) practice environment, 2) diagnostic testing, and, 3) reporting. Educational tools and methods should be specially designed for each of these levels of the clinical process to achieve well-defined, stage-specific expected outcomes.

3.2.1 Improving the Health Care Practice Environment

The practice environment encompasses all patient interactions that might be relevant to drinking water. These interactions include management of acute illness due to exposure to contaminated drinking water, evaluation of common symptoms (e.g., diarrhea) that may be caused by drinking water, and response to concerns about drinking water. Training methods targeted at the level of the patient interaction should increase the ability of health care providers to appropriately recognize, report, treat, and prevent as well as educate patients about issues associated with drinking water. An effective strategy at this stage requires a two-part approach: 1) expand the knowledge base of health care providers in drinking water, and 2) address the barriers to integrating drinking water issues into usual clinical practice. Strategies for education and training should consider how to overcome potential barriers that may prevent health care providers from addressing drinking water issues with their patients.

Historically, there has been very little health care provider training on environmental health in medical schools, nursing schools, and other learning institutions. Consequently, health care providers do not generally include environmental exposures in the evaluation of most symptoms or have difficulty responding to questions on environmental health issues. Examples of tools and methods which could foster knowledge and practice skills⁽⁷⁾ include:

- Take an environmental health history
- Recognize the signs, symptoms, diseases and sources of exposure relating to drinking water
- Identify risk factors for exposure to contaminated drinking water and health effects
- Understand key environmental/occupational principles, epidemiology and population-based health
- Identify the informational, clinical and other resources available to help address patient and community drinking water health problems and concerns
- Demonstrate awareness of the health concerns and problems in communities where patients live and work
- Provide patient education/guidance including risk communication
- Understand the legal and ethical responsibilities of seeing patients with concerns about drinking water

While the above points may seem obvious to many, a variety of barriers may prevent integration of drinking water skills and knowledge into practice⁽⁸⁾. These would need to be considered by EPA as it approaches the issue of education from a broad perspective:

- Lack of time for HCPs to become involved in drinking water health problems which may be complex and time consuming
- No reimbursement for time spent
- Overwhelming administrative tasks
- Potential for needing to interact with legal system which is discouraging
- Philosophical, political, social or cultural deterrents (e.g. disagree with environmental activists)
- Do not agree with data on environmental illness
- Lack of confidence in patient's compliance (follow-up testing)
- Lack of a systematic method for incorporating the skills into practice
- Lack of peer or staff support

3.2.2 Improving Diagnostic Testing

The next stage in the clinical process that requires specific training approaches covers the issue of diagnostic testing. Laboratory diagnosis is fundamental to the recognition and investigation of individual illnesses as well as outbreaks. Investigations of suspected outbreaks associated with *Cryptosporidium* and *Giardia* in drinking water, for example, have been shown to hinge on appropriate ordering and testing

for these specific ova and parasites. Health care providers may not be aware of the need and benefit of certain laboratory tests to define etiologic agents which might be related to drinking water problems. There also may be constraints with managed care organizations approving such tests, or with finding appropriate, affordable laboratories. Outreach, awareness and education strategies should, therefore, include not only laboratory organizations but health care management groups as well.

3.3.3 Improving Reporting of Disease

The third stage for specific educational intervention is reporting of potential waterborne illness. Health care providers may be the first to recognize an increase in diarrheal illness in a community. Reporting increased illness to the local or state health department (even prior to laboratory diagnosis) enables timely public health intervention.

A comprehensive strategy to inform health care providers about waterborne disease and symptoms should include many strategies with their specific expected outcomes targeted at defined stages of the clinical process. The overall outcome for this educational effort is multi-dimensional (knowledge increase and behavior change). Strategies therefore need to be multi-dimensional extending beyond usual written modes of information dissemination as discussed in Section 3.2.

3.3 Messages Should be Targeted on a Patient Group or Audience Basis

In several meetings and conference calls, the Working Group grappled with the question of what "messages" need to be communicated to HCPs. The group considered whether there was one or more clear pieces of information that needed to be transmitted to HCPs. In such a case, the emphasis for EPA would then be less on the information, and more on the mechanisms for communicating that information to the field. Examples in the health care field were cited, including the role of the microorganism *H. pylori* as a causative agent in stomach ulcers, and environmental lead and children. The answers regarding drinking water issues were found to be rather straightforward in some cases (such as the health effects of nitrates on infants) and more complex or unresolved in other cases (such as the possible link between disinfection byproducts and spontaneous abortions). The set of messages will continue to change as more information is uncovered about contaminants under regulatory consideration, as well as those which are candidates for regulation.

The Working Group was pleased to see EPA making significant progress in communicating health effects information to the public, an effort that supports both regulatory development and the Consumer Confidence Reports. Much of this information is available on an individual contaminant basis, which serves many purposes. The Working Group felt, however, that a significant unfulfilled need is for patient-specific, concise information packages.

HCPs receive enormous amounts of reports and other information, and are challenged in sifting through this volume to find what is relevant for their specific patients. Clarity and focus is needed to reach HCPs. If they are treating people with asthma, for example, they will respond best to information focused on asthmatics. EPA and CDC has developed guidance on drinking water issues for immune-compromised patients, and EPA has in draft form, a brochure on children and drinking water. This is an approach which should continue and be expanded, such as for women of child-bearing age and the frail elderly. Outreach is most effective when the messages are aggregated to a given population group, such as those on non-public water supply systems, or in areas with known waterborne illness or drinking water risk (e.g. concentrations of arsenic or radon above standards). The Working Group discussed a number of possible patient groups/audiences for targeted outreach, including patients who:

- have a weakened immune system, HIV or AIDS
- are on chemotherapy
- are elderly and in poor health
- are infants

- take long-term, oral steroids for skin conditions, arthritis, etc.
- are on dialysis
- have had a transplant
- are members of under-served or disadvantaged populations with substandard health care, limited education or limited health care access
- are chronic disease sufferers (e.g., end-stage congestive heart failure, renal failure)
- have poor nutrition

The Working Group recognized that outreach to these audiences or patient groups would cut across the contaminant-specific information products historically produced by EPA and others. The Working Group *for illustrative purposes only*, marked up the following matrix showing several groups versus contaminants of concern. Note that this analysis was done only for the purpose of exploring the idea, and *should not be considered as technically accurate*. The intersects are marked by an "X" where the effect is a health concern, and "?" where there is uncertainty to be explained in the outreach materials.

Patient Group & Possible Risk	Severely Immuno-compromise	Women of Child-bearing age	Infants	Frail Elderly	Non-PWSS & Private Wells	General Population
E. coli & Cryptosporidium	X		X	X	X	
Lead		?	X			?
Acute chemical (e.g. arsenic)		X			X	X
Disinfection byproducts		?				?
Nitrates			X		X	
Radon					X	

Regarding information presentation, the Working Group felt that succinct fact sheets could be prepared along the following topics:

- Background to the issue
- How great is the risk (on a relative or absolute basis)?
- Where is the risk found (e.g. what types of systems, utilities, or settings)?
- What is considered "reasonable avoidance behavior"?
- Why is there uncertainty (e.g. accuracy of certain tests)?
- Where to go for more information (e.g. government and non-government Web sites or data bases; medical literature, etc.)?

On the last point, the sense of the Working Group is that EPA and other U.S. Government information sources should make available, or provide references or links to, all relevant research reports on health and drinking water. This set can be broader than those studies considered fully peer-reviewed and included in technical support for regulatory action. Early or preliminary research results should be noted as such. The Working Group felt that HCPs should be given all the help they can if they decide to review the range in literature relevant to patient needs, and not just restricted to reports "cleared" by government agencies.

3.4 Links With HCP Networks Should be Strengthened

As pointed out earlier, the HCP community includes several million practitioners of wide ranging interest, expertise, and position. It would be an impossible task to try and reach them directly and effectively. The development and distribution of outreach materials will be greatly enhanced through partnerships with HCP organizations and networks. While some national organizations work actively with EPA on drinking water, pesticides, fish consumption, and other environmental health issues, additional partnerships should be explored. Activities with these groups could include:

- Engagement of the leadership of key national HCP professional organizations on the need for stronger links between the communities.
- Participation at national or regional meetings to foster awareness of the Consumer Confidence Reports, and basic drinking water and health fundamentals. This could be greatly enhanced by forming a cadre of experienced drinking water and health specialists who can give presentations. Speakers bureaus could be supported by making available standard information packages and flexible slide presentations. ⁽⁹⁾
- Providing input on fact sheet language regarding, for example, health effects or reasonable avoidance behavior.
- Distribution of information materials via direct mailings, Web site posting, inserts in newsletters, special sessions at national meetings, etc..

EPA is developing a candidate list of Health Care Provider organizations. The list includes the constituent groups the organizations represent, contact information, names of journals, newsletters and reports, major meetings, priorities for outreach, and other information. The addresses have been added to the Office of Ground Water and Drinking Water's mailing lists, which are supplied to staff when they plan communication strategies. The group believes that some of these linkages with networks will be sustained over the long term, and some will be shorter-term to focus on specific products. In either case, the Working Group is enthusiastic about the potential benefits from closer linkages between the health care and drinking water communities. EPA must use variety of approaches to partnership, and learn what works and what does not.

4.0 Possible Health Care Provider Training and Outreach Activities

4.1 Introduction

The Working Group recognizes that HCPs typically face more severe health care concerns than drinking water contamination. Nevertheless, many in the public are very concerned about drinking water issues and will continue to seek advice from their HCPs. We also recognize that EPA and its partners on implementation (states, public health officials, water utilities, etc.) have a formidable job meeting SDWA requirements within current and projected budgets. Nevertheless, the Working Group believes that a long-term effort to educate and inform HCPs on relevant drinking water issues should be incorporated into SDWA implementation programs. A number of candidate projects and activities were discussed by the Working Group over several time frames ⁽¹⁰⁾, which follows from the discussion in Section 3 above.

4.2 Possible Activities to be Initiated in the Near Term

There are two main purposes for this set of example projects; which could be started in the next two to three years and then be ongoing: (1) responding to patient questions

which arise from the Consumer Confidence Reports, waterborne disease outbreaks, claims of water filter and bottled water advertisers, etc., and (2) to set the stage for longer-term HCP partnerships.

- Concise, patient group-specific information packages; emphasizing risk characterization, assessment and avoidance. These materials could be distributed by HCP professional associations as well as EPA and CDC. EPA should try to present health effects information (including avoidance behavior) in as clear and simple language as is possible. The Working Group suggests that EPA draw on a wide range of reference sources, and note where the results of cause/effect research have been validated by peer-reviewed work, and where there is still emerging science, scientific debate on findings, and significant uncertainty.
- Adding such HCP information to EPA and CDC Web sites, with linkages to numerous organizations and groups.
- A "needs assessment" of targeted HCP groups (particularly doctors and nurses) to see how best to reach them with information on drinking water. This could be done as part of a wider EPA effort looking at other environmental health issues such as contaminated fish and pesticide poisoning. Such an assessment could include formative research (qualitative assessment, message testing, strategy feedback, etc.) and ongoing assessments of message, audience, and effects for each targeted health care provider group.
- Pilot projects for HCP outreach and education; to sharpen both messages and outreach products, as well as ensure relevance. These can be focused on specific patient groups, or areas where drinking water contamination is of relatively greater health concern. It could include developing local information resources to assist HCPs with specific drinking water topics pertinent to their community (e.g. taste and odor findings which do not constitute health risk). The pilot projects could be carried out by non-government and professional organizations as well as government groups.
- More routine coordination meetings between drinking water professionals and national, regional, and state HCP organizations; to learn about each others roles and responsibilities, and discuss possible areas of mutual interest.
- Increased participation by drinking water specialists at national, regional, and state HCP meetings and workshops.
- Training materials that provide HCPs with an appreciation of the various routes of environmental exposure that can result in the transmission of acute and chronic disease causing agents. EPA and CDC could work in partnership with Government and non-Governmental organizations and professional organizations on these.
- Formation of task forces and expert groups to plan for longer term HCP education initiatives. These can include the senior-management or policy level to achieve broader understanding and basic commitment.
 - Establish a group of HCPs and representatives of HCP organizations to provide feedback and evaluation on effectiveness of these education initiatives.

4.3 Possible Longer-Term Activities

It was clear to the Working Group that both university/graduate curriculum as well as that for practicing HCPs, should be augmented to include more information on environmental health, including drinking water issues. This is not a "new" observation⁽¹¹⁾, and has been the recommendation from a number of studies and task forces. EPA is currently looking at expanding its intra-agency coordination efforts to address longer-

term education and practice change for all environmental health concerns. The Working Group strongly supports this, believing that only multi-media and cross-sector efforts would be successful.

This multimedia/partnering approach is recommended since: (1) EPA has a relatively small number of staff trained as health care providers or in public health, (2) several EPA offices have promising initiatives to reach health care providers regarding specific environmental health hazards, (3) The Institute of Medicine has made recommendations to Congress that environmental health should be integrated into basic nursing and medical school education (see previous footnotes), and this recommendation has not been substantially addressed, and (4) several federal agencies and national professional organizations have been involved in addressing this issue. Particular outcomes from this effort could include:

- Encouraging medical, nursing, and other HCP schools to expand their curriculum on the recognition, avoidance, and treatment of environmental health problems. This could include the provision of the actual training materials⁽¹²⁾.
- Curriculum enhancement of continuing education programs for practicing HCPs.
- Enhancing standard medical and nursing reference manuals.
- Preparing training materials through expert groups and professional organizations.
- Establishing advisory bodies to oversee curriculum integration.
- Expanding environmental health internships.

5.0 Supporting Documents

This report is the final product from the deliberations of the NDWAC Health Care Provider Outreach and Education Working Group. Preparatory materials and interim working papers are available from EPA if needed by NDWAC, and include:

- Background materials for the December 1998 and June 1999 full Working Group meetings held in Washington, DC.
- Summaries of Conference Calls held in January, April, and September 1999.
- A working draft slide show on drinking water and health issues prepared by several members of the Working Group.

6.0 Acknowledgments

The official Working Group liaisons to the full NDWAC (Jeff Griffiths and David Spath) would like to express their gratitude to the members of the Working Group for sharing their diverse expertise, and working through particular issues or recommendations in a number of small group efforts. This intersection of health care and drinking water professionals was a fascinating and enlightening first step in what we believe will be a fruitful longer-term partnership across the sectors. We would also like to thank Ron Hoffer and Sherri Umansky, the (respectively) Designated Federal Official and Deputy DFO for this Working Group, who helped make the process go as professionally as it did. Finally, facilitation support for full Working Group meetings and several conference calls was provided by Paul DeMorgan of the Keystone Center.

7.0 Attachments

1. List of Working Group Members and Liaisons

2. Additional background discussion on waterborne disease from infectious agents

Attachment 1

Members and Representatives of the NDWAC

Dr. Jeffrey K. Griffiths
Department of Family Medicine &
Community Health
Tufts University School of Medicine
136 Harrison Avenue
Boston, MA 02111

Dr. David Spath
Chief
Drinking Water and Environmental
Management
California Dept of Health Services
(MS 216)
PO Box 942732
Sacramento, CA 94234-4320

Members

Ms. Simin Abrishami
Manager
Microbiology Department
NSF International
3475 Plymouth Road
Ann Arbor, MI 48105

Mr. Mark Anderson
Technology Transfer Director
Division of Water Supply Engineering
VA Dept of Health, Room 109-31
1500 East Main Street
Richmond, VA 23219

Mr. Phil Bastin
General Manager
Bean Blossom Patricksburg Water Co.
86 East Market Street
P.O. Box 186
Spencer, IN 47460

Ms. Kathy Blair
City Epidemiologist
City of Milwaukee Health Dept.
Room 112 Municipal Building
841 N. Broadway
Milwaukee, WI 53202

Dr. Jeff Davis

Ms. Kitty Richards
Program Manager
New Mexico Border Environmental Health
Office
New Mexico Department of Health
1170 N. Solano Drive, Suite L
Las Cruces, NM 88001

Ms. Deborah Rizzi
Manager, Communications
United Water Management & Services
200 Old Hook Road
Harrington Park, NJ 07640

Dr. Deborah Scott, M.D.
General Internist & Staff Physician
Alice Peck Day Memorial Hospital
125 Mascoma Street
Lebanon, NH 03766

Dr. Cathy Simpson, M.D.
Assistant Professor
Division of Occupational and
Environmental Medicine
Department of Family Medicine (UHC 4J)
Wayne State University
4201 St. Antoine
Detroit, MI 48201

Dr. Raymond W. Thron, Ph.D., P.E.
Chair
National Council on Water, Pollution, and
Health
National Association of Physicians for
the Environment
1043 Grand Avenue, #202
Saint Paul, MN 55105-3002

Federal Agency Liaisons

Mr. Patrick Bohan
Environmental Health Officer
Division of Environmental Hazards and
Health Effects
National Center for Environmental Health
U.S. Centers for Disease Control and
Prevention
Mail Code F-28
4770 Buford Highway

Chief Medical Officer & State
Epidemiologist for Communicable
Diseases
Division of Public Health
Wisconsin Department of Health and
Family Services
1414 East Washington Avenue, Room 241
Madison, WI 53703

Ms. Gabrielle Giddings
Environmental Health Coordinator
Clean Water Action
1128 Walnut Street
Philadelphia, PA 19107

Mr. Steve Hubbs
Louisville Water Company
550 South Third Street
Louisville, KY 40202

Janice Keller-Saul
Communication Manager
Washington State Department of Health
Drinking Water Division
7171 Cleanwater Lane, Building 3
PO Box 47822
Olympia, WA 98504-7822

Dr. George Lambert, M.D.
Associate Professor of Pediatrics
University of Medicine and Dentistry of NJ
Robert Wood Johnson Medical School
675 Hoes Lane
Piscataway, NJ 08854-5635

Mr. Steven Leonard
Water Quality Program Manager
San Francisco Public Utilities Commission
1212 Market St., Suite 310
San Francisco, CA 94103

Dr. Jane Lipscomb
Associate Professor
School of Nursing
University of Maryland Baltimore
515 West Lombard Street
Baltimore, MD 21201-1545

Dr. Jim Miller
Director
Parasitic Disease Surveillance Unit
New York City Departments of Health and
Environmental Protection

Atlanta, GA 30305

Dr. Dennis Juranek
Associate Director
Division of Parasitic Diseases
National Center for Infectious Diseases
U.S. Centers for Disease Control and
Prevention
Mail Code F22
4770 Buford Highway
Atlanta, GA 30305

Ms. Donna L. Orti, M.S.
Chief
Health Education Branch
Division of Health Education and
Promotion
Agency for Toxic Substances and Disease
Registry
1600 Clifton Road, Mailstop E-42
Atlanta, GA 30333

EPA Liaisons

Mr. Ron Hoffer
Senior Advisor and Designated Federal
Official
Standards and Risk Management Division
Office of Ground Water and Drinking Water
U.S. Environmental Protection Agency
401 M Street, SW
Mail Code 4607
Washington, DC 20460
202-260-7096
Fax 202-260-3762
hoffer.ron@epa.gov

Ms. Sherri Umansky
Communications and Outreach Specialist
Standards and Risk Development Division
Office of Ground Water and Drinking Water
U.S. Environmental Protection Agency
410 M Street, SW
Mail Code 4607
Washington, DC 20460
202-260-0432
Fax 202-401-6135
umansky.sherri@epa.gov

Keystone Center Staff

Mr. Paul De Morgan
Associate

Room 322, Box 22A
125 Worth Street
New York, NY 10013

The Keystone Center
1030 Fifteenth Street, NW
Suite 300
Washington, DC 20005

Ms. Lisa Ragain
Campaign for Safe and Affordable Drinking
Water
4404 South 6th Street
Arlington, VA 22204

Ms. Shelby Hagenauer
Project Support Coordinator
The Keystone Center
1030 Fifteenth Street, NW
Suite 300
Washington, DC 20005

Dr. Scott Ratzan, M.D.
Academy for Educational Development
1255 23rd Street, N.W.
Washington, DC 20037

Ms. Judy O'Brien
Associate
The Keystone Center
1030 Fifteenth Street, NW
Suite 300
Washington, DC 20005

Attachment 2

Additional Background Discussion on Waterborne Disease from Infectious Agents*

Diarrhea and abdominal cramping are the most likely symptoms to arise following the ingestion of a waterborne infectious agent. However, diarrhea and abdominal cramping are not specific to waterborne infectious agents and may be due to exposures by other routes (e.g., foodborne, person-to-person) or to non-infectious causes. Diarrhea and abdominal cramping may be mild and self-limited, and not lead a person to seek medical care.

When diarrhea is mild, most people do not seek medical care. Self-medication with an over-the-counter anti-diarrheal drug is the most likely thing done by someone with diarrhea. If a person does opt to see their HCP, the diagnosis of a specific cause of the diarrhea may be of little use to the HCP in the care of that patient. Even when a stool specimen is submitted for laboratory testing, *Cryptosporidium* testing is often not done in a routine ova and parasite laboratory examination. The number of laboratory-confirmed infections during documented waterborne disease outbreaks is generally small. For all of these reasons, HCPs, including laboratorians and pharmacists, may be the first to recognize an increase in diarrhea in their community, even in the absence of laboratory-confirmed cases of a specific infection.

Waterborne outbreaks of infectious disease occur in various situations. Water treatment (e.g., disinfection, filtration) can fail because of a malfunction, or can be overwhelmed by a sudden large increase in infectious agents entering the source water for the drinking water system. *Cryptosporidium* is notable for its ability to survive chlorination. Some water systems which use water derived from underground sources are not disinfected at all, and can transmit disease when contaminated water leaks into the well (e.g., during a flood). Cross connections can occur, which allow waste water (including human sewage and/or chemicals) to enter the drinking water system. Small water systems often lack sophisticated monitoring and treatment and may be at greater risk for transmitting a waterborne disease agent.

*** Note that this discussion was prepared by Working Group member Jim Miller during the final round of comments; it has not been reviewed by the Working Group.**

1. 1999, National Environmental Education & Training Foundation, "The National Report Card on Safe Drinking Water Knowledge, Attitudes, and Behaviors. Washington D.C., 55 pgs.
2. U.S. Bureau of Labor Statistics SIC database as of July 27, 1999
3. While the Working Group directs its recommendations to NDWAC, and then to EPA, it is assumed that implementation goes beyond EPA's responsibility and budget. Collaboration is assumed with CDC, other Federal organizations, and partners in the HCP field both within and outside of government agencies.
4. More background information on this issue is included as Attachment 2, as well as in "*Cryptosporidium* and Water: A Public Health Handbook", prepared in 1997 by the Working Group on Waterborne Cryptosporidiosis, and available from the Division of Parasitic Diseases, CDC-NCID, Atlanta, Georgia.
5. One member suggests that it may be more precise to communicate about levels of relative health "risk" for specific water consumer populations than to communicate more broadly about water "safety." The Working Group held only limited discussion on this point, but readers of this revised draft might wish to consider how this alternate "risk" terminology might substitute where there are currently references to water "safety" in this document. The member also notes as a practical matter that patients/clients may be more interested in guidance about whether or not they should drink their water, rather than whether or not their water is "safe."
6. As noted in Section 3.3 of this report.
7. This list is meant to be illustrative only, and is consistent with recommendations by the Institute of Medicine in their 1993 report "Environmental Medicine and the Medical School Curriculum" Washington, DC, National Academy Press.
8. Adapted from Pope, A.M., and Rall, D.P. (Editors). 1995. Environmental Medicine: Integrating a Missing Element into Medical Education, Washington DC, National Academy Press.
9. A few members of the Working Group prepared a generic slide show on drinking water to assist its members who are participating in HCP meetings this year; the full NDWAC consider whether (and in what form and venue) the slide show should be made available for wider use.
10. As noted throughout this document, while EPA is the principal audience for the Working Group's findings and recommendations, it is not assumed that all (or perhaps even a majority) of these can or should be carried out by EPA *per se*. Instead, it is assumed that these would be considered by EPA, CDC, and numerous professional organizations and advocacy groups for implementation within available budgets and priorities.

11. See footnotes #7 and #8 for example

12. Working Group members cited several examples, including the CDC/EPA biannual summary of waterborne disease outbreaks, ATSDR's updated case studies in environmental medicine, presentation materials for medical/nursing school classes, and continuing education programs.