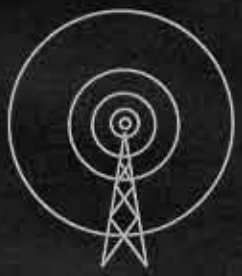
The Media's Role in Communicating Health Risks



What's in the Water?

October 5, 1994

The University of Iowa
Iowa City Iowa

Proceedings

Sponsors

Center for Health Effects of Environmental Contamination

University Hygienic Laboratory

School of Journalism and Mass Communication

The R.I.S.K. Project

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PREFACE

On October 5, 1994, a symposium on communicating health risks from exposure to drinking water contaminants was held on the campus of The University of Iowa in Iowa City. ***The Media's Role in Communicating Health Risks: What's in the Water?*** was jointly sponsored by the University of Iowa Center for Health Effects of Environmental Contamination (CHEEC), the University Hygienic Laboratory (UHL), the R.I.S.K. Project and The University of Iowa School of Journalism and Mass Communication. Thanks to each of the sponsors for their financial and technical support.

The idea to hold this conference came about as the result of a conversation I had with Dr. William Hausler, Director of the UHL, on the need to respond to what we felt were inaccurate reports by the print media on the possible health effects from substances in drinking water, particularly nitrate. Dr. Hausler convinced me that an op-ed piece to the local newspapers would not adequately present our position and that our efforts should be directed towards organizing a symposium to bring technical experts and representatives of the media together to voice their concerns. This conference would not have taken place without Dr. Hausler's excellent suggestions and continued encouragement.

Early on, we enlisted the aid of Dr. Alan Nagel, Director of the R.I.S.K. Project, and Professor Stephen Bloom, of the School of Journalism, in identifying potential keynote speakers and panel participants and in developing a format for the conference. We put together what we felt was an excellent group of technical and public health experts, and editors and environmental reporters from several large Midwestern newspapers. Special thanks to them as well as to Dr. Jim Hanson, Dr. George Hallberg and Bill Casey, publisher of *The Daily Iowan*, for their efforts in this regard.

The timing of this conference could not have been better. Reports in the national media on the reauthorization of the Safe Drinking Water Act and *NBC Dateline's* coverage of public water supplies and *cryptosporidium* preceded the conference by just days.

I would like to thank a number of people who were instrumental in making the conference a success, including Drs. Gene Parkin and Lola Lopes, Lisa Barnes, Vera Dordick, Rick Kelley and Lynn Hudacek. A very special thanks to Gloria Wenman, who was involved in the planning and coordination of the conference and helped edit the proceedings.

Pete Weyer, Editor
Program Coordinator, CHEEC

WELCOMING REMARKS

Gene Parkin, Director, Center for Health Effects of Environmental Contamination

On behalf of our Center, the University of Iowa Hygienic Laboratory, the School of Journalism and Mass Communication at the University of Iowa and the Risk Project, all of whom are co-sponsoring this event, I would like to welcome you to this conference on "The Media's Role in Communicating Health Risks: What's in the Water?" We feel like we have an excellent program for you today, one that we hope will stimulate needed dialogue in this most important area: how we communicate a variety of environmental risks to the public without causing undue alarm. The fact that this is a current local topic of interest is evidenced by an article that was in the *Iowa City Press Citizen* on Friday about possible *cryptosporidium* contamination in Iowa City's drinking water.

I would like to kick off our conference by introducing Professor Hunter Rawlings, President of the University of Iowa. President Rawlings came to Iowa as President in 1988 from the University of Colorado. As President of a major research institution, I am sure President Rawlings has considerable experience in assessing and communicating a variety of risks. During his tenure here at the University of Iowa he has had to deal with a number of water related problems that have caused trouble for the University in one way or another. For example, the drought in the late 1980's and the flood of 1993. President Rawlings has been a very strong supporter of research and educational programs and environmental health issues, and a number of environmental programs have grown and flourished during his presidency.

It is my honor to introduce Professor Hunter Rawlings.

Hunter R. Rawlings III, President, The University of Iowa

It is a great pleasure to welcome you to the University for this important symposium. In my opinion there is no question about the critical nature of your discussions today because you are dealing first of all with water, something that all of us depend upon crucially, and then you are dealing with public opinion, something that may or may not connect with reality, in my experience. You are dealing with reality and possible reality and getting the two connected seems to me a most important endeavor. I don't think that anything has a greater potential for creating panic than doubts about public water supplies. That has certainly been on our minds here in Iowa over the last couple of years. In fact, it was a graduate of our College of Engineering, L.D. McMullin, who became a local hero for his management of an extreme public water crisis in Des Moines last summer during the great flood of 1993. The job that he did not simply with the mechanics of trying to restore the water supply but, just as importantly, with the public opinion that he helped to shape during the early days of what could have been a true panic and crisis, won him enduring fame and support from his fellow Iowans. Here in Iowa City we had our own near crisis situation when the Corps of Engineers at the Coralville Reservoir during last summer's flood tried to hold back the deluge after the spillway was breached for the first time in history and volunteers appeared out of nowhere to work around the clock on sandbag duty to protect our water supply in Iowa City and at the University of Iowa.

So we have been dealing with public aspects of a water crisis first hand. It is not something that is theoretical and academic and scholarly in our context but it is real and that is why I think this is such a good place for this particular conference. An informed citizenry, and only an informed citizenry, has the means of understanding the levels of risk that it confronts and it can act reasonably to cope with real rather than imagined problems. In a flood or in some other disaster that takes an obvious form there is often a red alert and that red alert can cause just as much damage as the imagined situation itself. Then there are those invisible menaces like the appearance of *cryptosporidium* in the Iowa City water supply. When you can't see what you are up against, public reaction can be completely out of proportion to risks that are actually involved. In this case, considering the reputation this parasite acquired after the widespread illness it caused in Milwaukee, the city of Iowa City went out of it's way to provide ample public information even though the chance of someone's getting sick was actually rather small. I am happy to report to you that the University's water supply seems to be somewhat better in this regard than the City's water supply. We will

continue to work closely with the City to make sure that we are all as safe as possible.

You are here to talk about situations where the precise level of risk requires expert interpretation and explanation to the public, and that is the burden of this conference, to insure that it is expert advice that is brought to bear on a particular problem even before it actualizes. I would like to commend the organizers of the conference and the Center for Health Effects of Environmental Contamination for bringing together experts in water quality, experts in biostatistics, experts in management and experts in journalism. I am very much impressed with the interdisciplinary nature of this conference. They are, in addition, doing something else which I very much admire in conferences such as this one; they are going beyond the experts and including students. That's why universities are such excellent homes for this type of conference. It is not simply a matter of bringing experts together from many different disciplines. In order to be truly successful it is important to educate those most central members of our community: the students who are soon going to become the citizens who vote and concern themselves with these matters. I think the fact that this afternoon you plan to have a substantial number of students, including undergraduates, from the School of Journalism is an added attraction for this conference. I know you have a full agenda ahead of you and I want to wish all of you a very productive and successful conference. Thank you very much.

George Hallberg, Chief of Environmental Research, University Hygienic Laboratory

I just want to add a welcome to everyone. This is an exciting layout and in particular I want to give a special welcome from our Director who is a big proponent of this conference but had to be out of town. Dr. William Hausler sends his greetings. From the Laboratory's perspective in particular, part of our role as the public health environmental laboratory, this is often where the measurement of risk begins and where the debate begins with the kinds of analytical capability that we provide and the numbers that we generate. Besides welcoming you to the conference today, for those of you who are interested, we would also welcome you to visit the Laboratory sometime and see where some aspects of the measurement and monitoring of risk go on. Our greetings and we look forward to what looks to be a very exciting and successful day. Thank you.

Stephen Bloom, Associate Professor, School of Journalism & Mass Communication

Every morning millions of Americans partake in a special strange ritual. I did this morning and I hope most of you did also. We remove all of our clothes. We step into a private area of our homes and stand under a clear liquid that cascades over our bodies. After several minutes we are renewed for the vigors of another day. Before we go off to work we use the same magic liquid. We mix it with ground granules and we gulp it down. It is called our morning coffee. This mysterious substance is water. It is also our life blood. For chemists out there it is a relief for them to know that most people can quote water's scientific name: H_20. We worship the shimmering, almost tasteless substance. Today we are going to spend a lot of time talking about water, how we can communicate quickly and effectively when this life blood of ours is threatened. My definition of journalism is coverage of an event that a community of people cares about or should care about. It makes perfect sense then that the School of Journalism and Mass Communication is a fundamental part of this important conference. We welcome everyone and we thank you for attending.

Alan Nagel, Director, R.I.S.K. Project

It is an honor for me to have the task of introducing the keynote speaker. As a humanist particularly concerned with undergraduate education and the changing intellectual world and the academic, social and political implications of all that we are trying to teach our students, I recently had the chance to be working with college and university faculty from around the state and other students on a project for the improvement of post secondary education. To pursue new curricular initiatives joining some concerns for risk, ethics, public policy, and decision making we targeted environmental issues in our first year, then business, then this year we will be talking on issues in the

law bringing together some students, academicians, and practitioners. Our co-sponsorship of today's conference is, I hope, an example of the kinds of interaction we value. What our project would like to do better in preparing students for in the classroom, today's speaker does full time. Her topic today is of central and critical concern: "Risk Communication - The Art of Interpreting Science." This nexus of public health, environmental contamination, communication and practice of discourse is a prime example of just where art and science are inextricable. Please welcome Kate Kramer to this conference.

KEYNOTE ADDRESS

"Risk Communication - The Art of Interpreting Science"

Katherine Kramer, Western Center for Comparative Risk

Katherine Kramer is the Executive Director of the Western Center for Comparative Risk in Boulder, Colorado. The Western Center is dedicated to helping state, city and tribal governments in states west of the Mississippi River design and conduct comparative risk projects.

I am going to talk today about risk and I think I am going to be curling some hairs with my approach. I was just listening to the opening speakers talk about technical experts versus the public. I am afraid I am going to take a slightly different stance. The reason is because I deal with the public a lot. I have stood in front of groups and I have said to them "this is the technical answer, believe it, lets go home." And the response I get is "wait a second." What I am going to talk about today will cover three things - first, there is a problem with risk communication in our society; second, I'd like to go into what that problem is, what I see is at the basis of it; and finally, I'd like to talk about some solutions to the problem, the way I would approach risk communication and the improvement of it.

Here is a story about risk which illustrates that one problem we have with risk communication is a problem with probability. The story is: there is a man who had to fly a lot (it was part of his job), he had no choice in the matter and he liked going places, he just didn't like to fly. Over the years he became more and more afraid of flying and he decided that if this kept up, he was not going to be able to fly at all - his fear was just too great. So what he decided to do was look at the probability of getting into an accident. He figured that was the basis of his fear and so he first asked "Am I afraid of pilot error? No. Am I afraid of mechanical failure? No. I am afraid of being on a plane with a terrorist with a bomb." So he thought "okay I have isolated that, now let me look at the risk involved - the true risk of that" (he did fly internationally a lot). So he went to the FAA and the CIA and everybody else and found that the chance of being on a plane with a terrorist with a bomb was one in a billion. He thought, "that is a great number - I am really comfortable with that." Looking a little further he found out that the chance of being on an airplane with two terrorists with two bombs was one in a trillion. He took a deep breath and said "that is the number I am most comfortable with." So every time he traveled he carried a bomb. This begins to show some of the problems we have with risk communication.

Let me say two other words that will convince you further that we have problems - dioxin and alar. Here is one of the stories about dioxin that we have seen in the last couple of years - "Dioxin branded as the most potent manmade carcinogen known to science." I don't know who said this, but this has certainly been in the literature for at least ten years now. These kinds of statements caused federal officials to evacuate Times Beach, as you all know. In 1991, the *New York Times* declared "Dioxin is no more risky than spending a week sunbathing." The federal official who ordered the evacuation said it was indeed unnecessary. Recently, the EPA came out with another report on dioxin; now we know that dioxin is a potent carcinogen and also that there are non-cancer health effects. So what are we left with? Are we left with clear information about dioxin? Not yet.

Alar is an even more famous case. Alar is a clear carcinogen that induces a highly significant increase in the incidence of blood vascular tumors in Swiss mice. You say that to the public and what will you get? A lot of people saying "wait a second, what does that mean?" That was the opinion of a toxicologist and scientist in 1984. Next, the Federal Register in 1987 reported that "each of these studies on alar has been examined by EPA and the FIFRA Science Advisory Panel and has been found not to provide a basis for regulation," so basically, there is not compelling evidence to regulate alar. Moving right along, another scientist looks at it and says the weight of evidence clearly favors classification of alar as a non-carcinogen. The public at this point is getting a little upset and a little nervous. The final comment on all of this is from CBS' *60 Minutes* which said "Alar, the most potent cancer causing agent in our food supply, is a substance sprayed on apples to keep them on trees longer and to make them look better." This is what the public hears along with what the popular press was reporting

during the alar scare. Things like "Watch those vegetables, Ma." So what are we left with? Who knows the truth about alar?

I'm afraid that anyone who knows risk assessment knows that with most chemicals there are good studies and bad studies, there are animal studies and human studies. In the case of these two chemicals we haven't reached any conclusion, especially a conclusion that everyone in our society can agree on. Who is to blame for all of this? I just showed some examples from the media. Let me take the media off the hook. After dealing with them for many years, I found that responsible reporters don't make up stories about alar. They get them from industry, from environmentalists, and from government PR firms, and they usually believe good evidence and dismiss bad evidence. They usually check their sources. They usually write fair stories. The headline writers are another story but that is for the media to deal with this afternoon. Is industry to blame? Here is a cartoon that might lead you to believe that industry is to blame. It says, "Sylvia, why do some women become spokespersons for large corporations? They were cursed at birth. Due to a computer virus a powerful witch is left off a guest list, she comes to the christening anyway and before anyone can apologize to her she curses the little girl - "You will become a spokesperson for a major polluter. You will utter bald face lies in the blandest of voices and you will wear prim little suits." This is a popular view of industry and, as you all know, it really isn't true. It would be easy if we could blame everything on some evil enemy but in the case of industry they are not the ones who have to shoulder this.

Are environmentalists to blame? Here is a cartoon that says, "Honk if you love the environment." This points to the fact that sometimes environmental groups don't look at the ends and the means. What becomes a cause can sometimes hurt the ends. So environmentalists aren't really to blame either. Is government to blame? Absolutely not, and I am not just saying that because I vote and because I believe WE are the government. So who is left? Who can we blame for this major risk communication problem? Well, there are only two culprits left, the public and the technical experts - that is who I am going to blame today. First, the motives of each of these groups cannot be questioned. I don't think that technical experts are being bought off by anyone and I don't think the public can be bought off either. I think there are two major problems. One problem is a conflict between science as a process and science as an answer. The second problem involves the difference between what Krimsky calls technical rationality and cultural rationality, which I will define in a moment. About the first point. Citizens look at the debate about alar and dioxin and say, "Why can't they just make up their minds, why can't they just give me the answer?" Citizens expect these answers from scientists. Scientists will look at the evidence and conclude that good progress is being made towards finding out more information about dioxin or alar. Scientists view their work as a process towards more knowledge and not as a process toward conclusive answers. Citizens will always expect more in terms of answers than scientists will expect from themselves.

Let me discuss technical rationality and cultural rationality for a moment. Here is an example from a comparative risk project in Vermont on how the public's perception of risk differs from technical experts' perception of risk. The question was "What are the most important environmental risks facing the citizens in the state of Vermont?" Drinking water quality ranked highest in terms of what the public felt was the most serious problem and moderately low in terms of what the Committee on Ranking, which is a technical committee, felt. The most serious problems to the technical committee were loss of habitat, global warming and indoor air pollution. These either rank in the moderate or low category to the public. Here is a graphic example of the kind of differences of opinion that exist between citizens and technical experts.

Let me give you two examples of technical rationality. Technical rationality is this kind of a statement: "But living at a Superfund site is less risky than driving without a seatbelt." If you have been to public meetings, you have heard this kind of statement quite often. Here is another one from a technical expert: "You, citizen activists, say that you are concerned about the health of your children who may be exposed to toxic chemicals in this plant but you smoke cigarettes at home. What could be worse than that?" To the technical experts this is a real conflict. How do the citizens look at this kind of an issue? The citizens response, or what we call cultural rationality, might be "How dare you expose little innocent children to even one little speck of toxic chemical X!" or "I don't care if I pollute more than this plant by driving back and forth to work every day. I have no other way to get to work. This plant can be located elsewhere."

Now, what is this showing? This is showing that there is a dramatic difference in the way the citizens and the technical experts view risk. Technical rationality has such components as trust in scientific methods, explanation and evidence, whereas cultural rationality has trust in the political culture and democratic process. Technical rationality will appeal to authority and expertise whereas cultural rationality will appeal to folk wisdom, peer groups, and traditions. The boundaries on analysis for technical rationality are narrow and include reductionism; the boundaries on analysis for cultural rationality are broad and include the use of analogy and historical precedent. Very importantly: in technical rationality, risks are depersonalized; in cultural rationality risks are personalized. "This is affecting me and I am the one in a million" or "my child is the one in a million." There is an emphasis on statistics and probability versus an emphasis on impacts on the family and community. We can go on and on with these, but basically what it means is that these two groups of people are looking at the same problem very differently. There is not a good meeting of the minds and that is why the answers the two groups come up with are different. The final point of technical versus cultural rationality is the most important one. In technical rationality, those impacts that cannot be described are irrelevant. In other words, what we can measure is what we can talk about. For the public at large the unanticipated or unarticulated risks are sometimes the most relevant. These are very important points because the public brings more to the risk debate than the scientists do. The public expands the basis for decision making where the scientists seek to narrow it. This expansion is often based on self interest; everyone will probably agree that that is the way most of us live. For some reason it is not valid when it is brought up in this kind of risk debate.

So who is right? Technical experts who act rationally and want the public to do the same or the public who feels that they are broadening the debate and by doing that acting rationally and want the scientists to do the same? Supreme Court Justice Steven Brier says the problem is the public's perception of risk. In fact, he says that the public's perception of risk is part of a vicious circle which inhibits more rational regulation. He understands the reason behind the public's less rational risk view and he calls for a panel of experts to assess what is risky and what is not for our society. What Justice Brier is asking for is not possible. In our democracy we cannot remove the public's right to make decisions about how we regulate and give that responsibility to an elite panel. I assert that we should use both the public's view of risk and the expert's view of risk, which brings me to the third part of my talk.

How can we communicate risks better on this two way street between the public and the experts? First, let me give you my favorite definition of risk communication. Risk communication is an interactive process of exchange of information and opinions among individuals, groups and institutions. It involves multiple messages about the nature of risk and other messages not strictly about risk that express concerns, opinions or reactions to risks messages, or to legal and institutional arrangements for risk management. So it is not simply having the experts give the technical opinion to the public and wondering why they don't accept it. This is a new way of thinking. The old way is "we are the experts, the public is irrational." The new way is "we are the experts in some areas and the public are the experts in other areas." There are several reasons we are looking at risk communication differently now. First, the old way did not work. No matter how often we told the public they were wrong, they didn't believe the technical experts. Secondly, the public is making rational decisions based on what they think is important. The public has a different paradigm. Let's look at that closely for a moment. For those of you dealing with risk, you have seen this often. The major ways the public views risk are: something is less risky if the benefits are understood but more risky if the benefits are unclear; it is less risky if it is familiar and more risky if it is unfamiliar; it is less risky if it is naturally occurring and more risky if it is of human origin; and finally, it is less risky if there is high trust in the communicator and more risky if there is low trust. Let's deal with the idea of trust and look at some of the public's perception of information sources. Here is a poll which was done in 1988 and 1992. It lists where the public receives their information about environmental risk. It then shows who they trust and finally who they think is knowledgeable. You can see some dramatic problems with this. First, the public got more information from news reporters than from anyone else. They trust reporters generally, but they are not sure they are very knowledgeable. They got a lot of information from environmental groups. They trust environmental groups more than reporters and they think they are very knowledgeable. They also think that the government is fairly knowledgeable, at least more

knowledgeable than reporters. However, they don't get much information from the government. Finally, the public thinks chemical industry officials are very knowledgeable, but they don't trust them and they don't get information from them. Doctors are in the medium category on all of this and in many cases, doctors get their information from the mass media, so it is sort of a circle. As you can see, there are some serious problems in our society with communicating risk and serious problems with who believes what and when.

I have a few golden rules for risk communication. For those of you who have dealt with the public, these will seem pretty basic. Accept and involve the public as a legitimate partner. That is not much of a surprise. Strive for mutual respect. That should be business as usual. Listen for more than talk. In other words, if someone is making a strong statement, try to see what is behind that because often their concerns and fears are very real and very personal. Be open, frank and honest - that shouldn't be a big surprise for anyone. And coordinate and collaborate with other credible sources. That is particularly important. There was a project in the Kenawha Valley in West Virginia, which has a lot of chemical facilities. The project directors brought in Harvard doctors to tell everyone the real story, but the Harvard doctors had to be trained on how to communicate to the public, who would be under this very extensive toxicology and epidemiology survey for a long time. The point is, you can get credible sources to discuss risk, but they might have to be trained to talk the talk and walk the walk. Finally, even if you follow all of these risk communication rules, you might not win anyway. Sometimes we find ourselves damned if we do and damned if we don't. When we are dealing with risk, many of us feel that we have all of the guns pointed at us. The good news is, in fact, that this is actually a mystery novel, it is not a portrait of a risk communicator.

One quick footnote: I view risk as a useful, technically based tool for the public policy arena. I don't think it is the solution, the final answer, or anything more than good information. But I will soon be in the minority. Risk has become a four letter word to environmentalists and a gospel to others. Reasonable discussions of the use of risk are disappearing and are being replaced by polarization over this issue. Presently, all of this discussion is taking place inside the beltway in Washington, D.C., but I fear that it will soon reach the rest of the real world. This application of risk may have started with two books by the former governor of Washington, Dixie Lee Ray, but its current incarnation has come as amendments to environmental bills before the U.S. Congress. The amendments call for risk assessments to be done on most environmental regulations. I am not sure how to do risk assessments on environmental regulations but I can figure out it would be expensive and time consuming. The environmentalist response has been swift and strong. They have created what they call an unholy trio, which includes takings, unfunded federal mandates and comparative risk cost benefit analysis. The literature on comparative risk attacks the Washington brand of risk by saying "How can we value in dollars and cents the lives of our children, the health of our ecosystems and our right to breath?" Both sides have oversimplified the issue of risk and in doing so have devalued it. But the worst to weigh in on this debate so far has been the lead editorial from the *Wall Street Journal* of September 15, 1994. First, they say that 80% of the public supports the concept of risk assessment. I would guess that 80% of the public does not understand the concept of risk assessment. Next they raise the argument that if EPA had to do risk assessment on all regulations, it would be "so time consuming that the Agency would have to devote all of its resources to producing studies and it would be immobilized," and I am quoting again, "gosh, how awful, too bad the EPA has never shown similar concern about immobilizing thousands of local governments, companies and individuals with its ruinous fines and regulations." Finally, the *Wall Street Journal* blames it all on the Democratic leadership in Congress and calls for a GOP-controlled House. If this articles shows the future of the risk debate, I am truly scared. First, it makes risk the battle ground over which all our environmental laws will be fought and second, it makes risk a partisan issue. We may find that reasonable people may not be able to discuss risk in the future because they will get caught in the crossfire of partisan wars. That is why this forum is so important today. We must continue to discuss it, we must realize its value and its shortcomings. I hope this is a very productive meeting today that will continue to address these important questions. Thank you.

PANEL DISCUSSION The Experts - What is a Health Risk?

Gary Benjamin, Des Moines Water Works

Gary Benjamin is Director of Water Production for the Des Moines Water Works, where he oversees daily operations. The Water Works, which supplies drinking water for over 200,000 people, was shut down for almost a month during the 1993 Midwestern floods.

As President Rawlings mentioned earlier, dealing with the public was a big part of the strategy we had during Des Moines' flood recovery effort. It paid huge benefits as far as public opinion was concerned as to what was actually going on. One of the things that really helped us from a water quality standpoint was that once we realized that flooding of the plant was imminent, we began shutting the plant down. By doing that, we prevented the occurrence of pumping any actual flood water out to the distribution system. We notified the public that we were indeed out of service and we were going to be out of service for awhile. We told them not to drink the water even though we were sure that we had not pumped any flood water into the system. We wanted to err on the safety side, so we told the public that any water that was remaining in the distribution system should be boiled if it was going to be used for any consumption purposes.

When flood water did inundate the plant, our clear well was flooded, which contains finished water ready to be pumped out to the distribution system. So we definitely had a contamination problem in the treatment plant. During the flood recovery we started the plant up and used plant water to flush and disinfect the clear well. By doing this, we had good, clean, nonbacteria laden water in the clear well before we started pumping that water out into the distribution system. Our general manager announced we were going to be pumping water seven days after the flood; we thought he was a little bit nuts when he gave that information to the media. Fortunately, we were able to meet that goal and on the 7th day we were pumping water that was clean into the clear well. Even though we started pumping water and water was available to the public, we again told them not to drink the water. We needed to go out into the distribution system and get bacteria samples because we had some stale water that had been sitting there for a week and we wanted to make sure we had potable water.

One of the first things we did after we started flushing the system was to go through Phase I monitoring. This involves going out into the distribution system, taking samples and monitoring for chlorine residual. If we found any area in which the chlorine residual was low we went ahead and reflushed that area to bring the chlorine residual up so we had good fresh chlorinated water in there. The next step was to go to Phase II monitoring; the DNR and the UHL offered assistance in this area because we had to sample a large number of areas throughout the distribution metro area. We gathered samples that were tested for bacteria and we continued this until every sample cleared bacteria testing. By July 30, all bacteria samples passed and the DNR notified us that we could go back to a potable mode. We had one final notification regarding water quality which stated that the public could start drinking the water. This was the notification that both we and the public had been looking forward to.

We avoided some potential health risks by shutting down the plant in the fashion that we did . Albia, Illinois, was flooded and one of the steps they took to provide sanitary water to their customers was to pump river water out into the system. That type of scenario can really generate some potential health risks; I will give more detail on this a little bit later on. Turbidity is a definite problem with flood water, *cryptosporidium* is a hot topic these days and the bacteria, including coliform bacteria, are also a concern.

On a day to day perspective, what are the concerns the Des Moines Water Works deals with from a water quality standpoint? We monitor for bacteria on a daily basis, which is a definite concern. Coliform bacteria can cause disease or it can be an indicator that there are other organisms potentially present that could create problems. *Cryptosporidium* is the new buzz word around Iowa City. *Dateline-NBC* brought that back into the forefront with the stories they did over the past two weeks. Fortunately, we have been testing for *cryptosporidium* since 1991 and have data showing we did not have a problem. So when we started getting calls from our customers who watched the *Dateline-NBC* presentation, we had that information for them. *Cryptosporidium* is a microbiological contaminant that can really create some havoc, as

we will hear this afternoon regarding the Milwaukee incident. Fluoride is something that we add to the water. There are limits on fluoride due to possible dental and skeletal problems at high exposure levels. Lead is another contaminant. We have a lead and copper rule, so we are monitoring and going through optimum corrosive control procedures. Lead can cause problems with the nervous system and possible kidney damage and it is highly toxic to infants and pregnant women. Nitrate is something the Water Works faces on an annual basis in the springtime because our river supplies have heavy agricultural activity upstream. In 1991, we installed a nitrate removal facility that we operate on a seasonal basis to remove nitrate from the water. We have also detected pesticides and herbicides in our raw water. Our powder-activated carbon removes those with some success; to below the regulatory limits.

Trichloroethylene (TCE) is a product the Water Works had in it's finished water back in the early to mid 1970's. TCE is used in some dry cleaning processes and in the metal cleaning environment. There was a company right across the river from the Water Works that used TCE to clean out metal forms. Once it was no longer valuable as a cleaning product, they went out and used it as a dusting agent on their parking lot. When we found TCE in our finished water, we figured out where it was coming from and we isolated that particular portion of our water source. That company has since constructed and continues to operate a removal facility on the site so they can remove the TCE from the groundwater. Trihalomethanes are by-products that are formed when you add chlorine to surface water that has organic material in it. We do not chlorinate until the end of our treatment process, so we do not have a problem with that as far as regulations are concerned. Turbidity is a measure of the cloudiness of the water. It can interfere with disinfection and can be a problem.

If a water utility violates any of these standards, it is required to go through a public notification process. What are the rules for public notification? EPA has published a handbook titled "General Public Notification for Public Water Systems" which describes in detail what steps need to be taken when you get into a public notification situation. It lists the types of media that can be used, which include TV, radio, newspaper, mail and hand delivery of the messages. It gives the time frame within which the notice must be given after a violation has occurred, and lists the frequency of follow up reports required until the violation is resolved. It also describes what the notice must contain: an explanation of the violation, information about potential adverse health effects, information about the population at risk (such as pregnant women, infants or elderly people), information about the steps currently being taken to remedy the problem, and information about whether an alternative water supply is required. An example would be if we would violate the nitrate standard - the typical response to boil water to drink is exactly what you don't want to do in a nitrate situation. You really need to get an alternative water supply - bottled water or whatever. The notice must also list preventive measures that should be taken until the violation is resolved. In some situations boiling the water might be adequate to make the water drinkable. Lastly, there must be a phone number consumers can call to get additional information over and above what is in the notice.

Here are some points we have found to be very important when putting together a public notice. First, you must education the customers. It is very important to give them the facts - the true nature of the situation - which should be very clear, accurate and concise. When a water utility does this it becomes a credible source of information and helps prevent either public misinformation, confusion or panic. One thing you should consider is whether you need to use more than one language on the notice. My perception of Des Moines was that it was really not that culturally diverse. When we got into the flood situation we realized we had some Spanish and Asian speaking populations that could not understand English. They would see somebody opening a faucet and using water and assume it was okay just from that visual aspect. We worked with the Red Cross and several social organizations to make sure these people had the information in a form they could understand. Lastly, enlist public support. With L.D. McMullen's (general manager of the Water Works) expertise and way of dealing with the public, we really began to gain a lot of public support for our efforts in getting the water treatment plant up on line. When we initially started filling the distribution system we asked people not to use the water until the whole thing was filled so we could fill it quicker and make sure everything was flushed. We had people calling in turning in their neighbors because they saw them using water before it was released for use. The public really got behind our efforts.

In closing, I would like to say that from the water utility's perspective, facing a public

notification can really be an unnerving situation, but if it is done in an accurate, honest and factual manner, it can be a very productive tool in a crisis situation.

Joan Dent, American Water Works Association

Joan Dent is Director of Public Affairs for the American Water Works Association. Her reponsibilities include media relations, developing and managing national public education programs, and managing programs in member and corporate communications.

In looking at the name of this program, *"The Media's Role in Communicating Health Risks"*, I think what has happened is that public water providers have allowed the media, and sometimes other groups, to take the lead role in telling the public about drinking water. As Director of Public Affairs of the American Water Works Association, I often talk to our members about getting out in front. Certainly, Des Moines is one example of a utility that does that and understands the benefits of being the first with the news.

So who reports the story? Who is the one who frames the story? The fact that public water providers have not done that and maybe other industries as well, have helped other people frame the issues for us. It is our tradition of being the expert of taking care of things in secret, sort of proudly being the silent servant, as public water providers have been for over 100 years, in a sense, that has to change and is changing. Much of the impetus for that is the Milwaukee *cryptosporidium* outbreak which we will hear about this afternoon. Some people have referred to that as the Chernobyl for public water supply. My own sense is that it is basically going to change public water supply forever. Any change is difficult, but it is happening. I have sat in meetings lately, over the past six months, and the types of conversations that are taking place are very different. A year ago, six months ago, people were saying "Let's get the data, let's be sure we understand the technical, scientific aspect so we are absolutely positive before we go public." Now, that feeling is changing and what I am going to address today is sort of a philosophical framework. I am going to step back for a minute and hope you will bear with me.

The question in the program brochure posed to the panel was "what is the health risk in drinking water?" I am going to offer an answer to that question from my perspective and then address what I consider to be a much more important question for public water providers. But first, what is a health risk? I am not a scientist, an engineer or a technician and for some that means I have no credibility. However, my answer is a health risk in drinking water is anything in tap water that could damage someone's health. Though it may sound naive, I submit to you that this is how the public and the media view that question. If it can harm me it is a health risk and, as many of you know, most scientists and technicians spend a whole lot of time trying to figure out the probability and the numbers behind the risk. But the basic thing is - if it hurts me it is a risk. Given that, the most important question for public water providers, and probably others in this room, is "what are our responsibilities to our customers concerning health risks from our water?" It is a slightly different framing of the question. People in public water supply are seriously wrestling with that question. So to help answer it, I am going to frame the responsibilities in four categories.

Number one is technical competence responsibilities, that is where the emphasis has traditionally been. It relates to treatment techniques, water quality analysis, testing procedures, understanding regulations, how to engineer plants and distribution systems. It is sort of the meat and potatoes of public water supply: technical competence. The second area is operational responsibilities. This is actually a relatively new area in the frame. In light of Milwaukee, this takes on much more importance, because in terms of the technical solutions for *cryptosporidium* removal, it is actually optimizing every phase of the treatment system. It is not just one solution. Operational responsibility means making sure the systems and the processes are operating effectively and optimally, maintenance of the distribution system is ongoing and timely and other factors. The American Water Works Association is beginning to look at setting voluntary operational standards for public water supply systems. The AWWA Research Foundation, which is a separate sister organization , is funding research to analyze and select appropriate operational parameters to develop such standards. So as an industry the concept of operational standards is fairly new but is being seriously addressed.

The third area is management responsibilities.

This can mean long range supply planning, which many utilities do, and strategic watershed protection, which some do, but it is often politically sensitive, so maybe there hasn't been quite enough commitment in that area. Visioning for the future of municipal water supply. What is water supply going to be like in the year 2020? Looking long term about options and various types of services. Management responsibilities include knowing how to obtain needed resources from mayors, city officials and rate payers. Many utilities are in fear of asking for a rate increase. Some of the research we have done indicates that people are willing to pay. People say to me 'Oh, that's just a thought" and I say to them it doesn't replace the need for strategy. It means there is more interest than we have seen before in people wanting high quality water although it is not popular to ask for a rate increase. Maybe we need to be a little more aggressive in that area. Individual utilities are very astute in their management practices, however, especially in the small system arena, so there is probably a greater need for a more managerial approach to public water supply. Those three areas of responsibility: technical, operational and management primarily deal with the idea of risk reduction. The fourth area uses a term not commonly associated with public water supply, and that is ethical responsibilities. Ethical responsibilties to the community and to the customers. We are used to framing risk as "What is the risk, should I tell?" What I suggest is we look at the question of ethics in terms of risk. Responsibilities in this area include being stewards of the resource: informing customers of risks to their health, providing information on protective measures and respecting people's rights to make decisions on their health and preferences.

I think that is what Katherine Kramer was referring to. The expert mentality says "I know and I wil tell you" or "I will fix it for you." When we begin to think of cultural valies we begin to say maybe people have the right to make their own decisions and this may be an ethical frame. Having been associated with public water supply for several years, I am suggesting we might need to reframe the risk discussion and the comunication discussion into a discussion of responsibilities and add ethics to that. The situations before us are incredibly complex and maybe if we reframe our thinking we will be able to come up with new and exciting solutions. Thank you very much.

Edwin Geldreich, U.S. Environmental Protection Agency

Edwin Geldreich is Senior Research Microbiologist, Drinking Water Research Division, U.S. EPA, where he directs investigations into the microbiology of water supply sources, treatment processes, methods development and criteria and standards.

I would like to discuss the perspective we see from the public and the reality checks that we in EPA are working with to protect our environment, to protect the water supply. The public quite often thinks of our agency as one that on Monday morning comes in and decides what to go to work on now. There is no organization, no thought as to what are the problems in water supply that we should be concentrating on. This is the impression that some newspapers and much of the public has had in the past. Nowadays, with the electronic media, a lot of this has changed. The public is becoming more aware of the realities of what we are trying to do. The attitude was that EPA was illogically looking at problems, EPA is unreasonable and irrational. I know some smaller utilities have at times thought "My God, they are giving us some more regulations of things we can't measure, we aren't sure there is a problem and they are just harassing us." This is far from the truth. There is a scientific base which we are working from and in the regulation process we are constantly looking to what is going on in communities across the country and across the world. We are studying water quality problems and getting input, information from Pan America Health and other world health organizations, that relate to the water supply. They are out there looking. Let's anticipate that it may be difficult and begin to work on it.

What we are trying to do is to look at waterborne disease outbreaks, look at accidental spills and study how that might impact on the water supply. We also have to realize that once we identify there may be a problem, the next step is to decide whether we are going to do work in the office of Research and Development in EPA or give it to the universities or AWWA and jointly cooperate on this. To gather data from the field that documents the status of that water at this time

for that particular contaminant that we are concerned about. The proposed criteria in methods for that particular contaminant is a straw man approach. If they think there is a hazard or risk involved they may come up with the criteria to monitor around the country to see what the status: is this a common problem that we are facing? Maybe we have to develop methods so we can detect it. Set some kind of a straw man approach to developing what might be the limit in water supply and determine if there is any treatment available that will prevent this from getting into the water system. After this is done they develop a draft of the proposed regulation and present it to the public for comment; there is a period of 90 days or so, for comment by the public, by the water authorities, by the utilities and by environmental advocates. All those comments are then taken back into the Office of Drinking Water. Regulation is a damn difficult job, I can tell you. I am happy to say that I am in the research end of it. It is a very difficult task to establish that regulation and make it realistic. They take all these comments from the public, the utilities and the water authorities and pore over that document to establish the final rule. In addition, many utilities are unaware, and the public is unaware, that we do a lot of technical assistance. I was involved in a lot of microbial problems out in industry, we are available if we are invited by the utility. We are looking at watershed management and treatment deficiencies that might be occuring. We are also looking at noncompliance. What is causing the fecal coliforms? Can we control these problems? Several of us have been involved with people from CDC on the possibility of outbreaks in the community being food-related or water-related. Our area, of course, is water borne outbreaks. First, we must determine how the organism got into the system, identify the organism, and if we are lucky, catch it in time if we can still find it in the system. The community at risk consists of people who have normal health, and other special groups that are very sensitive to problems that might be occurring in water, these are called high risk groups. For example, senior citizens and infants, these people may be at more risk for certain kinds of microbial problems or chemical problems. We have a large group of people with AIDS, we have to be concerned about people in the hospital who are receiving skin grafts or having kidney dialysis.

We must also look at two kinds of exposures that make great risks. First, short term exposures that may occur anywhere over one to thirty days. Most of these are related to microbial problems, largely diarrhea problems.

These are going to be intestinal problems, respiratory problems, or skin infection; we have a variety of worker exposures that can be a problem because of body contact they have with poor quality water. In the long term the problems we are looking at are related to carcinogenic contaminants, such as chlorination by-products. In the short term, we have serious problems in areas like Central and South America with cholera. For example, the cholera outbreak in Peru, which is working its way through South America. The Health Departments there are more concerned about possible carcinogens from chlorination by-products, so they are very hesitant to disinfect the water. They refuse to do it in some places. They would rather take their risks with cholera. Well, in the last three or four years, something like 100,000 people have died from cholera. That figure comes from pooling the reports from Central and South America. That is a very high risk - we're talking about something that is going to occur to you within perhaps three days if you don't get to the hospital. The people of Central and South America have this concern that if they add chlorine to disinfect the water they are going to have a carcinogenic problem. They are heading in the wrong direction by ignoring the immediate problem of cholera.

The public loses confidence in water supply for a variety of reasons: water orders issued to the community; public notifications certainly don't encourage a lot of faith in water systems, particularly if they recur over and over again. I remember one situation I was involved in where the utility issued a boiled water order and they would hem and haw for about three or four days or a week and then take it off, put it back on . . . this occurred three times. By that time the people really got uptight, confused and angry because they felt the utility was not on top of the problem. People go to drinking bottled water for a permanent solution to the problem or try using some kind of water purifier. Other areas that could cause loss of confidence are reports in the media that there is something wrong with the water treatment, or it lacks something. Many of these problems relate to surface water systems that are using disinfection only to treat the water and really should be using filtration because the quality of the water is such that disinfection alone cannot handle it. The *giardia* is coming through, *cryptosporidium* may be a problem. These kinds of stories have a big impact on the public's perception of that water

supply.

I live in Cincinnati on the Ohio River. There are lots of utilities using the Ohio River as their source water; there is also a large chemical industry in the Kenawha Valley near Charleston, West Virginia. If any of those plants have an accidental spill, some of the those toxic materials can get into the river. The Ohio River Sanitation Commission monitors for this and alerts the water utilities to turn off their intakes to let that slug of water go by before re-establishing the water intakes and that has done a lot to help alleviate some of these problems. However, when people see this in the newspaper, they think, despite the fact that the utility may have a reserve of water that can last for 48 hours, their water is at jeopardy and the sale of bottled water climbs dramatically.

We have problems with some people with taste and odor and hardness of the water - so they just will not drink it. The public utilities are trying to resolve problems in certain areas of their distribution systems. Flushing sometimes works, but it doesn't always result in dramatic improvement, so citizens can get very upset. Waterborne outbreaks are concerns of the most serious nature and it takes the public a long while to accept that. Here is an interesting example on the problems involved in doing effective public notification. Last December there was an outbreak in a small community in Missouri, population of about 1,000. The community had no local newspaper, radio or TV. The immediate public notification consisted of posting messages on the door of City Hall and on the largest supermarket in town. People did not have any confidence in this. There were announcements made on the TV station of a nearby town; some people said they heard it but they really didn't think it was serious. CDC, recognizing that this local notification effort was failing, issued a notice of water borne outbreak. That proved effective: as soon as they heard that, the public began boiling water and the number of cases dropped dramatically.

I recently got a hold of an attitude survey that the AWWA Research Foundation developed to measure the public's attitude about their water supplies. Most people think their water supply meets or exceeds the federal standards and they are pretty proud of this. They get most of their information on water quality from newspapers, TV and radio; they get very little information from utilities. The public really believes that they have little control on the water supply. When it comes time to vote for treatment improvement and they recognize itis going to tack on a few pennies a day on their bil, they become rather reluctant to accept that to get higher quality water. Public officials and politicians generally think the quality of the environment has improved over the last ten years and that more emphasis should be placed on keeping the price of water supply the same as it has always been. That attitude is somewhat distorted. The AWWA survey reports that utilities believe the public feels that they do not have a problem with the water supply until they have a health issue, then they start complaining to the utility. Until then there isn't a problem so the utility thinks the public is satisfied. The utility's greatest concern has been the source of water: is there enough of the source water to keep supplying the needs of the community?

Those are some of the impressions that we have of the public's perception of water quality problems. EPA is working with the public and with the utilities on these risk issues. We have got to do a better job of getting the public involved with the problem in conjunction with the regulators and the utilities.

James Hanson, The University of Iowa

Dr. James Hanson is Professor of Pediatrics and Preventive Medicine & Environmental Health at the University of Iowa. His research interests include the effects of envrionmental agents on fetal growth and development and the epidemiology of birth defects.

I want to thank the organizers for inviting me back and allowing me to participate in this conference. I'd like to acknowledge two people that I don't believe are in the audience today. These two people from the University of Iowa helped with the Iowa Ground Water Protection Bill. Drs. Bill Hausler and Peter Isacson have worked in this area for many, many years. We need to acknowledge a debt of gratitude to them for their efforts which led to the creation of the Center for Health Effects of Environmental Contamination, which is really a very unusual academic, public health and state government partnership. It is also important to acknowledge David Osterberg, one of our state legislators who has been an active person in the area of public policy regarding environmental

health issues.

I have to admit to a couple of things having heard Katherine Kramer's presentation. I find myself in great agreement with all that she said, but having lived in the Washington, D.C., area in the last year, and then coming back here, I am increasingly mindful of the public suspicion and mistrust of government. I am reminded of the old saying from the IRS, "I am here to help you." I also have to confess to being a physician. I was particularly struck at the loss of public confidence in physicians and advice coming from physicians in the last few years. I think that is probably an accurate statement about the public. I think most people think of physicians as a group of individuals who were born congenitally unable to use the three little words "I don't know." You notice I didn't say that I don't know. I find it easier to say "no one knows" or "I know but I'm not telling."

I have quite a number of thoughts about these topics and found myself, as other speakers were making their comments, having a press of ideas. I suspect many of you did. My own background has been in dealing with risk issues from a somewhat different perspective over the years. That is, dealing with families who have children with birth defects, or with couples who are anticipating reproduction. Sometimes their questions focus on what risks might be occurring to their unborn child that may stem from exposure to real or perceived environmental exposures. For me this raises a concern that a number of the speakers have touched on, and that is the complexity issue. I think we all know from this year's healthcare reform debacle that neither the public nor policy makers do a very good job of dealing with highly complex technical issues, especially if they are treated strictly from that perspective. I would like to talk about an area I have dealt with over the years - adverse reproductive outcomes as risk outcomes. You can break down that risk into a variety of specific outcomes that concern people when they drink the water supply or in other settings in which they are concerned that it may represent a hazard to their unborn child. When we talk about adverse reproductive outcomes we are not really talking about just one thing. We are talking about a variety of things that range from birth defects to long term developmental disabilities. Still births, infertility - there are an enormous number of different kinds of issues. This makes the point that we have a very heterogeneous and broad group of health risk outcomes that we need to be aware of. At the same time, the public and the professionals are faced with an enormous number of exposure issues.

One of the things that I have been interested in is environmental health hazards. In my clinics around Iowa I often have families come to me and ask "Is this medication that I am taking going to cause a birth defect in my child?" or "I work in this kind of setting and I am exposed to one of these agents. What is the risk to my unborn child?" The most notorious example in my own experience occurred a few years ago in a Cedar Rapids clinic where a woman came to see me. She and her husband were contemplating reproduction and she had some concerns about her work environment. She was a chemist at the Palo Power Plant and she encountered a number of chemicals on the job. I told her I could give her some information about those things if she could give me an idea about which ones they were. Was there a particular one she was concerned about? She said she was really concerned about them all, and she handed me a list of chemical names two pages long. Besides the fact that I cannot pronounce most of those chemical names, the truth of the matter is there is no safety information available in terms of human health for a very high percentage of the chemicals on her list. We can deal with things like acetic acid (vinegar) and sodium chloride. This type of situation is a real challenge, both at the exposure end and the outcome end, for the health professional, public health official, or technical expert of whatever brand. Not only to communicate in understandable language but to set up a meaningful dialogue from which anybody, including the health professionals, could draw any conclusions about health risks.

This brings me to my next point: how do we identify health risks? I think in general the public and, in fact, a high percentage of the policy making community, really don't understand these issues. They don't understand that there are systematic efforts to identify and assess health risks issues, they don't understand the role of surveillance systems - health outcome registries. They don't understand that we need these collection and tracking systems in order to come to the kinds of information that we need to help people understand what health risks exist. The public also doesn't understand very well that there is a process of balancing health risks that we are dealing with all the time, that reducing a risk of one type sometimes means increasing a risk of another type. This isn't very well perceived, at least it doesn't seem to enter into the public consciousness. Living is not risk free. There is no safe level of getting out of bed in the morning. You could always slip and

break your neck. Unfortunately, there is no safe level of staying in bed either, because there could be an earthquake and the roof could fall in. The truth of the matter is that none of us gets out of this alive. We all face risks that we need to balance - that doesn't seem to weigh very heavily on the public consciousness, from my standpoint.

During the past year I have been dealing with the problem of vaccine policy for children in this country. One of things I have learned, that is relevant to this conference, is that there are a variety of barriers to effective public health actions like immunization. They can be lumped under different categories. There are problems with providers, there are problems with payers, there are problems with parents (in this case we could say the public) and there are problems with our system. If we are going to have an effective risk communication strategy for environmental health risks we are probably going to have to address all the components of the system. Let me say a word about the providers. It is clear to most people who are familiar with the issue that most physicians, most nurses, and most health providers do not have very extensive training in the assessment of environmental agents as potential health risk factors. They are not trained very well in the communication process. There is a tendency to say all we have to do is put the information out there and that is where the public health response ends. I think that is not correct. One of the points that I hope to leave with you is that an appropriate and adequate public health response and policy has to address our whole system. We have to address access to care and quality of care as well as equal access issues. Furthermore, an adequate public health policy includes addressing the need for accurate information and the need to be sure that the providers and the public can manage the risk as it is relevant to them. There is a need for the system to be able to respond.

Something that all physicians are taught in medical school is the *primum non nocere* concept: first do no harm. I think that is a very important issue here. It is insufficient to simply provide information on possible hazards while failing to provide the tools for management. This raises two concluding notions. First, this clearly implies that individuals must be empowered in their own behalf to be able to make decisions. This is not going to happen if we don't improve our comprehensive school health education programs. It is not going to happen if health departments and other state agencies that are concerned with environmental issues don't have a game plan that is proactive, that is working with the public to allow them to make decisions on their own behalf. Sometimes people are forced into a situation where they have to make prudent choices in the absence of very good information. There are a variety of other factors that enter into what an individual perceives as a safe choice. This raises several cultural issues. Not only the language problem but also access problems for cultural groups. In addition, minority groups are often in poverty and are associated with an even higher risk for environmental exposure. There are a variety of different cultures in this country; views of health risks and appropriate behaviors vary from culture to culture. We need to be familiar with and sensitive to those differing perceptions.

My final point relates to the issue of ethics. I absolutely agree that there are ethical problems and issues that we face in the environmental health risk management area as well in risk communication. The one that was stressed earlier was the issue of autonomy: people being able to make decisions on their own behalf. There are a couple of other ethical principles we need to keep in mind in this debate such as privacy, confidentially issues and the principle of nonmaleficence. It is not easy to reach a consensus on prioritization of those issues, especially across cultures. We clearly have an enormous task here, I hope that by the end of the day we will know more about the role of the media in helping us translate science and technical expertise in a way that will help inform policy debate. Hopefully that policy debate leads us to a more satisfactory conclusion - one that won't be involved in the partisan politics that too often victimize the process.

Lola Lopes, University of Iowa (moderator)

Lola Lopes is Pomerantz Professor of Business Administration and Professor of Psychology at the University of Iowa. Her research interests are in decision making under risk, and in behavioral and normative conceptions of rationality.

As one way of kicking off comments, questions and thoughts on the issues that have been raised, I

would like to throw in something from the perspective of one who is not an expert on water quality. I am, however, a member of a group of experts who have been much in the news lately. This is a group of psychologists who have been studying the public's ability to understand, think about, and choose wisely among different risks and different alternatives involving risk. One thing I think Katherine would think of as the old way of thinking about risk is that the experts and the public are very much at odds with one another, and the main job of risk communication is to get the public to do what the experts think they should do. That, in some way, the mark of understanding is for the public to accept not only the information but to accept the recommendation. I have personally disagreed with much of the emphasis of my colleagues in their analyses and claims that the public is very badly mistaken and unable to understand risks. I would like to simply toss out the kind of dimension that tends not to be talked about when there are assessments of public capability.

Very often, technical experts and people who are expert in the areas of risk assessment have mathematical tools for ordering risks and understanding risks that have embedded in them certain assumptions that are there for reasons of mathematical tractability, or this is the way that we have always done it, that kind of thing. When you ask risk assessors and experts to rank risks, very often they rank the order or seriousness of the risks in terms of the average number of fatalities that can be expected to come from the risk. Things that have large number of fatalities, like driving a car to work, are ranked as much more risky than things that have very low average rates of fatality. When you ask the public to tell you what they think is risky, they do not order risks on this single dimension of the number of fatalities. There appear to be two dimensions that concern the public. One has to do with whether or not the risk is one that has a steady rate of deaths over time versus the possibility of a catastrophic accident. Say, the difference between the number of deaths that are caused by injuries in coal mining (a steady rate) versus the possibility of a catastrophic event involved with some kind of nuclear power production. This is a dimension that sorts risk out for the public, but the issue of average number versus whether they are spread out or catastrophic does not inform the experts' assessments of risk.

The other dimension has to do with whether or not the probability figures that are available are ones that we understand very well, are based on the long accumulation of actuarial knowledge of risk, or are they the product of analysis of theoretical modeling, the kind of thing that gives us a risk probability that is of something that may be a technology that has not yet come into existence? So the public is very sensitive as to whether or not there is ambiguity in the risk estimates. From the point of view of assessing riskiness, neither ambiguity or variability in the goodness of the risk estimates nor the way risks are distributed (whether they commonly occur at low rates or whether there is a small probability of catastrophic risks) has become part of what the experts care about. For the most part the analyses that are being used are aimed at minimizing the average number of deaths and in both cases the variability and the distribution are compressed out of the measure that is being used as the measure of risk. When we say that the public does not agree with the experts, very often the public is saying that the standard deviation or some measure of the variability does matter to them whereas it doesn't enter into the expert's risk analysis. By the time this is cranked through the publication process, both in academics and in the public press, it comes out that the public is being irrational, that they don't understand or that they have psychological values that are not relevant to the assessment of risk.

I think it is a very interesting project that we embark on here today. We have people who are dealing with the issue of riskiness, the public response to riskiness, and the expert response to riskiness. We have a better chance of opening up some areas instead of seeing things as divided into the public versus the experts. We will be putting the questions out on the table for input from a variety of sources to understand what the issues are that divide people, what issues we do have in common and where we can look for solutions?

PANEL DISCUSSION The Experts - Questions and Answers

QUESTION: In yesterday's *Iowa City Press Citizen* there was an announcement at the top of the *Local* page -"North Liberty to flush fire hydrants today and Wednesday." It goes on to say "City official advises against washing laundry because the flushing may cause rusty water to flow through the pipes which can stain clothes." My question, to any of the panel, is if this was an adequate public notification? Are there some additional public health or water quality issues that are raised when somebody reads this? Might they be concerned about bacteria in the rusty water or other water quality problems?

Benjamin: Not having read the article, but from what I have heard right now I can surmise that they probably have some iron tubercles in their distribution system. Some communities go through an annual flushing process so that iron doesn't build up to the point that it constricts flow in those mains. Iron is an aesthetic standard only, there is no health concern associated with iron; so that is probably what they are doing. The aesthetics involve staining clothes and water closets if it happens to be in there in high concentrations on a continual basis. As far as whether the notification is adequate according to the rules and regulations, it probably is.

Geldreich: Looking at it in a more general perspective which doesn't relate to the regulations, I wonder if part of the difficulty may relate to the loss of chlorine residual in that part of the distribution system. One of the most important things I try to get across to the water plant operators is to keep the water moving. There are areas near the dead end of systems where there can be stale water conditions that encourage more corrosion, tubercule formation, and loss of chlorine residual. When you have those things happening your chances of finding bacteria multiplying are also increased. Tubercles are great places for bacteria to colonize and with the loss of chlorine residual you can't control that population. The regulations don't go into specifics; the water authority makes a judgment on how much they need to tell the public.

Hanson: I have a couple of comments. It seems to me that it would be useful to proactively say in the announcement that there are no known health hazards associated with iron. That would be reassuring, particularly in view of two things. First of all, the word that you used was "tubercles". To a physician, tubercles are things that occur in the lung when you have tuberculosis - I wonder if anybody in the audience would have that thought pass through their mind. Is this some kind of bacteria? Second, I also wonder how many parents out there know that you can be poisoned by iron? If a child takes his mother's iron pill, it might kill the child. Maybe it would be worthwhile for the notice to say that this form of iron is not a toxic form, if in fact that is true. So I would be more proactive.

Geldreich: That announcement, in my mind, was too brief. The public should have a little more explanation. The utility might have decided that they didn't want to get into an area that they felt the public wouldn't understand, and therefore kept the announcement to a very brief statement. There are, perhaps, other ramifications as well. We don't know until we see the data on the conditions of that particular situation.

Tubercles are formed in corrosion areas of pipes; over time, all iron pipes develop tuberculation . . . it's like icicles, or stalactites in a cave. It's in these areas, which are very porous material, that organisms can colonize. They are safe from the velocity of flow of water going past, and begin to multiply if they can find enough nutrients. In some cases, these organisms can begin to colonize the pipe area, and can spew off in the summertime, when warm water conditions occur, into the distribution system sampling. If some of these happen to be coliforms, it can become a nightmare for the distribution system, because you're suddenly out of compliance.

Kramer: If the community is used to this type of announcement and the community trusts the water authority, then this is an adequate announcement. What you have to do is establish a long term situation. If there are new residents moving in you are going to have to do some re-education. Hopefully after you work with your public for awhile this is going to be quite adequate and they are going to say thanks, and go on with their lives.

Geldreich: This is where the public needs both the press and the water utility to educate them on the

treatment of water, the processing of water and the distribution of water so they get an understanding of all the problems. It is not simply putting water of a certain quality in a pipe, it will deteriorate as it goes through the pipe if certain things are not done. We need to have an environmental report or an article on our water supply problems and solutions. Keeping the public educated, such as by the water utility putting little flyers or inserts or announcements in their water bills. Everything isn't bad, we can discuss positive things about water supply but also give them an understanding of what we are working with.

Dent: There is an old adage, "a little knowledge is a dangerous thing", that applies here. From the personal perspective, I say "What about my health?" Although I may have heard the announcement before, I think it is a sense of rapport with the public; if you understand what is important to them they are going to trust you more. Personally, my own health is more important than my laundry; I suspect other people will feel that way too. To me, publishing this notice strictly because of aesthetic considerations is ineffective in that it demonstrates a lack of awareness of where the human issues are. In many cases, we think that if we tell people something it is going to upset them, whereas in reality if we give them the opportunity for input and exchange of information, we could indeed calm them down. This tends to be a technical thing - we are afraid people will panic and not understand and in reality that creates the very thing we think we are avoiding.

Hanson: One other thing - was there a telephone number at the bottom? It would be nice to provide a number where somebody could call if they had questions. That is always a useful thing. I also wonder whether or not there was any coordination between the public water supply folks and the local health providers either in terms of being a resource on those health questions or coordinating so they knew what the other group was doing. That is something we repeatedly see breaking down, not because of any evil intent, but simply due to a failure to think about the needs of other agencies or other members of the system who are trying to deal with these kinds of concerns.

QUESTION: I would be interested in some observations. Technocrats often times get very involved in discussions about costs and benefits in this whole arena of risks. Sometimes it is put into the context of dollars and cents about the benefits of something we do versus the potential costs and/or risks involved. In a variety of public forums this sometimes becomes a divisive issue in terms of dialogue with the general public. I am interested in hearing about some of the work you have done in this area, and any perceptions you may have on the whole issue of cost benefit in terms of risk dialogue.

Kramer: I am extremely wary of the cost benefit analysis model. I quoted the one environmental publication that attacks comparative risk and cost benefit analysis saying it is the same thing. They are actually being using in conjunction with one another currently. My reason for avoiding cost benefit analysis stems from my work on the Colorado Comparative Risk Project where instead of looking at quality of life values we looked strictly at economic values. After struggling with a number of economies for about a year, we threw out all the information we had. We didn't feel we had enough information on all the issues; the information we had was questionable. We could determine environmental damage to statues but when you get into the willingness to pay and some of the other issues economists try to measure, I felt that there were very serious deficits with that approach. There are broader issues that have to be discussed and you can't put a dollar figure on, such as peace of mind and sense of community.

Dent: In public water supply, cost benefit is a very serious concern. It is part of a traditional argument in terms of minimizing risk and, even in AWWA's policy on water quality, it basically says with a reasonable cost. Whenever you use the word "reasonable" you ask "who decides what is reasonable in making that decision?" I think that is all part of the technical expertise - I think we are starting to rethink that. I have said to people "we shouldn't make this improvement because it is going to make things cost more, and water should be as cheap as it can be." We need to get away from that mentality and we probably are. Certainly *cryptosporidium* and its possibilities are going to move us. It gets back to when somebody says "you can get a nutritious meal at McDonalds, therefore you should always eat there because it is the cheapest alternative." I guess that's what the cost benefit analogy is to public water supply. Maybe the public wants something better and is willing to pay for it. I think the cost decisions

should also be public decisions as opposed to being decisions made by people who are providing the water and saying "this is the quality and this is the cost." I think those discussions are being had not only in water utilities but also in AWWA. It is a question of whose decision and whose money is it?

Benjamin: We faced the cost benefit scenario when we considered building our nitrate removal facility. Looking back at the history of nitrate in the Raccoon River and how it affected the Des Moines Water Works, we anticipated that we would probably be in violation an average of thirty days out of the year on the nitrate standard. When you consider building a two million dollar facility that you are only going to operate on average thirty days a year, maybe a normal cost benefit analysis would not support that. But at the same time, you lose face every time you go into a public notification to tell people not drink the water because it has nitrate in it. That really did not enter into the equation. A decision was made because it was something we had to do. The money was allocated and the facility was constructed. I think sometimes you weigh things other than the cost benefit analysis on those type of issues.

Hanson: I would re-emphasize the question "whose costs and whose benefits?" You can do these analyses in different ways - they also depend on whether or not a database exists from which you can extract that information. Speaking as a pediatrician and one who deals with children with defects, it is hard to find that data. Nobody wants to weigh it in. They talk about mortality but they never talk about morbidity. The failure to prevent a lifelong disability is a very expensive kind of cost. As a person who lives upstream on the Raccoon River on a farm which contributed to the nitrate problem in Des Moines, I am sure that the people in our community would be less likely to pay for Des Moines' problem. What I am suggesting is that the remediation strategy could have also suggested standards to reduce nitrate going into the Raccoon River. These are not trivial issues and I agree for the most part the models don't work very well.

QUESTION: I am the Public Information Officer for the Iowa Department of Public Health and my job is communicating health risks to the public. Let's talk about *cryptosporidium*. It's in the news -the network news magazines have done stories on it - yet the information that I get from the water experts I talk to is that there is no standard for it. The water experts say the tests for it are expensive and remediation is expensive. What I should tell media people and the general public about this? Is there a risk for us to be concerned about? Or is it something that we are going to have to learn to live with, and have been living with for the past fifty or sixty years and it hasn't been a problem?

Benjamin: As far as the regulation of *cryptosporidium* goes - there was an information collection rule that was to begin this year where utilities are required to start monitoring for certain contaminants. The approach is to gather the data, find out what the problems are and then start regulating the ones that appear to be problems. That has since been pushed back as far as enforcement of the information collection. As a water utility, we really don't have to start monitoring for *cryptosporidium* until next year. We were geared up to start it in June, so as a water utility we just made the decision to go ahead, incorporated it into our annual budget this year, and started a monthly monitoring. It is expensive not only to gather samples but to ship them off to Massachusetts for analysis. But it is something that we felt we needed to do to gather the data to find out whether we had a problem or not. I'm not sure where it is going to end up as far as what the regulations are going to be. I think it is a definite concern to utilities that are on surface water - they should not stick their heads in the sand and hope they don't have a problem. There are ways to remove *cryptosporidium* from a system. I talked to some engineers that are working on the Milwaukee situation and they are going to be recommending that the water utility has two levels of defense. *Cryptosporidium* is not something that you can't get out of the water, there is a specific filtration process that will do it - some are fairly expensive, but they have been known to work. At the Des Moines Water Works we have two lines of defense. We do lime softening, which is a high pH environment, then sand filtration is our second line of defense. Again, we are testing for it - so far we have not found it in our water supplies either in the raw side or in the finished side. This is not to say that *cryptosporidium* is not out there. It is just a matter of the sampling techniques used. It depends on seasonal run off from the cattle lots. This year the Raccoon River is very low. We are looking at putting flashboards up on our dam because the water is so low compared to last year, when we had more water than we could handle. So seasonal

fluctuations may be a reason why we are not seeing it right now. It is something we need to be aware of and hopefully have a line of defense in place that can get that out of the water.

Dent: That is a real issue. There is a lot of controversy related to finished water - what one or two oocysts means, whether they are alive or dead. This is really a case where there isn't a good scientific answer and that is why it is causing such a public issue, not only with water providers but with others. AWWA has issued a twelve point plan which we suggest public water providers follow. The main point of this is for those utilities who take it seriously to show that they are monitoring, to show that they care and that they have not only technical procedures in place but relationships with the Public Health Department in terms of notifications. This is the case where there is not a specific answer. It is like you don't put in filtration and the problem goes away. It is an ongoing situation that utilities have to prove that they are knowledgeable about and on top of, so I think it is different from a technical fix. It is ongoing awareness and solution finding and monitoring.

Geldreich: Information and collection rules are very difficult. They are rules that are being rushed through the system in hopes that the Agency can decide whether we need to enhance the surface water treatment rule by specifying certain treatment processes which will optimize our removal of *cryptosporidium*. Logically, the idea is to gather enough data from the states and utilities to make that decision, so that we have some reasonable assurance that the effectiveness of different treatments can be measured. The reason the ICR has been slow in getting off the ground is due to turmoil within our research, both inside and outside the Agency as to what is the best way to handle this, with respect to gathering the data. We have to recognize that the methods currently available may only recover 3% of the *cryptosporidium* that might be in a water system. The methods are not that good. We don't know whether we have viable cells in many of the cases or just the empty shell of an oocyst that we are looking at. If it is empty, it is dead - there is no problem. We can't cultivate it. So those present some of the problems that we face. When you realize that if you are using these current methods we really won't get down to effectively measuring the treatment ability to remove them because at 3% or at 5% recovery our feel for how effective those treatments are is questionable. In addition, only a handful of laboratories in the country are capable of analyzing for *cryptosporidium*. We have to develop performance samples that will guarantee that the laboratory that says "yes, we can examine for *cryptosporidium*" indeed is doing it properly. We have to go out and evaluate those laboratories before we turn them loose as an approved lab for an examination of *cryptosporidium* because the labor intensity of this and the special need to know how to do the tests is such that without some kind of control on it the data will be meaningless. We need some quality assurance on this problem. So it is a difficult thing. My understanding as of last week was they are hoping that the rule will start in the spring time; they would begin to get the start of seasonal variations spotted through looking at it in spring when the run off begins to occur. You may get certain levels of it peaking at different seasons, whether it is spring, summer or fall. They want to gather a year's worth of data, then go back and make some kind of determination on what enhancement we need in the surface treatment rule to ensure that we are doing the optimum job. It is very difficult, there are lots of difficulties associated with the mechanics of gathering the data, getting reliable data and interpreting it.

QUESTION: My question has to do with the example of the nuclear power plant worker that had two pages of compounds she was concerned about and the response regarding what do we know about these things, and should we be concerned about those things? It seems we find a lot of different compounds both in water and in air and maybe *cryptosporidium* is just another example of this week's hazard and risk. It seems that we are really, from a scientific perspective, in an infancy about chronic long term low dose exposure to many of the compounds that we commonly put into the environment. My question relates to how do we reconcile the difference between our scientific knowledge, which seems to be fairly limited for many of these compounds, and the public's desire to have a fairly high level of understanding about the risks we are exposed to through water supply and through toxic air pollutants? How do we reconcile those things? Also, it seems we spend too much time focused on questions of risk and not enough time on issues related to pollution prevention.

Hanson: Let me say that I am not sure that I have an answer. Reconciliation is a process that will be ongoing. I do believe that bad science rarely makes for good policy nor does no science make for good policy. I don't think there is a simple answer to that. As I tried to suggest in my earlier remarks, I think teaching people how to think about these issues, to reason with them and to work with them in regard to their own health outcomes, is an objective that I would include under the topic of "comprehensive school health education" is one part of a strategy. I think one needs to recognize that there are an enormous number of new compounds coming into the environment every year about which we know very little. You are absolutely right - there isn't a good way to address specific concerns of individuals; that was why I said sometimes you need to empower people to make choices on their own behalf that they feel are prudent. Prevention strategies are a part of that. Prevention is another one of those words like "risk" or "health" that most people think they know what it means. However, when you actually start to compare responses, people come up with wildly diverging ideas as to how to even define these terms. So I don't have an answer other than to say that I think we need to be alert to this issue and to try to promote getting information. I was remiss in not saying that just bad science or no science is going to make good policy; good science isn't adequate of itself either - it has to be communicated and used by individuals.

Dent: I think the point of talking a lot about risk communication implies risk acceptance is a very interesting point. Certainly in public water supply we are looking at a commitment to high quality service and the best possible water. There are a lot of implications to that. I would agree with you that too much emphasis on how to tell people about risk does imply that we are accepting it and we are not trying to improve the situation. I would suggest that public water providers are making a new commitment to high quality service.

Kramer: I would like to address your pollution prevention point. Having worked in that area for a few years, I don't think pollution prevention covers all the environmental problems we have to look at. It looks only at toxics. I think that is a very key area but there is a broader world to look at. Secondly, I think pollution prevention should be the first step any group takes. Unfortunately, having looked at the last five years of work in that area, we have picked a lot of the low hanging fruit. We also have cost benefit analysis we have to do now. For example, look at the farm situation with nitrate. Would a pollution prevention solution require some kind of system on every single farm and every single creek and every single river? What about *cryptosporidium*? What is the pollution prevention measure for that? I think you are absolutely right: pollution prevention is what we should look at first. But after we look at it, we have to make some reasonable judgments about how we can prevent the problem versus how we can treat it and what kind of cost would be associated with both.

QUESTION: I work for the Iowa Association of Municipal Utilities. We represent 510 cities in Iowa that operate water utilities ranging from the Des Moines Water Works to some of our very smallest communities. I think we have to go back to the question of affordability in any kind of risk issue. I agree that when we are talking about water quality it needs to go back to a public health issue where people can manage water contaminants from their own public health perspective rather than from an environmental perspective. Somehow in the 1960's the water industry got away from that and we heard about Silent Spring and Love Canal. Water was no longer a public health issue but an environmental issue. When people are given an opportunity to view water quality from an issue of public health, they start to make other choices if they know total exposures. I think lead is a good example of this. We might have a small Iowa community of 500 people faced with a corrosion control issue where their options might be removal of lead paints (which is the primary exposure for children) and providing bottled water to specific homes. They will make those choices on the basis of affordability. I think we are moving in that direction with the Safe Drinking Water Act (SDWA) reauthorization. I think there is a growing realization that SDWA should include variances for small systems and the development of best available affordable technology as opposed to just best available technology. That moves us into the next issue of a two tiered water quality system, and who has the right to be protected at a maximum level versus a secondary level? Anybody want to comment on that?

Hanson: You have raised a number of good points. A little while ago I commented on the need for good science and I implied that because we

don't have detailed health effects studies of many of these agents we can't give any information at all. There is another kind of information that is useful for the public to have which relates to mechanisms and routes of exposure. The reason I am responding to your comment relates back to the Rathbun Lake stories that people have probably seen over the last few years. They involved concerns about whether or not there were health related outcomes in people that may have been or are currently using that water source. One of the suggestions was that people perhaps should use bottled water there. Which brought up the question "is the bottled water tested for the same kind of compounds?" If, for instance, it was a volatile organic compound (something that would leave the water if it was heated) the primary source of exposure or risk would not have been from drinking the water, but probably would have come from bathing in it and inhaling the vapors. So the right response in that case would be not going to a bottled water supply but backing the bottled water up to your water heater, which isn't going to be a very effective thing. I think people need to understand the mechanisms and the routes by which they get exposed, and how these chemicals travel. They are not going to learn this in a comprehensive way for all chemicals, but they are going to need to have a mechanism by which they can get information about their particular concern when it comes up. I think part of the issue is a stratified capability and a coordinated capability between government agencies and the private sector. In this way, health officials and health providers will know how to respond when a family voices a concern so they can get information to use in their own behalf. It simply has to be stratified.

Kramer: One of the elements the public hasn't grasped is that they are not impacted by a toxic substance if there is no exposure pathway. Then it is not an issue for them individually. I think that is a really important thing. That is part of the area where the public can get more education, so instead of saying "this is out there in the world and I fear it and it shouldn't be there", they can talk about it more personally and say "this is how I come in to contact with it, this is how sensitive populations come in contact with it" and they can make an individual assessment about whether it is a real problem for them.

QUESTION: I want to ask a more general question of the panel. One thing that has been helpful for me is my own personal involvement as a citizen in public meetings. I have been active in urban neighborhood revitalization. I attend a lot of public meetings and usually I am pretty rational. I often feel myself acting as somewhat of a moderator in saying "yes, I understand this is complex", but ultimately I still have my pet issues. I enjoy asking my local officials questions about them and communicating my concerns about what I believe is the way I want the world to be. My point is that this experience gives me a perspective and empathy in dealing with the public from the other side. I ask any of you if playing the role of a citizen affects your communication as a professional? How does that work for you?

Kramer: I have a four year old son and I can tell you that changed my view of environmental health problems. I am a healthy person - I am going to survive - but I fear more for his exposure and it certainly changed my perspective. When I go out and give advice to people about risk communication I always say there is one key question that you are going to have to answer as a government official or industry official and that is "is this going to hurt me?" I gave some advice to a group in Alaska one time - I said "be able to answer that question personally when you go out to a meeting, if you can't you shouldn't go." An individual in the audience raised his hand and said, "well, I went out and they asked me if I would eat the fish that were contaminated with some chemical and I said "no" and my boss wanted to fire me." I replied that his boss should have asked him how he was going to answer before he went out. If he had said "yes" it would have been obvious he was lying and if he was going to say "no" and make the boss look bad then the boss shouldn't have sent him - the boss should have gone himself. I think it is very important to see both sides of this. If you are a government person or an industry person and you are not sitting where the people are sitting, you are going to be very ineffective at communicating.

Dent: Several people have raised this in terms of the levels of public debate. In terms of public water supply, one of the things we look at which can be an effective strategy is the comparison of risk in a real sense - there is probably more lead in paint than there is in water, there is more radon in the background in a lot of places than there is in the water. Unfortunately, when we use that argument, it puts us in the position of looking like we are

passing the buck and not caring. From the public affairs perspective it is a double edged dilemma, because if you only look at the facts and the data - there is more risk eating broccoli, there is more risk walking across the street - it seems as if you are uncaring. On the larger public policy issues the comparison of risks is extremely important. From the perspective of public water supply and the ability to have confidence in the community, it would seem reasonable to take responsibility for the piece that you can control. This is something we debate all the time. If people want to have confidence in the ability of the public water provider to provide high quality water, it may be in their best interest to say they are going to deal responsibly with the piece that they can control, which may be lead, it may be radon, it may be something else. There are levels of public debate here. Perhaps the larger questions of comparative risk should be left to other kinds of public policy debate. If people can take responsibility for solving a piece of the problem, that may also help build confidence in terms of the agencies responsible.

Hanson: As a physician, I think those are an important set of values to understand. In some instances, I am a consumer and I am not free of anxiety about these things myself. Obviously, I have an opportunity to try to access information in a more detailed way than probably most individuals, but I agree with you, I think it is very important to try to put yourself in the position of the average person hearing these claims. I think it is very important to understand that even if you, as a technical expert, don't think the risk is very high, there is still a problem if the public is concerned and you need to be responsive to that. I think this issue of building trust is terribly important to public health in this area. When the questions get to a relevant technical issue, they can be dealt with on a one to one basis. That is why I keep coming back to stratifying the debate - a public meeting is a good place to answer some kinds of questions but not a very good place to answer others. We would hope that a goal of public meetings is to advance the whole process. Under those circumstances, technical questions may not be very functional. I encourage you to always think about whether you are doing something that will improve the process when you, as a private citizen, ask a question. I suggest that you think about how that will contribute to the debate. We know that some people do that very well and other people do it with different agendas in mind. There are responsibilities on both sides.

QUESTION: You have talked in terms of risk assessment as a non-quantitative process and you have referred to it as a four letter word. There is another four letter word and that is data. Data is by nature quantitative and we have talked of these terms in parallel but separate fashion. How do we bring these together? As a scientist, how do I present data that will be believable so that it doesn't get thrown out by the risk assessors? I have one more point. When we talk about water and risk associated with water, we tend to focus on potability, but we have recreational exposure to water as well. I know people in this community who will not drink the treated city water, but swim in water in the Coralville Reservoir, which is the untreated version of the city's drinking water.

Hanson: Isn't that one of those issues of understanding about routes of exposure? If people were, in fact, informed they might modify behaviors or they might shift the area of debate into managing the Reservoir and not worrying so much about the Iowa City water treatment plant. That's what I meant about having come from a community upstream of Des Moines that contributes to the pollution of the Raccoon River. I am sure that I have contributed directly to the pollution of that River on several occasions. You can broaden this policy debate and propose interventions that become society wide. It is important for the public to be familiar with that as a different kind of approach.

FEATURED ADDRESS

"Public Health and Environmental Health Risks: Examples of Successes and Failures"

Richard Jackson, National Center for Environmental Health

Dr. Richard Jackson is Director, National Center for Environmental Health, Centers for Disease Control and Prevention, where he leads the CDC program to promote health and quality of life by preventing and controlling disease, injury, and disability related to the interactions between people and their environment.

I would like to talk about water issues: The Movie, not the snapshot. I think there is a tendency to take a picture and look at where things are right now and not look at where we have been and where we are going. Throughout history, water has occupied an almost mystical position. Paracelsus talked about all things being derived from water; Periclitus, the Greek, came along and said it all comes from fire. In the Christian tradition, Christ talks about water as a symbol for God's love, God's bond to the human race. When Christ is talking about water you can read the word "grace" in the connection to humanity.

I had the opportunity of spending several months doing smallpox eradication in India. I had a wonderful man who was my paramedical assistant who was an Indian doctor. He believed that nothing in the Ganges could be unhealthy. Every morning he would drink water from the Ganges. Everyone who has seen the Ganges knows what a public health disaster this would be. The man was never sick. I was sick the whole time, so maybe he was right and I was wrong. In fact, when you died you were returned to the Ganges. If you were cremated and put in the Ganges there was a good chance you would either not have to be reincarnated or you would come back as something better than you were. In America, we have adopted a very religious sense about water as well. The new American religion is that water has assumed the value of money. In California, for example, when you see the word water, that means money. There is a big fight going on in California about Mono Lake. This is a beautiful lake Mark Twain described; it is just beyond Yosemite to the east. This lake has been shrinking year by year because of the water diversions down in Los Angeles. One of the big issues in the West is water quantity, as well as water quality. In Irvine, for example, there are separate supplies for potable and non-potable water, almost like in a ship. They recognize that trying to provide perfectly pristine water for irrigation of golf courses is probably not going to be the wave of the future.

Have all of you read about the Cairo meeting on population? It was going to be a big fight about abortion and birth control. The most interesting conclusion from that meeting was that the most important issue to deal with in terms of population was the role of women. The empowerment of women, the education of women. If you go to places like India or Haiti, what do you think women spend probably a quarter of their time doing? Drawing water and carrying water. Huge amounts of human energy, intelligence and activity go into one of the most mundane activities you could think of: simply moving water from one place to another. A tremendous aspect to the advancement of our society was the fact that we could have all this free time because we were not carrying water from one place to another.

At the turn of the century, the life span of the average American was 42, right now it is roughly about 75. If you ask my medical colleagues why, they will say it is because they are such fine doctors and the medicines we give are so terrific and we are really watching out for people's well being. Everyone knows that is really not the reason. The reason that the life span of Americans has improved is basic public health: providing people clean and safe water; clean, abundant, safe and diverse food; good nutrition; good shelter and good housing. Good shelter and good housing primarily come from prosperity. Do you know what the most dangerous job an American man can hold is? The job with the highest morbidity and mortality in this country is unemployment. A take away issue here is that a good environment is, in the long run, good for environmental health, it is cost effective, it is cheaper than not doing something. Many times we find that people concerned about the environment and health, and people concerned about business prosperity and economics are pitted against each other, and they don't need to be. If you do a fair

analysis of the impacts of a bad environment you will find that it is very cost effective to maintain the environment at some level of cleanliness. The last item that caused the great improvement in human health in America was immunization. It is a disgrace that only about half of all the two year olds in this country are adequately immunized.

In the past much of our disease was related to water that contained microbes. I deliberately wore this tie today, it is the Epidemic Intelligence Service tie. In 1975, when I was a disgruntled physician, I joined the Public Health Service and that's how I got off to India. The EIS is a training ground for young physicians that want to pursue careers in public health. A bit of background for you: the father of epidemiology was a man named John Snow. He was a general practitioner in London around 1850 and was the man that anesthetized Queen Victoria for a number of her childbirths. He was very interested in the fact that there was a cholera outbreak in one part of London. By doing two things, mapping out where the deaths were occurring and by looking at the maps of the water supply (part of this is a shoe with a hole worn in the bottom, going out and actually examining the well system and the water supply), he realized that the outbreak was tied to a single pump - the Broad Street pump. Empowered with this information he could not convince authorities to take some action; how could little tiny things in water do any harm to great big human beings? No one would believe him, so he went down and took the handle off the pump. It was really a dramatic lesson in the fact that sometimes you are operating on pretty vague information. Doctors operate on vague information all the time. You have to make a decision and you have to take action because if you don't take action - that is a decision too. So a lot of our advancement in public health has been disinfecting water. Jersey City, New Jersey, was the first to have water disinfection because they couldn't clean their water very well. They discovered that if you add chlorine to the water that it can be rendered safe. This wonderful turn of the century technology has prevented enormous amounts of human disease and death in society.

Communicable disease outbreaks are far more common and more of a problem than chemical hazards, but the chemical hazards are not trivial. People have mentioned nitrate: I just want to say that there is really no reason that people need to drink nitrate. If fertilizers are applied thoughtfully, carefully, and away from wellheads, if wellheads are properly designed and feedlots are kept under proper control - people don't have to have nitrate in their wells. But throughout the United States (and Iowa is on this map) there are many areas where nitrate levels are high enough to be a problem in drinking water. This is probably the only drinking water standard that is set with no margin of safety. All other drinking water standards have a margin of safety - this is the level it is safe and you can usually go ten times over it before you see people getting sick. With 45 milligrams for nitrate there is really no margin of safety for the young infant who drinks this, in terms of his or her risk of becoming a blue baby and getting what is called methemoglobinemia. There is a double whammy here as well. Any of you that have been spit-up on by an infant remember that the curdled milk from a baby's stomach is somewhat different from you would expect from an adult's stomach. It is because up to about six months the baby's stomach doesn't put out much stomach acid. If there is not much stomach acid you have bacteria growth in the stomach itself and that is what enables the nitrate to cause problems. The lack of stomach acid is also a risk factor for a whole string of communicable diseases because stomach acid is a very effective way of killing bugs and germs that you ingest. One of the reasons milk is often a vehicle for outbreaks is because it is such a good buffer for stomach acid - bacteria survive and get past the stomach. Often times the wells that have problems with nitrate are also those that have problems with bacterial contamination.

There are many kinds of bacterial contamination. Two easy tests are the coliform test and the *E. coli* test. Not that we are really terribly worried about either one of these organisms. What we are worried about is that they are markers for a whole string of other intestinal diseases that can be spread. We have been sampling wells through the nine states using flood money. These are mainly shallow, privately-owned wells, to see what the quality and condition of wells is. It was interesting to see the display downstairs on a survey of shallow wells in Iowa. Analyses run about 50% with coliform and about 25% with *E. coli*. An awful lot of people are drinking very poor quality water and the prospects of fixing this are really very limited. Most of these folks are struggling, just trying to get by on the farm. It is tough to argue about digging a new well when this is the same water that your father and your grandfather and the rest of your family has been drinking for years. In California we actually passed a bond act that will allow folks to get very low cost loans to either hook up with

larger water supplies or dig safer wells.

An area where we have made considerable progress is lead. Lead is a divalent cation and your body is loaded with things that are plus--plus, like calcium. Your bones are primarily calcium and lead follows that. You use iron and lead follows that. It gets into all sorts of systems in the body. It retards the development of the brain - that is one reason there really has been a push to get lead out of our environment. One very important success was getting lead out of the air. A very effective way of getting lead into a human being is to put it into water. For 100 years, the best solder you could buy for joining pipes together was lead solder. There have been reports in Boston where babies that were on reconstituted formula mixed with tap water developed very severe lead toxicity. I'll come back to the issue of kids because it is a very important one. One of the take away points here is we have gotten rid of lead solder and we don't use lead in pipes, so there really has been considerable progress. There is a lot more we need to do with lead but we are making good progress.

I have talked about microbes and contaminants like lead and nitrate. The other group is the inorganic compounds. These tend to be the waste products of industry. One big problem we had around the Air Force bases in California was they were degreasing the engines with trichloroethylene right on the runways. The grease and solvents would go right down to the ground water and get into the drinking water in nearby communities. There was an episode around the Fairchild semiconductor plant in San Jose where a gardner noticed that the ground was sinking in one part of the office complex. It was discovered that the company had put 50,000 gallons of waste solvents from the chip manufacturing plant into a 5,000 gallon tank. This is while they were designing space shuttles. They were eighty feet above the major drinking water source for a million people. At the same time there were three babies with congenital cardiac defects in the immediate area. We can talk about the risk factors for congenital cardiac defects. This ended up leading to a study and a community advisory committee looking at solvents and drinking water. I'll come back to the community issue when I talk about the future.

PCBs and PBBs: a take away message about water is that one fish is probably good for about 1,000 gallons of water if the compound is fat soluble. If something moves up the food chain it is the fish you eat that is really going to be loaded with it. General Electric in New York dumped dozens of pounds of PCBs into the water system day in and day out. There were eels taken out of the Hudson River that probably were totally resistant to incineration because of the high levels of PCBs they had in them. The problem with these chemicals is they are fat soluble; they move up the food chain and once they get into your body you cannot get rid of them. You can take saunas, you can exercise, you can have fevers, you can lose weight, you are not going to reduce the amount of PCBs or PBBs. The only way you can effectively get rid of them is by nursing an infant. That is a very effective way of moving fat and these solvents out of the body. Walter Rogen cites the fact that half of all the breast milk from American women is unfit for human consumption under FDA standards. The last thing I want to say is that women should not breast feed! Breast feeding gives enormous psychological, personal, and immunological benefits. I want women to breast feed - pollution prevention is really where we ought to be going.

This picture was taken near the Stringfellow quarry in southern California. This was a hazardous waste site that kept overflowing and heavy winter rains would flush the overflow into nearby communities. We had a laboratory analyze the water that was coming through and flushing into the community and they said it only contained this, this and this. The community said "how could this be? There is froth and it's soapy and the stuff is filthy - how can you tell me that?" Finally we had the laboratory do a total carbon analysis and they found there was probably 100 times as much carbon in this water than normal. The analogy here is like going through a forest with a tiny little flashlight and looking at about 20 trees and saying "I really know that forest." You end up with technocrats who say "only that which I can see is really in there." In reality, there were a vast number of compounds in there that they weren't seeing by the usual methods of analysis. The other take away is that the public is always right - perception is reality. The public was saying "there is something wrong here" and we finally listened to them and paid attention and it turned out that there was something wrong.

I have very strong feelings that despite how craven American advertising is and how disappointing most political campaigns are, they know how to speak to most people. The average citizen can understand almost anything if someone takes the trouble of explaining it in reasonable terms, in layman's language. As pediatricians, this

is one of the first things we learn. You are sitting with a panicked Mom and you are telling the Mom you need to do a spinal tap and you are worried about meningitis but you don't want to say it that way and you try to put it in terms that she can understand. Very early in pediatric training we learn to cast things at levels that people can understand, but ultimately it is the citizen's decision - it is the Mom's decision about what is to be done. It is rare we can take the child away and do what we want, nor should we. This issue of empowerment of the public at a local level to make decisions is a very important one. I don't agree with Steven Brier saying that we need a panel of experts who are going to decide what the best thing is for Americans. I have seen it happen too often - the issue has been sucunded by special interests.

This morning, Kate mentioned the story of alar. In 1985, we at the Academy of Pediatrics wrote to EPA and said "you have allowed alar to be used on apples and apple products for 22 years. The Uniroyal Company never did a cancer bioassay. They were required to - by law." I am sure they didn't do it because they knew it was going to come out positive. Alar was used on apple products which kids eat about 15 to 20 times as much as adults do. The kids weren't deriving any personal benefits. So you start to look at whose risks, whose benefits? There were plenty of benefits for the apply growers: they could mechanically harvest, they could do a whole series of things. The kids weren't getting any risks, there were plenty of apples without alar. Most parents, myself included, if we had the choice, would rather have our children drinking apple juice that didn't have alar in it. I had half of the Academy of Pediatrics sitting at a Senate hearing in front of Mr. Harkin and Mr. Leahy with Meryl Streep on one side and Uniroyal Corp. on the other. Meryl Streep was saying "this was absolutely terrible, it shouldn't be there," and actually, Meryl was right. It was terrible and it shouldn't be there. Uniroyal Corp. was saying "this isn't so bad - it is a very remote risk, you would have to drink huge amounts of it and don't panic" and of course they were right. You shouldn't be chasing after the school bus to get the apple out of the lunch box. But from a prospective basis we are talking about millions of pounds of apples - you need to control that chemical. When you are thinking about parts per million - it just isn't worth having a mother that is worrying about her job and getting the kids to school and safety and guns at school, also worrying about these apples. It doesn't appear on her radar screen but it damn well should appear on the radar screen of those that are entrusted to worry about the well being of 250 million Americans or 50 million children, so there was real dereliction on the part of the EPA and I would like to give you the data. Uniroyal Corp. was forced to do a cancer bioassay after all this time. Remember that the NCI said alar caused cancer, the Air Force said it was a carcinogen but the "perfect study" had not yet been done. The Gold standard study in male mice used 40 parts per million, which is about 500 times what a child would get in their morning apple juice; it resulted in 60% of the test animals with these tumors. There were plenty of storm clouds on the horizon to tell us this was going to be a problem. A reasonable person would have said "look, until you can show this is safe, I don't want it in my kid's apple juice." I think that the default involved a code of justice, an English code rather than a Napoleonic code, in terms of these chemicals. The code of justice being you had to prove this was guilty before you could show that it was worth removing from food. The advisory committee that looked at this for EPA had one person that was a close industry consultant to the company that made alar, it had no public health official, no pediatrician, no one that really understood issues on behalf of children. It was a bunch of technocrats who within the technocratic reductionist view of looking at their issues said that it was fine - take five more years and do the study.

Let's take a look at the Movie into the future. Chlorination is good or at least disinfection is good. Every study that looks at disinfection by-products makes you a little nervous, particularly if you have brominated by-products. These things have shown up as carcinogens in test animals, and I guarantee your basic biological machinery at the cellular level is no different from any rat's or mouse's. It is very easy to dismiss it and say that it's just rats or mice but there are plenty of warning signs out there that too much of these chlorination by-products are bad for people. Where do you put the trade off? You don't do something ridiculous like stop chlorination and bring cholera to the western hemisphere. At the same time, just because you have a benefit from chlorination doesn't mean a whole lot of chlorination is good and a whole lot of chlorination by-products are good. I am fundamentally opposed to personal treatment systems and to bottled water. I am opposed to these personal treatment systems because they take the fluoride out of water and because people don't maintain them. They're terrific for about the first

two weeks. After that, people forget about them and bacteria begin to grow and then they are really a problem. I am opposed to bottled water because Perrier costs about $8500 a gallon. I think a thousand gallons of city water costs 88 cents. The provision of clean and healthy drinking water, I think, should be a fundamental right to every American and not simply the exclusive bailiwick of the wealthy and those that can afford to go out and get bottled water. I get very nervous when I hear people say "why don't we stop worrying about municipal water? Everybody can drink bottled water." I think the burden would very much be carried by the poor and we would be right back where we were 100 years ago.

Fluoride is wonderful. The most common disease in America is dental caries. One-ninth of the entire U.S. healthcare budget goes to dental disease in one form or another. Many of you have seen this with your own children - those of us who had twenty cavities when we were kids, our kids have one or two - it has been absolutely marvelous. Now, it's typical of America, if a little bit is good for us, we're going to have a lot. So now we've got fluoride rinses and fluoride in toothpaste. I take my kids to the dentist and he soaks fluoride on their teeth for thirty minutes; fluoride is in our drinking water. Too much fluoride is bad. The world of toxicology is filled with u-shaped toxicity curves where too little is bad and too much is bad. I'm worried that if we continue to over-do on fluoride we could have problems - teeth with deep mottling and even pitting related to too much fluoride. We need to titrate the amount of fluoride we are giving people very carefully because the antifluoridationist will use the issue of too much and argue against something that has brought enormous public health benefits. I would like to see us really be very careful with this one - there are a lot of politics around this fluoride issue.

A little earlier, I touched on the situation with solvents and drinking water in California. We really are going to have to think about what to do about shallow and bored wells throughout the Midwest. The wells that tend to be contaminated with inorganics are the same wells that are contaminated with bacteria. This involves the fundamental right of people to be drinking safe and healthy water. What do you think the first thing the people in Poland and other countries that were newly liberated wanted in terms of environmental health? They wanted information. They wanted their local communities to be empowered to know what was in their water, what people were doing. The government, up until then, had jealously guarded this information as a state secret and they wouldn't let the people have it. The point here is that the right to know, the community right to know - actually giving people information - brought about tremendous benefits. The toxic release inventory (TRI) contains information on how much toxin is being released into the environment from various sources. This is public information and is available to anyone, including decision makers. In San Jose, IBM was putting out something like 10 million pounds of solvents a year into the air in the local environment. IBM's own executives didn't even know they were putting this much out until it came out in the TRI. When they realized this, they swore to the community that they would get rid of it. IBM is down to virtually no emissions whatsoever through changing and controlling manufacturing processes. Empowering communities with information is really the future. One thing I would like to see, and I have been talking to Lynn Goldman at EPA about this, is how we can allow access through either the Internet or libraries to this information so people can look at emission data, geographic data, water data, birth defects data, cancer data and empower communities to really be involved in making their own decisions. Industry really has made progress. Remember the spill into the Rhine River in Switzerland where people were so furious about it that they chased the executives down the street? A lot of this decision making comes down to good citizenship. I have a rule - if I put together an advisory committee I don't let lawyers on the advisory committee because lawyers are trained to protract the issue, to divide it out and divide it out. My experience is that people of good will, people interested in the community, can often come to a resolution at the local level far faster than having someone from the federal or state government or the legal profession help them figure it out. I think the role of the citizen is really the take away here.

The next take away is pollution prevention. It is very expensive to clean water when you are doing it downstream. It is much easier to control when you are loading millions of pounds in airplanes to dust various fields for this or that . Controlling it at the source, thinking about the end stage impacts makes much more sense than trying to control tiny amounts at the far end. There was an outbreak that I worked on in the Sacramento River involving a tankcar that fell in that contained metham-sodium. 19,000 gallons of this very potent herbicide spilled into the river and basically

sterilized the river for 35 miles. We would have had deaths if it had been in an urban area but it was far enough away from the community that it did not. It did cause a terribly toxic virtual tear gas, which got into the community. Pollution prevention. This was basically the same design tankcar they use for transporting milk or water. It is 3/8 of an inch steel, isn't braced with girders or bars. You can design tankcars that can take a 25 or 50 foot drop and not burst. Like double hulled ships. Pollution prevention.

The laboratories are always finding new things that we need to worry about. The big issue you will hear about in the next few years is endocrine disrupters. These are chemicals that sit on estrogen receptors and exert weak but long term estrogenic effects day in and day out. You are going to hear about studies dealing with PCBs or DDT or DDE and breast cancer or endrometrosis or lowered sperm counts. One fascinating study was done where fish of indeterminate sex were put in a cage in the Thames River upstream of the city of London and fish were also put in downstream of London. After a period of time, it was found that 90% of the fish were phenotypic females in the cage below stream and (of course) it was 50/50 male female above. I don't know what this is all about (I don't think anyone does) but the decreasing sperm count, the increasing rates of certain reproductive cancers - they are alarm signals, storm clouds on the horizon.

A couple of quick take aways - one is the issue of interdisciplinary research. I am very impressed in my new job that there are a whole bunch of very bright people who don't talk to each other. There are walls in between those in the genetics discipline and the communications discipline, you name it. We really need to think about better ways to force that connection. I think Iowa has been a tremendous leader in that whole role. One pediatrician told me that the shelf life of human beings was so short that it doesn't make any sense worrying about adults - virtually nothing that we do here is going to make much of a change in the well being of our health. We are really talking about the trajectory of the environment and the world that we are going to give our kids and our grandkids and just because we may not personally benefit from this doesn't mean that it isn't a worthy fight, it isn't a worthy task that you have been working so hard on and Iowa has been providing such leadership on. Thank you for inviting me.

KEYNOTE ADDRESS

Disease on Tap: Milwaukee's Drinking Water Crisis

Don Behm, *The Milwaukee Journal*

Don Behm has been environment reporter for the Milwaukee Journal since 1985. He was the lead reporter for the Journal's coverage of the 1993 cryptosporidiosis epidemic, and has written major series on abandoned waste dumpsites in Wisconsin, contamination of the Great Lakes, and agricultural pollution of Wisconsin's lakes and rivers.

I thank all the sponsors who got me out of the newsroom for a few days. I apologize to the audience, I am more comfortable in my role as a reporter because I ask the questions, not respond to them.

At 10:00 p.m. on April 7, 1993, Mayor John Norquist warned Milwaukeeans to boil their drinking water because health officials suspected that the metropolitan water supply was a carrier of a microorganism causing widespread intestinal illness. This was a Wednesday night. For more than one week prior to that announcement, the local media had been reporting that pharmacies and grocery stores had sold out of diarrheal medications and that many schools were being hit heavy by the absences of both staff and students. During that week public works officials had repeatedly denied that the water supply could be the problem. Also, for a week or more prior they had been inundated with phone calls complaining about water quality for one reason or another: color, taste, odor. We all know today that the nation's largest outbreak of waterborne disease in this century occurred at Milwaukee in March and April of 1993. That epidemic of *cryptosporidiosis* sickened about 403,000 regional residents, according to state surveys. *Cryptosporidium* infections also caused the premature deaths of more than 100 people, most of whom had AIDS, cancer or other problems with impaired immune systems. I call those premature deaths because this debilitating infection brought on their deaths much more quickly. The ages of those people that died were from three to seventy-three years old.

Since April, 1993, more than 1,400 claims have been filed against the city of Milwaukee and the Milwaukee Water Works seeking a total of $25 million dollars in compensation. The claims involve people not only from the Milwaukee area but from 10 other states as well. People visiting Milwaukee during this time period also became sick. They include hockey team members and their friends from all over the country who were in town for a hockey tournament. They include the crew of a coast guard vessel who were working in Lake Michigan and docked in Milwaukee for one day and made the mistake of taking on fresh water in Milwaukee. By the time the boat returned to the opposite side of Lake Michigan, about a week later, everyone on board was ill.

Why did the outbreak happen in Milwaukee? The city's Health Commissioner now says it was caused by complacency on the part of the water treatment plant managers. Public works officials insist that their employees had simply settled into a routine after many years of serving a safe product to the public. I should tell you that no one in Milwaukee has lost their job as a result of the epidemic. The people most criticized were the stock boys at pharmacies and grocery stores for not being able to keep up with the demand for diarrheal medications. Diarrheal medications have no effect on *cryptosporidiosis*. Part of the answer to my question on why it happened in Milwaukee was the failure of federal environmental officials to raise an alarm about possible *cryptosporidium* contamination of public water supplies, particularly in those communities using lakes and rivers as a source of their water.

The U.S. EPA made a judgment call in the late 1980's and decided that precautions taken to remove the parasite *giardia* would be adequate to reduce the risk from *cryptosporidium*. That decision was contradicted by their own internal research and by several researchers working for EPA under contract. This is what they knew: generally, *cryptosporidium* is found in higher concentrations than *giardia* in those surface waters where both are found, and that both are widespread in the United States. The inactive stage of *cryptosporidium* is much smaller than the inactive stage of *giardia*. Also, *cryptosporidium* is more resistant to chlorine than *giardia*. One reason given for the reluctance to act several years ago was the

crude *cryptosporidium* testing procedures available in the 1980's. By assigning a secondary status to this parasite, EPA caused research on testing procedures to remain at a low level. To this day, we are stuck with those inadequate testing procedures. There is an ongoing debate about the reliability of using those procedures. In fact, we are told that a negative result is not considered a reliable finding that there are no *cryptosporidia* present in the water.

Several local decisions helped set the stage for the nation's largest waterborne disease outbreak. One was the 1962 opening of the Howard Avenue Purification Plant, the city's second plant, which was located on the south side of Milwaukee County. The water intake for this plant was built one and a half miles off the shore of Lake Michigan and just a few miles south of the city's largest sewage treatment plant. Believe it or not, the Milwaukee Water Works, in a brochure published in the late 1970's, described the location of that intake pipe as "beyond any contaminated waters which might exist near the shore." Everyone knows better than that now. It is a good bet that the *cryptosporidium* that toppled Milwaukeeans by the thousands last year came from cattle manure washed off fields into streams. It is a good bet because we will never know where it came from. Other possible sources are slaughter houses in downtown Milwaukee or overflowing sewers. Milwaukee now has underground sewage storage tunnels to prevent the overflow of aging downtown sewers directly into the river and Lake Michigan.

Regional media continued to raise the possibility of other sources. Most recently, a freelance writer from a small city in Wisconsin went from office to office trying to sell a story he had. He visited our office, we turned him down. He visited the other daily newspaper, the *Milwaukee Sentinel,* that paper apparently turned him down also. He started knocking on the doors of television and radio stations. Finally, one television station bit the story and aired it. It was picked up by wire services and it ran in some of the Chicago papers. His story was that the *cryptosporidium* contamination was caused by a quickly expanding population of whitetail deer in the suburbs around Milwaukee. The debate and discussion in the Milwaukee area still goes on. People want to know where this *cryptosporidium* came from. In 1916, President Woodrow Wilson's personal physician already knew that the intake pipe for the water supply on the south side could bring in contaminated water. He knew that the city's water supply was contaminated and he refused to allow President Wilson to drink Milwaukee's water on a visit there. Dr. C.T. Grayson told the *Journal* in an interview "Let the President drink Milwaukee water? Certainly not. It is barbarous for a city like this to pump it's raw sewage into the bay and then pump back the water to drink. The President does not drink any water except that which is brought along." Shortly after that, Milwaukee had another bout of typhoid and there continued to be problems with other bacterial illnesses. After Milwaukee started chlorinating and built filtration plants, a lot of the bacterial illnesses were finally prevented.

The next significant local decision that played a role in the *cryptosporidium* outbreak came in September, 1992. The Milwaukee Water Works changed the chemicals it used in the coagulation of particles during the treatment process to reduce the corrosiveness of water it distributed to households in order to cut the amount of lead leached from household pipes. The Water Works decided to halt use of alum, it's traditional coagulant, and instead use polyaluminum hydroxychloride, which is an effective substitute. The switch was praised by local officials as being well ahead of pending federal deadlines for reducing corrosiveness and preventing lead poisoning. Plant operators and chemists were given training on the new coagulant's use and everything worked fine until March, 1993.

In March, they lost control of the purification process at the Howard Avenue Plant. From March 11 to March 23 chemists at Howard Avenue faced recurring problems in the coagulation and the floculation of the settling stage of the purification process and they were unable to reduce turbidity, a measure of suspended particles, below 2 units on the commonly used index. That happened despite the chemical manufacturer's boast that the measure of particles remaining in the water would be .75 or less on the index at that early stage in the treatment process. Turbidity levels of water coming out of the coagulation stage peaked at 5.8 on the index on March 23. At the same time early spring thaws, on March 23 and 24, could have flushed organisms off upstream fields. The winds could have stirred up sediment in near-shore areas and pushed them out toward the intake pipe. We do know that on March 23 and 24 bacteria counts in the lake water increased 100-fold from one day to the next. Starting at 11:00 p.m. on March 23 and for five days thereafter the plant's filtration system lost effectiveness. On March 27, the turbidity of water coming off the filters at Howard Avenue rose

nearly ten times the normal amount. During that time, many Milwaukee County residents were likely exposed to the parasite that would sicken them between two and twelve days later with acute diarrhea, vomiting, and gut wrenching intestinal cramps. On the 27th, operators boosted the amount of polyaluminum hydroxychloride used in the coagulation stage. On March 28, chemists at the plant tried cutting the dosage based on speculation that too much of the chemical would contribute particles to the process. This did not work either and workers increased the dosage again on March 30. This guessing game continued until the 31st. On April 1 turbidity in the finished water dropped to normal levels and plant officials resumed the use of alum. They responded to turbidity problems and the turbidity index because that was their only indicator of water quality at that time. During the same period, March 23 to 28, plant operators had steadily increased use of another chemical, potassium permangenate, to help reduce taste and odor. They were facing considerable taste and odor problems which they dealt with every spring due to spring thaws and rains flushing manure and everything else into Lake Michigan. Turbidity of water entering the regional distribution system rose dramatically on March 27 and by 7:00 a.m. the next day it matched the plant's highest recorded turbidity in a decade.

By Monday, March 29, complaints of cloudy or yellow-brown water had overwhelmed the Water Works offices. People calling with these complaints were not seeing *cryptosporidium* and they were not seeing what most treatment plant operators would call turbid water. Even at relatively high levels of turbidity you can not see the particles with your naked eye. These people were probably calling with specific localized problems. There might have been a break in a water main, there might have been some local construction, there might have been any number of other problems related to an individual home's water, but they were not seeing *cryptosporidium*. A month later, state and city health officials who were checking patient records at local hospitals and clinics discovered that the first major surge in illness began on March 29. Exposure to the infectious parasite likely occurred two to ten days prior to that depending on the age and the health of the individual. In early April, Water Works officials said their problems did not start at the plant until March 29; that statement is obviously contradicted by records in the community. City officials never admitted that operators lost control of the purification process at Howard Avenue. They would only say the plant was meeting all federal drinking water standards at the time, which it was. After a brief investigation, an EPA official explained that an unknown number of the protozoa likely contaminated the metropolitan supply because plant operators and chemists lacked experience with the new coagulant in spring applications. For that reason, the EPA official said, it took four days in one of the instances, March 28 to March 31, to determine the proper dose of the new coagulant to use.

This crisis occurred because the water utility did not employ better monitoring technology, such as turbidity meters and particle counters on each filter. Instead, they relied on a plant wide turbidity measure. Individual meters on filters have been advocated for several years by the American Water Works Association and many independent researchers. Today, the Milwaukee Water Works has those monitors on each filter at each of its plants. That was a big step forward in the wake of the outbreak and it was a big step forward in returning public confidence to the water supply. One of the reasons is the frequency of testing for *cryptosporidium*. Water samples from each of the two purification plants are tested weekly. Proposed state regulations require only monthly testing for *cryptosporidium*. The Milwaukee Health Department now has it's own *cryptosporidium* testing capability, but after a water sample is collected it still takes two days or more to analyze the sample and receive the results. This is one of the few municipal laboratories in the country with that capability. Prior to this summer, Milwaukee was still shipping its water samples to the Wisconsin State Hygienic Laboratory at Madison to test for *cryptosporidium*. That took a week or longer, up to three weeks in some cases. By the time the utilities received the test results they no longer reflected the current water quality. Even with the city's own lab, and a delay of two days, the water has gone through the system--we drank it and sent it back. It is important to have particle counters and turbidity meters on individual filters for that reason alone. By using particle counters the utility can assess size and number of particles in water as it passes through the plant. If there is a large amount of particles with a of range of 3 to 5 microns or larger it would be prudent to expect that some of them could be *cryptosporidium*.

In addition to new monitoring equipment, the Milwaukee Water Works hired a consultant engineering firm, CH_2M Hill, to review each step of

the water purification process and recommend improvements. It looks like the City is going to accept all of the firm's recommendations, which will involve a package of three basic improvements to its plants. One step would be bringing in ozone treatment at both plants, providing them with a better weapon in the fight against this type of protozoa. Step two involves extending the Howard Avenue water intake by almost another mile into Lake Michigan to get it further away from the influence of the Milwaukee River. Step three is maintenance on the two plants. The total cost for all improvements would be around $89 million dollars. For residential households that comes down to an increase in their water bill of about $16.00 a year.

PANEL DISCUSSION The Media - Getting the Story Out

Stephen Bloom, The University of Iowa (moderator)

Stephen Bloom is Associate Professor in the School of Journalism and Mass Communication at the University of Iowa, where he teaches medical and international reporting and feature writing. He has worked as a reporter for the Sacramento Bee, the Los Angeles Times, the Dallas Morning News and the Chicago Sun Times.

Journalists and public health officials... they go together like oil and water, bleach and ammonia, Grecian Formula and Santa Claus' beard: they don't mix. They are natural adversaries.

What we've done today is assemble all these people. They are not moving targets today, they are sitting in front of you. No one is going to leave the room, we'll lock the doors if we have to. Journalists always want to know "why wasn't that public official telling me the truth?" or "why did that public official just tell me part of the truth?" The public official in turn says "that reporter got it all wrong... my job is on the line now.

You are natural adversaries.

Let's begin with some thoughts from the panelists regarding any thorns in their sides about public officials, about how you go about reporting the problems you encounter from editors on one side who say "clarify it and simplify it" and officials on the other side who say "that's too simple."

Tim Burkhardt, *Health & Environment Digest*

Tim Burkhardt was previous editor of the Health & Environment Digest, a publication of the Freshwater Foundation. In September, 1994, he took a position as Research Scientist with the Division of Environmental Health at the Minnesota Department of Health.

My comments will be relating to my experience as editor of the *Health and Environment Digest* for the last two years, a monthly subscription newsletter that covers a broad scope of environmental health issues--often water related. I am going to tell a few brief stories about some of my experiences as an editor dealing with setting up issues in the *Digest* and some of the things that can come into play. The first issue I want to discuss is on infectious disease. The story, subtitled 'New and Forgotten Risks,' was about how for the last fifty years environmental health has focused on chemical risks. That is what the *Digest* was created to deal with. Increasingly, we are becoming aware of new risks from pathogens and recurring risks we thought we were done with. One of my efforts at the *Digest* was to redirect some of the discussion in this field back to the emerging and reemerging issues of infectious agents such as *cryptosporidium*. A story I want to tell today relates to another issue that we did and is a pun on the telephone game (where you have a line of people transmitting a message and you laugh at the final version). This article was written by Joan Rose, a Professor at the University of South Florida, and contained an estimate by the CDC of the annual enteric diseases reported to CDC, an estimated 940,000 are waterborne. That statement didn't excite anyone one way or another when we published it. However, later in the year the Natural Resources Defense Council came out with a report that was splashed all over the media called "Think before you drink." It documented the violations of public water systems around the country. I was somewhat distressed to discover that as one of the backbones of the report was the 940,000 diseases figure, quoted and cited from the *Health and Environment Digest*. The context of the NRDC report was vastly different than the context of our story. The report was from an activist point of view and used the number as "Oh, my gosh, this is a huge number and this is what the government is telling us." The authors didn't go back to the original research which was published in the *American Journal of Preventive Medicine* but lifted it straight out of the *Digest*. They neglected to recognize that the 940,000 figure was all waterborne diseases from <u>all</u> sources, not just drinking water. I am sure the NRDC report was summarized in a number of newspapers.

The issue that gave me the most problem during my time as editor was on the proposed ban on chlorinated compounds. Several environmental groups, starting with Greenpeace, the American Public Health Association, and especially the International Joint Commission, had come out with a proposal to ban all industrial chlorinated

compounds. What the *Digest* attempts to do is give public health officials and others a concise, accurate, scientifically-based summary of a current issue. This is something that was in the press a lot--often reported in inflammatory ways. I thought it would be nice to give people something useable. More people turned me down to write articles for this issue than any other. Most people knew about it and had an opinion but were reluctant to get into such a polarized issue. One of the most interesting things I learned is that most people who do not support a ban of some sort say it's because you can't ban an element of the periodic table. The fine language in the proposal was not to ban chlorine as an element but to drastically curtail industrial production of synthetic organochlorines. That is not the same as banning an element. It is my perception that miscommunication has really heightened the polarity on this issue. The Michigan Environmental Science Report to the Governor on Chlorine indicates how the state should respond to the issue of chlorine. One of their findings was that language alone has been a major stumbling point and has helped escalate the tensions.

Randy Evans, *Des Moines Register*

Randy Evans is an assistant managing editor of the Des Moines Register. Since 1988, he has been responsible for the coverage of Iowa, and has directed coverage of such major events as the United Airlines jet crash in Sioux City and the 1993 floods.

Before I became an editor my hair was dark; I don't know if there is a correlation or not. The job of the media is to serve as an information agent for the public; to provide the information that people want to know or ought to know; to ask the questions that the public is not in a position to ask directly themselves. One of the things that is uncomfortable about the whole process is that journalists, whether they are working for a newspaper or television, aren't historians. They don't have the luxury of sitting back and waiting one, five, ten, or fifty years for this mountain of material to settle, then sift through it to analyze it. The public wants these questions answered yesterday, not tomorrow morning or tonight on the 6:00 o'clock news. It creates a real pressure to sort out misleading or misinforming information. The task is even more difficult because there are so many points of view on any issue--who's opinion do you believe? Even in an agency like the EPA you have conflicting opinions on the significance of something or how big an issue or problem might be. Utilities have their experts. Government agencies and academic institutions have their experts. The environmental activist groups have their experts. All these different points of view are the recipe for gray hair.

One of the obligations of the media is to work our tails off to make sure that we talk to as many people as we can, to check and double check facts, to play off one point of view against another, and then to provide lots of information to the public. One of the things that aids the process is when the people who are involved take an enlightened approach. The officials at the Des Moines Water Works did that last summer when they were confronted with what could have been a gigantic public relations nightmare. There were questions about whether the Water Works personnel had been as attentive as they ought to have been toward the magnitude of the problem (given the heavy rains upstream in recent days). They were able to transform this into probably the best thing that has happened to the utility from a public image standpoint since they first turned on the taps. They had a general manager who was willing to stand in front of the public and before live television cameras answering any questions that came his way. L.D. McMullin provided information without flinching, without being defensive, and as a result people trusted him. You don't find that same approach to openness and candor with some companies or government agencies. The public perception of some of these entities and their officials is suffering because of the appearance that they are not accessible or not completely candid. That kind of public relations has undermined the reputations of some companies.

I have talked about the responsibility of the information providers. The media have equal responsibilities too. We have to be aware of how fragile public attitude and perception is and how easily it can be affected by inaccurate, misleading, or misinformed reporting. We have an obligation to keep checking and rechecking what we hear. We have an obligation to work hard to translate complex, scientific, and technical material without oversimplifying it. One way to be accurate is to lay it all out in the jargon and lingo of the technical speciality--but the public's perception and

comprehension might be zilch. Going to the opposite extreme is also a danger. We have the responsibility of insuring that the people who are working for us, who are writing about these topics, are knowledgeable. That doesn't mean we have the ability to go out and hire people with master's degrees in public health to write about the environment. However, it is incumbent on the media not to just grab some reporter whose qualifications are having a pulse and expect him or her to be a successful questioner, interpreter, and analyzer of complex material. We have to make time available for them to understand the material. Deadline pressures and pressures on the media companies to get more blood out of the turnip create the kind of demands that make it difficult for a reporter to get away, to go off to a conference for three or four days, to become better informed--to be a better journalist.

Chuck Laszewski, *St. Paul Pioneer Press*

Chuck Laszewski has been the energy and environment reporter at the St. Paul Pioneer Press since 1987. From 1980 through 1987 he was a police and fire reporter for the Pioneer Press in the Twin Cities.

The great thing about being a police and fire reporter is that the risk is obvious--either the house burns down or doesn't, either the gunshot victim lives or dies. It is not so easy with coverage of environmental risk on a lot of occasions, problems are more clear cut than others. For example, in 1982 there was a suburb north of St. Paul that discovered trichloroethylene solvent in its well water. Immediately the Health Department said, "you can't drink that stuff, it is well above what we consider a safe limit . . . it is a suspected carcinogen . . . that's it, you are done - turn off the wells." It is easy for us to come in at that point and write the stories that say, "New Brighton can no longer use those wells," and "people won't be able to sprinkle their lawns because they are going to have just barely enough water for necessities."

Follow-up stories focused on the possibility of New Brighton having to invest a lot of money for new wells, reporting on what trichloroethylene is and if it can lead to cancer, and zeroing in on what happened and where it came from. It turns out it came from an Army ammunition plant which had for 40 years, since World War II, been turning out ammunition. The plant has also been used by Honeywell and 3M for a place of research. They had been dumping all kinds of stuff down the sewers. The Army officials not only wouldn't tell us, the reporters, anything but they hadn't been telling the state officials what was going on either. They blocked them at every possible turn and would flat out lie when asked. That makes it difficult to tell the public what is real and what is not real, how concerned or unconcerned they should be.

Another example: there was a piece on farming and what it was doing to water supplies in southern Minnesota around the Minnesota River valley. The researchers were finding a lot of nitrate--fairly easy to quantify--they were also finding the herbicide Atrazine in the water. Atrazine shouldn't be in the water, that much we can agree on, but nobody could really say whether it was harmful or not. Sure, it does a hell of a job killing weeds but does it injure humans? Are babies and senior citizens at a higher risk? At best, we could tell the public there was research going on. The agricultural officials in the state were not ready to take any firm action other than to advise farmers to be careful on how they applied Atrazine. That doesn't reassure people.

Reporters have people telling them different things depending on where they are coming from. We have to try and sort it out in a way that makes sense to us and to the readers--sometimes we do a lousy job. I was really made aware of this problem when I was at a conference two years ago. A scientist came in and started lecturing on the greenhouse effect. He said, "you give all this coverage on the greenhouse effect to one scientist who is way out on the fringe, 90% of the scientific community believes that there is a problem with the greenhouse effect." In the afternoon another scientist came in and talked about the greenhouse effect. He said, "You know that scientist you listened to this morning? What he said was no good." Then he said that he was doing some really important, interesting work and that we ought to do more coverage on him. If the scientists can't agree--what possible help are we going to be? All we can do is do what we do on any of our beats--whether it is environmental reporting, risk reporting, or police reporting. We need to interview as many people as we can. Grab the documents, as Don

Behm did in Milwaukee, and actually see what is being written down--it is harder to lie on paper than by speaking. Then try to figure out who is closest to the truth; who has the most credible criticism of those who are voicing their points of view. That is the best we can do.

Steve Swanson, *Chicago Tribune*

Steve Swanson has been an environment reporter for the Chicago Tribune since 1988. He received the Chicago Audubon Society's award for Outstanding Chicago Environment Writer in 1990. He has also covered city and suburban assignments for the Tribune.

In the time I have been writing about the environment, drinking water issues have raised some fairly typical problems that environmental journalists face as far as translating complex information for a general readership and understanding confusing standards. I would point to a couple of situations I have written about. One problem that has cropped up in the Chicago area drinking water is excess radium. The radium is due to a geographic strata that runs around the outer ring of suburbs. It goes along the Fox River down to Will County bending to the east around Joliet. The U.S. EPA, under the Safe Drinking Water Act, required many communities to start taking action to lower the amounts of radium in their drinking water. Then a few years ago they revised the standards and raised the radium limit. Towns that had spent hundreds of thousands of dollars putting in treatment facilities or specialized equipment found that they had spent money to meet a standard that no longer existed. They were outraged about this. This made for a good news story. It posed the challenge of trying to understand the basis on which regulatory standards are sometimes set. They are not always set based on a known health effect, and as more research is conducted knowledge about health effects changes. The Safe Drinking Water Act allows cost benefit analysis to be considered when standards are set. It was felt that requiring smaller water suppliers to meet the tighter standards was not worth the cost, and the standards were revised. That can be a hard concept to get across to your editor, let alone your readers.

Another issue that has been tremendously popular in the news media over the past couple of years has been lead in drinking water. One of the frustrations in writing about this problem, and I am sure one of the frustrations you have when you see news reports or read news stories, is focusing on the highest level of lead that has been been detected in a sample. Due to the complex way that the sampling requirements are set up, you can exceed the standards but not have high levels of lead in your drinking water. The lead standard is a tough one for the news media to get a grasp on because of the way it is written. From my experience in reporting on lead in drinking water I found that the lead standard is one that public water officials were reluctant to talk about and very reluctant to enforce. If it is a problem with a water main going into the house then the problem is most likely within the house itself. Why should that be their responsibility? Well, the water still ends up coming out of somebody's faucet, ending up in someone's glass, and getting ingested by a two year old. The health officials that I spoke to, especially at the Illinois EPA, had the feeling of being dragged kicking and screaming into enforcing this, and of having to go public with the results before they really wanted to. That made for a frustrating situation, trying to figure out what the story really was.

The third water issue that I have dealt with recently is something Don Behm was talking about in his keynote address--the *cryptosporidium* crisis in Milwaukee. I covered it as a national story for the *Chicago Tribune.* It wasn't our drinking water problem--it was our neighbor's problem--but it was the kind of story that we went to, reported on for a week or so, and then our interest dropped as the crisis seemed to ease. It gave me a glimpse of a very effective way of handling the water crisis. The Milwaukee Public Health officials and Mayor Norquist were very forthcoming, accessable, and willing to stand in front of a microphone answering the same question over and over again from every reporter in the room. The Director of the Public Health Department was very good about this. He conveyed a sense of confidence, forthrightness, and the ability to answer all kinds of questions. A question that I asked dealt with products that used local water and then were shipped all over the country. I wondered if it was safe to consume Milwaukee's beer. He answered the question right there.

Don Behm, *Milwaukee Journal*

Newspaper reporters and editors can make major mistakes. Last week there was a story in the afternoon newspaper in Iowa City. The headline read "Parasite in Water." The story described how *cryptosporidium* was "in the Iowa City water supply." It didn't say "in the Iowa River" which has a lot of agriculture upstream from Iowa City. Earlier today, I was given a copy of the memo that spawned this story. The memo points out that there are a lot of livestock operations in the Iowa River watershed. The potential for contaminating the Iowa River is high, it could happen. Yet the local newspaper had a banner headline--"Parasite in Water." This is a gross piece of negligence. I would hope that the Iowa City Water Works officials will push the newspaper to explain this and also to publically correct themselves.

One thing you should know about any newspaper is that it is as large a bureaucracy as a government agency. It begins with reporters and copy editors (people that check the facts on stories), and then there are the headline writers and editorial writers. Headline writers too often fail to consult with the reporters involved in a story to determine whether the headline reflects what the story is about. Editorial writers can be a problem. You would think that in Milwaukee, particularly with the *Milwaukee Journal* staff, we would know the difference between protozoa, bacteria, virus, algae. Two weeks ago I read an editorial about "this bacterial crisis that we had in our water supply in 1993." *Cryptosporidium* is a protozoa. The editorial writer failed to talk to me about it. He pulled a couple of stories out and either didn't read them or just assumed that we must have been talking about bacterial contamination. There were five references and five paragraphs to this bacterial contamination.

Many media outlets do not do a good enough job of checking the facts they present. But with public officials, whether it is a local, state or federal agency, as well as company officials, one of the problems that I encounter is flat out denial in the face of a crisis. In Milwaukee, the flat out denial by our Public Works officials is probably the best recent example. They denied that water could be part of the wide spread diarrheal problem. They denied that it was happening for weeks before anyone ever thought to check for *cryptosporidium* in the water. This denial varied from: "It hasn't been a problem here . . . we are not required to test for that," to "I have never been aware of that problem in all my years of experience, so it can't be true."

Where did this *cryptosporidium* come from? Is this new, is this real, is this a threat? *Cryptosporidium* is not new, it didn't just evolve in the last few years and walk into Milwaukee. It has been found in various livestock throughout most of the century. It has been known for awhile that it can contaminate surface water, but we haven't been looking for it in the public water supplies. The CDC tells us that with more than half of the known outbreaks they cannot determine what specific pathogen caused it. *Cryptosporidium* has probably been a factor in numerous outbreaks but has gone undetected. The threat is real, whether it is immediate to your community is a different question.

Another pathogen that has been discussed today is dioxin. The media's role in reporting the potential threat of dioxin deserves more study and more discussion. The *New York Times* has gone back and forth on whether dioxin is a problem or not. One of the things the media has consistently failed to do when saying that it could be a problem, it could cause cancer, it could cause other health effects, is explaining to its readers or viewers how they can be exposed to dioxin. Do you get it in your diet? What about your lifestyle? The media has a responsibility to explain those questions. Not only at the outset, but also that there may be a problem on the horizon. We have a responsibility to take the next step and say 'this is how it could potentially affect you, this dioxin or *cryptosporidium* or whatever.' Then tell the public what they can do to lessen their risk of exposure.

PANEL DISCUSSION The Media - Questions and Answers

QUESTION: My concern is that we are looking at the *cryptosporidium* outbreak as only a *cryptosporidium* outbreak. What other factors were addressed in the Milwaukee situation such as other chemical compounds which cause the kind of symptoms you are looking at? What about possible synergistic effects?

Behm: To begin with, the investigation of the outbreak in Milwaukee occurred long after the fact, long after the contamination of the water. We were lucky to find just a few organisms in the Milwaukee water at the outset of the investigation. Most times investigators don't find the organism that is responsible. What really convinced public health officials that *cryptosporidium* was the dominant culprit here was that it was found in stool samples collected from various sources. They did consider and check for other microbial pathogens at the time; there was a very specific list. On the question of checking for chemical contaminants, they did look at the harbor for recent spills, we do know what is manufactured in the area and the chemicals which are generally used in the area. Mainly, the investigation focused on the microbial pathogens and the conclusions made were largely focused on *cryptosporidium* for a number of reasons: it was widespread in the stool samples that were tested, it was found in the water, it was found in ice that had been preserved from the time period. I don't know how to address the question of synergistic effects of microbial pathogens or microbial pathogens acting with chemical contaminants.

Laszewski: No one can show a victim. I can't show that somebody has died of synergistic effects of say, three chemicals that are out there. The debate has waged for 10-15 years on whether or not dioxin is a problem; we now have another very credible study (an EPA review of the literature) that indicates that -yes- it probably is and maybe we can take some steps to curb it. All the chemicals that are out there - we as reporters are not going to be able to tackle those issues unless we can find some concrete way of showing people that there is an effect. Short of that all we can do is to say "well, in the labs, and in the research that is going on right now, there is some indication that a specific chemical is a problem," but we can't find specific persons who are suffering from that.

Geldreich: The EPA Drinking Water Research Program was invited to send several engineers to Milwaukee to look at the filtration. Before we went, we discussed the possibility of there being a number of contaminants in the water system. I had worked on Milwaukee's water problems years before related to the bathing beach problems in Lake Michigan that impacted on Chicago. I suggested that our staff focus on looking not only for *cryptosporidium*, but also for *salmonella.* By the time they got there the intensity of the search and the magnitude of the sampling was so great that they couldn't begin to look for other pathogens and they immediately started to find strong evidence that it was *cryptosporidium.* This does not mean that another pathogen could not have been there. Some of these cases perhaps could have been caused by another pathogen- that was never really explored but we did consider it. The logistics of doing all the work to cover this and the intensity of the sampling was impractical for us to do. If it was animal waste, as we thought it probably would be - feedlot waste, concentrated as you have described, there is a good possibility there was a lot of *salmonella* in that material too and both of these cause intestinal upsets, diarrhea and dysentery. There are some subtle difference between symptoms in some cases. We must remember that though we always look for one predominant pathogen there may also be some other ones going along with it. There has not been enough staff to be able to cover all the things we would like to do.

Bloom: I suggest that we broaden our perspective and discuss the institution of environmental journalism - what it does, what it doesn't do, what it can't do, and what it should do. I would suggest that this is an opportunity to talk about how journalism interfaces with public policy and science. I would like to see a broader discussion on how these professions interact or don't interact.

QUESTION: I work for the Hygienic Laboratory and I interact with the media occasionally. I would like to go back to the headline comment that you made, which I thought was right on. Other than the headline, the article was relatively factual, unlike the television coverage we got of that same situation. When we interact with the media it seems that we have one of two scenarios. Either

we interact as a multidisciplinary group of individuals that are interviewed separately about an issue. That leaves the media to synthesize and write their story from bits and pieces which may or may not be interrelated, which may or may not be factual and which can be fairly distorted and contradictory. The other alternative is that you appoint a media spokesperson and that person represents the group to the media. Every situation you have praised as being positive for media contact has been in the context of a spokesperson or perhaps two spokespersons rather than a series of individual interviews. From my experience, I find that it is very important for public health officials to speak with one voice. The voice doesn't have to be unanimous - there can be pros and cons within that voice - but the fewer contacts you have with the media, the better the message is communicated to the public. I would be interested in any comments.

Bloom: It is an interesting issue because journalists generally don't like to talk to spokespersons. Those are the public information officers. The journalist says "I want to talk to the head of Public Works; I want to talk to the top of the organization. I don't want to talk to the man or the woman through whom the information is filtered." Journalists always seek to talk to the well-informed people and persons that have the title. I think titles are good in journalism - I would rather talk to the President than the spokesperson of the President.

Evans: One of the reasons that the Des Moines Water Works' message was conveyed so effectively was that the spokesman was the person who had the ultimate responsibility. It wasn't the press secretary who may not have been involved in any of the discussion but had only been briefed before going out to face this horde of reporters. In the case of L.D. McMullin, you had the guy who was calling the shots. If there was a question about why they responded or didn't respond in a certain manner, he was the one who was going to either get the praise or the blame rather than some underling.

Swanson: I think there might also be a difference between a crisis situation like the floods last year and if you are working on a more in-depth story that doesn't have some kind of timely element to it. When lead in drinking water became a matter of public attention and public concern a couple years ago, I did a few news stories based on it, but I also did a longer story based on lead in the environment. What are our total environmental exposures to lead? What part does water play in that? You can't talk to one person - you certainly don't want to talk to one person - to get all that information. I talked to a variety of people across the country to try to put together a picture of how lead enters the environment.

Evans: I think in the day to day dealings of an environment reporter, one of the ways that they can get better at what they do is by being able to interact with the people who are the trained ones - the scientists - the ones who have the expertise - rather than having to go through an information officer. I think there is a trust built up there. I can certainly understand in a case where an organization is dealing with a reporter they have never dealt with before - there may be some uneasiness in the beginning about how reliable the person is - how accurate. But it seems to me after the reporter has proven himself that it's to the benefit of the organization, whether that is a governmental agency or a company or whatever, to be able to have their experts there talking. That is a terrific opportunity to get a particular reporter's ear.

Burkhardt: The *Health & Environmental Digest* has a slightly different experience. In the back of each issue are what we call "news updates" which are general summaries of research or programs going on at Universities and other agencies. In writing those, I would always try to find the researcher. If I was connected to a public information officer I would try to get to the researcher and generally I had very good luck with that. This could be because people were less afraid of something like the *Health & Environment Digest*, which is not a daily newspaper and is not going to a broad public. The purpose of this section of the *Digest* is to summarize what the research is. However, I definitely found myself trying not to sound like a reporter because I found that it was hard to get through to people. It was enlightening for me to realize how to get through the channels; my objective was always to get to the researcher.

Behm: One of my basic operating rules is that I don't trust anyone completely. I think it is an obligation for the media to check other sources to ask "does this make sense. . . is this true?" We fail in part of our responsibility if we do not do that, if we just accept things at face value. I have an example of this from my own experience. In the late 1980's there was a lot of interest in a number

of cities regarding lead in soil. I started asking Milwaukee's school officials whether they had checked the soil under school playground equipment for lead. I asked other local officials whether they had checked publicly owned garden plots for lead; whether they had checked this or that. Nobody had in Milwaukee, but people in other communities were checking playgrounds and were checking gardens. So we did it ourselves. I went out with the guidance of someone from the Marquette School of Engineering and collected soil samples from schools and from garden plots. That series of stories spurred a research effort by the University of Wisconsin at Milwaukee which culminated in a four county map of soil contamination with lead. A similar thing happened with lead in drinking water. Because I read other publications and because I talked to water officials in other cities, I was aware that other communities were finding lead in water in households. So I asked the Milwaukee Water Works "have you considered this problem?" And they said "well, no - the regulations aren't forcing us to deal with this yet. . . we are reading what the EPA is sending out." So again, with the guidance of the Marquette School of Engineering, I started collecting water samples from household taps and we found lead levels that were of a public health concern. This kind of forced Milwaukee to deal with the issue. In both of these cases the local officials would have just said "there is no problem - it is not a concern" and that is why the media has to take some initiative or go through other sources.

QUESTION: The question I have is what would have been the headline if it was announced that it would cost $62 million to upgrade the municipal water system in Milwaukee, and in the same announcement it indicated that this was being done because there may be an increased risk of contamination? The point is that it seems like the newspapers support what sells newspapers as opposed to what supports good prevention in public health. We need your help. I agree with a lot of things that were stated in terms of trust - I think that state officials must be forthcoming with good factual information and not try to hide anything.

Behm: There was just such a story on June 30th of this year with the headline "Cost to Stop *cryptosporidium* put at 89 million dollars." The story discussed the total package of what it would involve and then breaks it down into each of the individual elements and discusses what level of certainty you would get if you did one or if you did another one or if you did a third one. We couldn't have done this on our own. The basis of this story is a thick report by an independent engineering firm that was hired by the city to consider what to do because we had that crisis. This city's Water Works, I think, has shown that it is not looking ahead - that it doesn't consider anything to be a problem if it hasn't already been a problem. I would not have had any research specific to Milwaukee to write a story on. I guess I can't answer your question because I don't understand the framework of your question - where it is coming from? We wouldn't have had this engineering study for me to write about if we wouldn't have had the crisis.

Audience comment: I can help you with framework. WHO in Des Moines had a program on radon testing; the headline they ran for two to three days was "The Killer in your Basement." When *USA Today* broke the story about water utilities in major cities that had violated the lead standard it wasn't until the third paragraph from the end that they finally identified the fact that the greatest environmental exposure risk comes from lead paint, and that water has a relatively low contributing factor to children's risk of lead exposure. The third paragraph from the end! You (the panel) have got to address the issue of sensationalism. I think what the previous questioner was saying is that sensationalism sells papers and that not every story has to be approached like Woodward and Bernstein. At some point you can be an advocate of a public health agency that is doing a good job of looking after the public trust. Certainly you have to approach it with inquiring minds but once in a while you could be an advocate for public utilities that are doing a good job rather than always seeking the sensational point of view. For example, a couple of weeks ago when Eric Olson broke with his press release about how hazardous public water supplies are, the Des Moines Water Works didn't get a single call from any readers because, I think, they are just so overloaded - so hyperstimulated by all these risks that get written about in the newspapers in inflated terms. The public is getting numb to the whole issue of health consequences associated with water or anything else. We have to talk about sensationalism at some point.

Bloom: I think that is a good point and I think we are finally getting to the crux of the matter here.

Let's have a response. The speaker has addressed several issues. One is sensationalism, another is selling newspapers. Let's talk in a hypothetical way for a minute about this headline - "The Killer . in your Basement." You are right, I think everyone on this panel agrees that the job of a newspaper is to stay a newspaper. To stay a newspaper the newspaper has to be read, people have to take out advertisements, people have to buy subscriptions. Another point you bring up (and my sentiment of what you are saying) is that "We are not bad guys out there and we want to get a pat on the back. We want to be acknowledged when we do something well." What I am saying is that it is not news that the utility is doing a good job. It is not news when President Clinton does a good job. What is news is when President Clinton isn't doing a good job. That's what makes news. It is not news when Hunter Rawlings is proclaimed to be a wonderful president of the University. It is news when Hunter Rawlings is found with his hand is someone else's pocket. I think we should address this because this is the fundamental aspect of the public and the press. Public officials feel that the press is always lurking around looking for something and in my point of view, that is the press' job - to lurk around and look for something. What you are suggesting is that you called up the newspapers, the media, and you expected the media to relay your message. I am not sure if that is the role of the media....to always relay your message.

Laszewski: Yes, we are sensationalistic, there is no denying it, but it is sometimes a little more subtle than that. By and large, we are going to do the stories that are crisis type stories, because that is what will sell papers. That is what the public wants to read. Here's an example: a couple of years ago, Hennepin County (Minnesota) wanted to build a garbage incinerator and there was a fair amount of opposition. I had written about six to eight stories on it and the possible hazards related to it. I get a phone call one day from a woman who says "you ought to do some stories on the Hennepin County incinerator." I said that I had. She replied "Well, I didn't see them." The point is you would like us to do stories that are of interest to you and which you think are important to the public and, by and large, we like to do those. But people aren't going to pay any attention to them until they are ready to pay attention to them. So, without an outbreak in Milwaukee, nobody is going to pay any attention (sadly) to the need to update the water treatment plant but once there is an outbreak, then they will spend 89 million dollars to fix it. We do go after the stories that will grab people and frankly, the people will only read the stories that grab them. Occasionally, we will try to get ahead of the curve and do the stories to let people know things are coming or that there could be a potential problem. Often times, people are not going to read those stories, remember them or act on them - they will only do it when there is a crisis.

Behm: One way that the media has a responsibility to balance the initial sensationalism is to stay with the story. The media has a responsibility to go back and report on what happened to that story and what has changed. A year after the crisis I went back and checked the records of the Milwaukee Water Works and wrote a story that was positive, it wasn't sensationalistic. I found that what they had done up to that point in time (one year later) with the counters on filters and turbidity meters on filters and their taking hour by hour measurements at those plants. I found that the Milwaukee Water Works was indeed putting out some of the cleanest water in the country. I called experts around the country to check - what do these numbers mean? To a person they responded that they must be working overtime to maintain that kind of clarity of water in Milwaukee given that they have this surface water source. One guy looked at these particle count records they were maintaining a year later and said that those particle counts are as low as you would find in some distilled water. I did that story. That is how we have to balance both this initial sensationalism, as you describe it, and our responsibility to continue with the story. If we don't continue to follow a story then we are remiss.

Evans: I am troubled by the perception of this so called "adversarial relationship". I don't view my role as being an adversary of anybody, I view my role more as being independent of everybody else. As a journalist, I am not out there to carry out the agenda of the Des Moines Water Works or the Branstad administration or the Democratic Party or anybody else. We are out there to do the bidding for the readers. Sometimes that takes the form of a three paragraph item in the Metro Section that warms the heart of L.D. McMullen because it is something nice, warm, fuzzy and positive on the Water Works and it is a decent local story. There are other times we will write a story that will drive the blood pressure of somebody right through the ceiling; not because we set out to do that but

because the subject matter was one we thought was worth the attention. I am troubled, too, when I see headlines that are misleading at best and inaccurate at worst. If you check with the staff in Des Moines, the paint above my desk has been chipped off because I have hit the ceiling a number of times when things like that happen. We need to boot ourselves around the room and find out what led to a bad headline getting in there - was it because the copy editor didn't take time to read it and thoroughly understand it? We are not perfect, but I get troubled when I perceive that people think we are out there doing some wild hair things because it will sell five more newspapers. I would have higher blood pressure than I do now if I worried about how many newspapers I was selling. I don't sell newspapers - my role is to make sure my reporters are covering what they ought to be covering and we are getting stories that are fair and accurate and interesting.

QUESTION: Risk is not just about the physical threat to health and life. I think we probably are doing a better job in the media if we are responding to the popular sense of risk rather than the scholarly side of risk. Are you saying, in essence, that the scholarly side is not news, and that the popular side of risk may not be accurate, but it is reality, whatever that is. It seems to me that this statement and the one made by Dr. Jackson about the information officer in California stating that the public is always right - that perception is reality and we are going to give you that perception of risk - it may not the scholarly side. Do you agree with that presentation of how risk should be brought to the public?

Swanson: I'm guessing it means that if people perceive there is a risk from the sun coming up in the east, we have to somehow or another address that in a story. Not that we say "yes, it is a risk that the sun comes up in the east," but you have to deal with the fact that the feeling is out there and try to put it into some kind of context. If scientists, on the other hand, say there is no risk from the sun coming up in the east, but there is no public perception that there is a risk, then what is the point of doing a story about that? It is only if there is something out there floating around - a public sense of danger or public health threat or something of that sort - that you have to respond to.

QUESTION: As journalists, could you describe the process you use for identifying resources for information to check facts or to establish the authorities you feel you can appeal to get useful information? Do you have a process that you try to follow? Related to that are the things that the academic community and the public health community can and should be doing that would make this process more constructive, in your own view. Along with that, what ought to be done in schools of journalism to train your successors? Are there activities that could be enhanced in that regard? In other words, how can we improve this process?

Swanson: I don't know if there is anything about journalism that is orderly. Speaking for myself, I develop my list of sources story by story basically. As I deal with a scientist or public official or consultant or environmental group in Chicago or Washington or wherever, based on my dealings with them and my feeling as I am interviewing them that they know what they are talking about - they are responsive to my questions. Do I feel comfortable with this person? Does this person make me feel like he or she is being forthright? I was talking earlier about lead standards and trying to get somebody to talk about that. Two or three months later I might want to check out something on the same topic or another aspect of it, and I can go back to the person that I talked to two months ago. I started out with just five or six names when I started as an environment writer, now my source list takes up practically all of my computer capacity.

Behm: We also have public universities which are wonderful sources to begin with; I often call them depending on the issue. Or I will call the Wisconsin Division of Health, if I think they could be helpful or they could refer me to someone. So you use all of these agencies and others to refer you to people they consider to be specialists as well. So in that way, you can find the people who the technical people consider are the experts. That's how the media found Joan Rose in response to Milwaukee's *cryptosporidium* outbreak. We kind of stumble into experts because we ask other people "who are the people doing research in this area?"

Burkhardt: I had the luxury of not having to sell newspapers. The *Digest* is based in science and really relies on scientists as sources of information. My job as editor in developing an issue was to

identify authors. There is also an editorial board that oversees the *Digest*. They are Ph.D., M.D. level trained people from around the country. That is not to say that they have all the answers, but they review the content of each issue before it is published and also work with the editor to identify potential authors to write for the *Digest* from different perspectives. So that I think the process works. On the other hand, the objective is not the same as a daily newspaper in that we don't have to present the information in quite the same format or to the same audience.

QUESTION: The idea here seems to be that for some reason the media is blowing things way out of context, that what really goes on is pretty safe and if it weren't for the media, people would be a whole lot happier. Let's look at a couple of things. The front page of most papers now is full of the Simpson trial. In the *Des Moines Register* on Monday and Tuesday there were cancer stories, one on estrogen mimickers and one on hair dye. Those were both AP stories. You guys are unusual since you are environment reporters; I don't know how many newspapers actually have people like you. Then you have the part that is not represented here which is radio and television, who don't have staffs to do very much at all and pretty much copy your stuff, which I hope is accurate because it gets copied over and over again and you can never find where it started from to go back and correct it if it is wrong. With all those problems (which certainly exist) the rest of the paper is full of stuff that plays on people's irrationality more than anything else: advertising making us feel inadequate about how tall we are or how big our car is or something like that. So I don't see that there is this huge problem out there. I am an elected official and I hate the press going after me all the time but that is part of what I have to do if I am going to stay around in that job. Also, I have an easier time because I am not in power, I am a Democrat and the Governor here is a Republican. You call me up and I have great things to say about whether or not the administration is doing a good job, and that is what you do. I think the whole premise that says you guys are blowing things way out of perspective may not be true when you look at the entire thing. It may be that some of us are sensitive. We like to think about the environment all the time and that is probably why we are in this conference. If you went out and asked somebody over the last two days "what did the *Register* have on it's front page?", I don't know how many people would remember the cancer stories - they would remember what happened with O.J. Simpson - but I am not sure what they would remember with the rest. I am not sure how you would comment on that but I would like you to try.

Laszewski: The one concern I have is how we present risk. We, as the media, have gotten to be so pervasive that people haven't caught up to us yet. We can talk about a kidnapping in California and because it is so sensational every newspaper in the country has it, every newscast has it. Every parent thinks that they are at risk and their children are at risk when in fact the chance of that actually happening is one in a million or so and people haven't caught up to the fact that they have got to step back for a second and ask "is this really a risk to me?" Unfortunately, we may not do a good job of putting that into perspective for them. This is an interesting story and we are going to report it, but really, here is what the ramifications are for you. And that is my concern. I think you are right, that individual local issues do a decent job of getting it right and giving it the right weight, but when we take it altogether we may be overwhelming people.

Behm: If we want people to read the banner headline or to watch the broadcast and give them this first shot of information that there is this brutal killer, whether it is human or chemical or microbiological, it is also our responsibility to give them the information on how to reduce that risk, and whether that is to reduce the fear of homicide or in the spirit of public health, we can do both. We can provide both pieces of information. If the newspaper story or television broadcast fails to provide information on how you can reduce your risk of becoming involved in a similar situation, then that is irresponsible. You should talk to that local newspaper or television station or radio station and tell them that it is their responsibility to provide that missing piece of the story.

QUESTION: I am the Superintendent for Iowa City Water. Listening to this discussion, it occurs to me that we both go through kind of an iterative process to arrive at the final product, and maybe we are not very forgiving with each other if we don't get it right the first time. I have a request for some specific coaching for a situation in Iowa City. A story recently came out in the local paper in which we were informing our community about the

cryptosporidium issue and providing information that we had about it: the vulnerability that we felt was possible in the community and what we were doing about it. I would like some specific coaching from you on how we can share this information in a way that is helpful to everyone and does not put us at odds. I personally don't believe that we are at odds. I think our missions are actually more aligned than we care to say right now and I think that is the tact that we want. Can you give some very specific coaching on how we might approach this? There were also television stories that were a lot of sound bites saying that there was *cryptosporidium* in our water, which was inaccurate.

Behm: The University is trying to do some of that here today but, unfortunately, no local print or broadcast media bothered to show up. That was their responsibility to have someone here. This forum was provided for their education as well as ours. It was their responsibility to have someone here to listen to that. If they thought it was a big enough story to make a banner, whether on their newspaper or their television broadcast, then they should have thought it was a big enough story to have a staff person here. What Water Works people can do is give city officials and the media some background information on this watershed, on your source of drinking water. It is also the responsibility of the media, whether newspaper or broadcast, once they review this to come back and ask you some questions. Obviously, one of the things they would have gotten straight, had they called you, was there was no recent test that found *cryptosporidium* in the drinking water, but the perception you get from the headline was that it was in drinking water. What you can do on an ongoing basis would be to meet with editors and reporters at each local newspaper, each television station and each radio station and try to get them to give you a half hour or an hour so that you can try to begin to educate them. Give them some background information on this watershed. I would definitely encourage you to do this prior to the spring thaw that brings everything back downstream. If they are not taking the responsibility to look for that information then I think you should turn the table and go knock on their doors and say "I would like 30 or 60 minutes of your time to tell you about this." That is going to be very time consuming.

Swanson: I took a look at the story during the break. My first question to you is why did you come out with this information? What did you see as the news? Your thinking can develop from there.

Audience Response: What we have been doing is pretty much what all surface water suppliers in the nation are trying to do. We have been fortunate to receive lots of information from the American Water Works Association, particularly in the form of teleconferences that identify the issue and also the ways that we can change our treatment process to improve the product and minimize the risk. In addition, we also have some outstanding local experts working in this area. So we brought this expertise together to actually look at the issue and help us decide the risk. We were looking at the research information and also looking at our treatment process and looking at our water source. Based on this we felt that it was our responsibility and obligation to inform our administrators about the difficulty in measuring for and removing *cryptosporidium*. Their responsibility was to inform the community. Our next step is to continue to work on other ways that will allow us to know if it is really an issue that is occurring right now. So we are on track with that. There has been an incredible amount of research that has come out of the Milwaukee incident that is still being digested and thrown around. We brought together our community experts to help us digest it and what we came out with, following those meetings, was a memo to our City Council. The newspaper got the story via the memo - anything that goes to the Council is public knowledge. The reporter who did the story was the city hall reporter.

Evans: One of the real problems when you start dealing with a small newspaper is you may have five or six reporters in the entire newspaper and they are turning over probably at the rate of every two or three years. It's a real drawback when they are not at a place long enough to develop any expertise: the city hall reporter who is not sophisticated enough to be quizzing you about how your memo fits in with somewhat controversial plans to move to a well supply rather than a surface supply. I don't know that there is any way around that other than outreach efforts on your part.

Swanson: In a situation like this you may have reporters passing through who are two, three, or four years out of college, and the editors are going to have somewhat longer tenure. I would say that you probably have a somewhat better chance trying

to work with a city editor or a managing editor of the paper to provide some context in advance or prepare the ground.

Bloom: Let me also say that environmental reporting is real complicated business and everyone is looking over the reporter's shoulder. You have scientists, physicians and others who have more expertise than the reporter. To stay an environmental reporter you have got to make sure your facts are right or you won't be an environmental reporter too long. So what happens when the information in a story is wrong? What do you do? You call the reporter and you say "you made some fundamental errors - can we sit and talk about these things?" And you begin an educational process. Unfortunately, if you educate the reporter very well, then the reporter gets very good and the reporter leaves the paper and goes to a larger paper. So then what you do is talk to the editors. A newspaper isn't a monolith, it is made up of a whole bunch of people. You sit down with the editor, or with the city editor, and talk about these issues. And you bring up the kinds of questions that have been brought up today. It is an education process. The point I want to leave with you is - don't think the media is all in this to get you. They are different people; they by and large want to seek out the truth. I don't think any reporter is going to seek out a sensational story if it jeopardizes the truth. If that does happen it is not going to happen in a repeated way because the natural system conspires against that.

Audience Response: I have no illusions or disillusions that the media is out to get me. I have never stated that and I hope I am not conveying that. I disagree with you that there is this kind of conflict that is natural. I don't agree with that, and I will not approach it like there is a natural conflict - I don't think that is true and I think that we can work it out.

Burkhardt: One thing that is sort of under the surface here with respect to educating the media is the assumption that some people feel that shouldn't be their responsibility. Reporters aren't going to be able to know everything no matter how good they are. I suspect that the commonly held feeling is that it is part of my job to spend time to make sure that whatever media I am involved with understand my work.

QUESTION: That was sort of inherent in the question I asked before. How do you get the resources? How do you educate yourselves? I didn't hear any response about what could be done by academic programs to improve that process. I don't know whether or not the School of Journalism here, for instance, instructs students on how to write an environmental article.

Evans: One of the things you might do is try to organize half day or one day seminars where you can pull together some experts and bring in some of the reporters out there and try to do a little teaching on subjects you sense are going to be out there for some time to come.

Bloom: Journalism education is changing rapidly. The trend for a long time was to teach budding journalists how to think. Don't teach them specialized issues - teach them how to think critically. It comes out of a liberal arts philosophy. If you teach someone how to think critically then that person can effectively cover a range of topics. That has changed. Journalism education now is beginning to emphasize specialized issues and specialized reporting. I am really pleased to say that for the first time ever the University of Iowa will be offering a class this spring in medical reporting and it will be team taught. We hope to offer more cross-disciplinary studies to students because we realize the world is complicated; you can't be a generalist any longer to cover it.

CLOSING REMARKS

Stephen Bloom

In closing, I would like to say that I think what we have learned today is that if you have an issue that needs to be explored with the media, the media is here. All it takes is a phone call and a meeting to iron out differences. I don't mean to say there is a natural adversarial role between the two. What happens is that the covering of news may evolve into that. I want to thank the panelists and everyone for participating in the conference today.

Lola Lopes

I think if you had looked fifteen or twenty years ago at the emerging literature in social sciences and in the physical and biological sciences about risk assessment and the public, you wouldn't have found so many clearly opposing groups facing off: the differences in opinion between the public and the experts; health vs. cost; media vs. science.

My impression, especially after this morning's panel, is that we have new dimensions emerging that are much more important and much more subtle. Subtle differences in meaning between such terms as risk communication and risk perception, which are often used interchangeably. Differences between individual implications of risk information, for example, the mother chasing after the school bus to get the apple out of the lunchbox, vs. the public policy implications of the same information - quite often these are clearly being equated.

Also, the difference between information division and actual decision making. Whether we are deciding for people, or whether we give people information and allow them to make their own decisions, these are things that fifteen years ago were simply never mentioned. That when the experts got together to talk, the experts were right and their only focus was how to get the public to follow the good advice that they had. I think one of the things that has been crucial in bringing about this change in what you can and will talk about is that the important questions are finally being asked, actually were asked of the panel this morning: What is a risk? What is a health risk? What is an environmental risk? The answer to that question, what is a risk - what is risky? had to go beyond the experts narrow definition and go out basically to include what the public means by risk. Informing ourselves about this broader sense of cultural aspects of risk perception. I think the entire conversation on risk, public policy, health, has been notably improved. I have a question in mind that perhaps it is also time that we include in the debate on the opposition between the media and science the question what is news? My impression is that the public may have quite a different idea of what is news than what is the kind of things that were suggested here. We cannot know how they will respond in answer to that question until we ask it.

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