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.

WHY DON'T THEY UNDERSTAND?

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ABSTRACT

A healthy dialog on environmental matters is a primary condition for the democratization of environmental decision making and more citizens than ever are prepared to enter such a dialog. At the same time, the Federal and State agencies whose activities impact the environment are increasingly recognizing the need to engage the public in their decision making. However, consensus has not been achieved between the public and federal agencies over many environmental concerns. Issues such as the transportation and disposal of hazardous wastes, and the permissible levels of halogenated organic materials in drinking water are still very contentious. Deliberations over nuclear waste disposal sites such as Yucca Mountain have been dragging on for decades and stakeholders and regulators alike are often frustrated by lack of progress in achieving consensus and moving forward. At the end of the day, each side of the argument is left wondering, "Why don't they understand?"
This paper explores the basis of effective risk communication for environmental issues. The language and concepts employed are often not sufficiently "rich" to encompass all the factors that must be addressed to arrive at consensus. In particular, the failure to explicitly address ethical issues in communications jeopardizes the possibility for effective risk communication and management. To demonstrate this point, we present, as a case study, the release of a parcel of land for use as a youth sports complex. This land was near a site where radioactive contamination was discharged over forty years ago and many in the local community could not support placing a recreational area for children close to that site. We argue that federal agency policy and communication are likely to be more effective at achieving consensus with stakeholders if care is taken to promote ethical communication and appreciate the interplay between stakeholders' ethical and scientific concerns. "Unscientific" concerns that are not addressed, or that are referred to in ways that are perceived as disparaging, often get in the way of effective risk communication and management. Fortunately, regulators need not be ethicists to promote effective, ethical risk communication, and we discuss an example of an approach to risk assessment that encompasses a broad set of issues that may encourage a richer language for risk assessment.

INTRODUCTION

In "It's not Fair," Brian Quirke describes a problem in communication (1). Well-meaning people with technical degrees who are trained to evaluate problems analytically come to stakeholder meetings prepared to discuss their modeling results or the latest batch of sampling data but the audience seems unappreciative. They try to explain what's going on but the stakeholders just

don't seem to get it. Risk professionals complain, "It's not fair." Stakeholders on the other hand feel that they

> *... are constantly barraged with a forest of data, a plethora of meetings to attend that never seem to yield any real results, a new home page to search so they can have easy access to another cross-referenced volume of impenetrable techno-speak. Stakeholders try. They ask questions, but the answers don't seem to be on the same continent as the questions. It's not fair.*

This paper deals with the communication of risk and focuses on ethical communication, that is, communication that explicitly acknowledges the cultural and ethical values of the communicating parties.

The National Research Council (NRC) defined "risk communication" (2):

> *Risk communication is an interactive process of exchange of information and opinion 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 risk messages or to legal and institutional arrangements for risk management.*

Risk communication should also be ethical communication. It must be fair, honest, and open. Where uncertainty exists it must be acknowledged; where the communicator has "an agenda" it should be stated openly; the discussion of ideas and actions should be encouraged; and where there is a disparity of resources between sides in a dispute, resources should be made available to the side at a disadvantage so that it can fully participate. This form of communication promotes understanding and thus is also a form of effective communication. Unfortunately, even well-intentioned parties sometimes fail to establish fully ethical risk communication processes.

We do not mean to suggest that when one communicates ethically all issues in dispute will suddenly be resolved; different cultural and political viewpoints can result in honest differences in the interpretation of the same "facts" and support different decisions. However, if both parties communicate ethically, the bases for disagreement will be clearly identified and understood. Only then can useful compromise solutions be proposed and discussed.

BACKGROUND

By now it should come as no surprise that effective risk communication must be a two-way process that requires more than simply presenting scientific facts in an understandable way to stakeholders. In 1989 the National Research Council (NRC) concluded (2) that:

> *To be effective, a risk message needs to refer both to information about risk and risk reduction and to the psychological or affective factors that influence the intended recipients. (p. 133)*

However, the final report of the Federal Facilities Environmental Restoration Dialogue Committee (FFERDC) published in 1996 (3) showed that the NRC recommendations had not yet been implemented in communications related to the restoration of federal sites. It was reported that:

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> *In current community involvement efforts, federal agencies often do not seek to include the full range of interested and affected parties and when they do, they sometimes do not provide appropriate or adequate information. This contributes to the continued mistrust that exists among some public stakeholders. (p. 39)*

Moreover, such problems may be amplified with intercultural risk communication. Communication materials must be culturally sensitive and relevant to the stakeholders' interests. The FFERDC report cautioned that:

> *There is no good, single implementation program appropriate for all Latino/Chicano communities, all African-American communities, all Asian/Pacific Islander communities, or all tribal reservations. For example, the culture, history, and resources of the Yakima Indian Nation are so different from the Hopi Tribe that any generalizations regarding information exchange programs for Indian Nations are likely to be incorrect. (p. 42-43).*

and recommended that field staff learn about and understand the specific communities with which they wish to communicate. Communicators were instructed to ensure that materials for public participation were culturally sensitive and relevant. Risk communication must be tailored to different types of audiences, and materials should be prepared in "… appropriate languages and at a variety of scientific levels."

While transcultural risk communication poses obvious and not-so-obvious difficulties, it can also be surprisingly difficult to promote risk communication that is sensitive to the values and interests of stakeholders in relatively homogeneous communities..

AMES, IOWA: A CASE STUDY FOR ENVIRONMENTAL RISK COMMUNICATION

Ames, Iowa is a university town with roughly half of the population of 50,000 affiliated with Iowa State University (ISU). Although more diverse than most Iowa towns, Ames' diversity is mainly associated with the university, and the people involved in civic affairs are predominately white and middle class. In 1993 the city of Ames became embroiled in an environmental controversy over the development of a sports complex. Property near the proposed site of the complex was accidentally contaminated by radioactive waste (i.e., chiefly thorium and its daughter products) in the early 1950's by the Ames Laboratory, a U.S. Department of Energy (DOE) laboratory on the ISU campus. Many Ames citizens, including some physicians, criticized the city's choice of site as posing unnecessary risks, and questioned whether the Ames Laboratory could be trusted to fully acknowledge past mistakes and not underestimate current risks.

The Ames Laboratory attempted to facilitate open and effective communication with the community. The lab's Director, Tom Barton, established a Citizen's Advisory Group (CAG) to help him understand citizen concerns and respond to them effectively. An information repository was created at the local public library, and the DOE Operations Office in Chicago helped host a series of community meetings at which high-ranking staff answered questions from an audience that was sometimes hostile. In Barton's prepared remarks for a public meeting, he acknowledged the inappropriate waste disposal practices of the past, the factual inaccuracies contained in

communications from all parties (including the Ames Laboratory) to the current dispute, and the right and the duty of the public to serve as a check on the future activities of the Ames Laboratory that could potentially impact its health and environment. He emphasized the need to end the "unhealthy" polarization of the community around environmental hazards from past operations (his "agenda"). Dr. Barton's remarks, which are a model for ethical communication, are attached to this paper.

The public information office at the Ames Laboratory attempted to determine whether the meetings and communications plan were successful (4) by tabulating the number of "positive" and "negative" words that appeared in newspaper stories, editorials, and letters to the editor to local papers between October 1994 and June 1995, the period of time that included the first three public information meetings associated with the cleanup of an another Ames Laboratory waste disposal site. The number of positive terms increased significantly over this period of time whereas the number of negative words declined marginally; thus the public information campaign was considered by them to be successful.

Was the Ames Laboratory communications plan "ethical" in this paper's context? In some respects it was (i.e., open discussion was encouraged and the Ames Laboratory participants who strongly supported the release of land for public use openly stated their position) but in other respects it wasn't (i.e., there was no explicit offer to provide opponents of development with technical assistance and the fundamental uncertainties that exist in risk calculations were not addressed).

True communication is an interactive, "two-way," process. In the example cited above and in most environmental situations, there are many interested parties and many simultaneous channels of communication continually in use. We've discussed how the Ames Laboratory communicated with the interested public through open meetings and the CAG. How did the other parties involved in the sports complex dispute communicate? Were their actions "ethical" in our context?

The decision to release the sports complex site for unrestricted use was complicated. Even deciding which state agency was responsible for making this decision was problematic. After some parrying between the Iowa Department of Natural Resources and the Iowa Department of Public Health, the latter agency (IDPH) asserted itself as the appropriate body to determine whether the site could be released. IDPH had personnel participate in public meetings to present their findings, answer questions from community stakeholders, and even to tutor the public in complexities associated with the site characterization process. They eventually released a risk analysis that supported the final decision to release the land for unrestricted use. However, the risk analysis report presented to the community (5) failed an essential element of ethical risk communication as defined above by not fully addressing the uncertainty of the calculation, which was substantial. In addition, no independent technical assistance was made available to assist interested citizens who wanted to understand the site characterization process and the details of the IDPH risk analysis; persons in the community opposed to development were not convinced by the report that the site was safe and, in fact, used the same data to claim that the site was more dangerous than other sites in Ames (6).

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This process can be contrasted with a more recent incident involving a different DOE facility in Colorado. The DOE and the Colorado Department of Public Health established "acceptable" levels of plutonium in soil for varying scenarios of land use at the Rocky Flats Environmental Test Site near Golden Colorado but members of the public considered these levels to be too high and made those feelings known to DOE. To ensure that the final levels chosen achieved public support, DOE provided funds to the citizens to commission a risk analysis by experts of their own choosing. The final results of this risk analysis are not yet available but local residents report that they have learned a lot from this process and appreciate the opportunity afforded them by DOE (7).

Newspapers through their editorials, feature news articles, and letters to the editor columns are also important communicators. How ethically did they communicate in this dispute? Over the period of December 20, 1993 to November 1, 1995 ten editorial columns in The Daily Tribune, published in Ames but distributed more widely in Central Iowa, and the Iowa State Daily, the student-produced newspaper on the Iowa State University campus in Ames, included commentary on the sports complex site. The columns were even-handed in their criticism.

For example, state regulators were chided for not allowing the public sufficient time to prepare for a meeting, the advocates against site development were criticized for not bringing their concerns before the public until late in the process (Fig. 1), and the safety of the site was lampooned in a cartoon (Fig. 2). A repeated theme of the editorials was the need to obtain better evidence before making a decision. In addition, the newspapers regularly suggested that the public participate in the process. After the state announced that the sports complex site was "safe for any use," the newspaper supported site development.

The involved public in Ames could be associated with either of two positions: 1) the site should be developed into a sports complex, or 2) the site is unsuitable for development into a sports complex. Between December 14, 1993 and April 26, 1996, the local papers published 15 letters from people opposed to development and 10 from supporters (it isn't possible to say how many letters the papers received that were not published). A group of doctors headed by a local pediatrician criticized the development of the site because it might be dangerous to children's health. Why accept any additional risk from thorium exposure when there were other sites available for development, they asked. These letters were generally polite, raised questions, attempted to provide information to help others develop an opinion on this subject, and appeared to be an honest attempt at communication. Another group of letters criticized the proposed sports complex because of its health impact but were less informative and somewhat inflammatory. For example, they implied that the Ames Laboratory had not told the public all that it knew about radioactive contamination in the city of Ames, questioned the independence of hired consultants, insinuated that the contamination was somehow related to nuclear weapons, and characterized the site as a nuclear waste dump even though there was only one accidental discharge on the site in over 40 years. It is likely that this group resorted to insinuations and name calling because, among all the stakeholders, they were the least powerful and resented their inability to set the agenda. Their level of trust may well have been lower as well (8). A third group of letters from opponents seemed less interested in children's health than it was in the expenditure of public funds.

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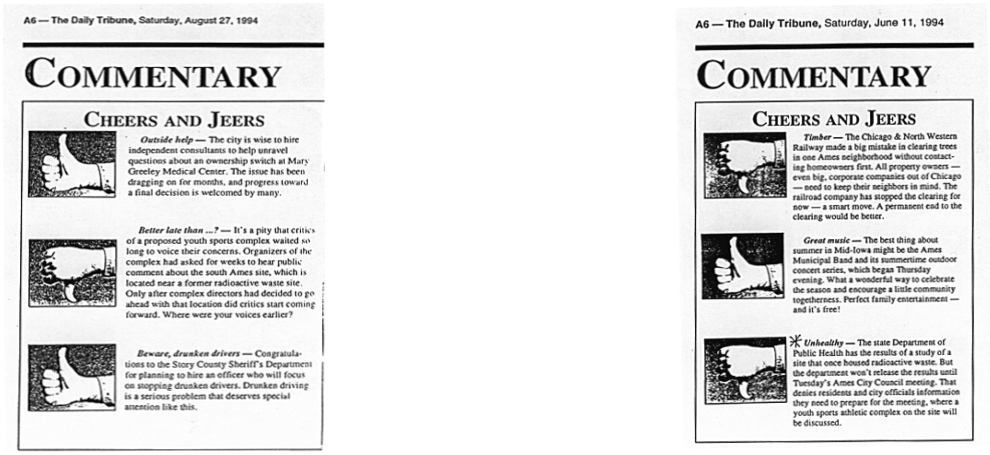

A6 — The Daily Tribune, Saturday, August 27, 1994

COMMENTARY

CHEERS AND JEERS

Outside help — The city is wise to hire independent consultants to help unravel questions about an ownership switch at Mary Greeley Medical Center. The issue has been dragging on for months, and progress toward a final decision is welcomed by many.

Better late than ...? — It's a pity that critics of a proposed youth sports complex waited so long to voice their concerns. Organizers of the complex had asked for weeks to hear public comment about the south Ames site, which is located near a former radioactive waste site. Only after complex directors had decided to go ahead with that location did critics start coming forward. Where were your voices earlier?

Beware, drunken drivers — Congratulations to the Story County Sheriff's Department for planning to hire an officer who will focus on stopping drunken drivers. Drunken driving is a serious problem that deserves special attention like this.

A6 — The Daily Tribune, Saturday, June 11, 1994

COMMENTARY

CHEERS AND JEERS

Timber — The Chicago & North Western Railway made a big mistake in clearing trees in one Ames neighborhood without contacting homeowners first. All property owners — even big, corporate companies out of Chicago — need to keep their neighbors in mind. The railroad company has stopped the clearing for now — a smart move. A permanent end to the clearing would be better.

Great music — The best thing about summer in Mid-Iowa might be the Ames Municipal Band and its summertime outdoor concert series, which began Thursday evening. What a wonderful way to celebrate the season and encourage a little community togetherness. Perfect family entertainment — and it's free!

Unhealthy — The state Department of Public Health has the results of a study of a site that once housed radioactive waste. But the department won't release the results until Tuesday's Ames City Council meeting. That denies residents and city officials information they need to prepare for the meeting, where a youth sports athletic complex on the site will be discussed.

Fig. 1 Editorial commentaries from The Daily Tribune. The June 11, 1994 article (right) chides the IDPH for not releasing information in time for citizens to prepare for a coming meeting. The August 27, 1994 article (left) rebukes "critics" for not voicing their concerns in a timely manner.

Figure 2. Reprinted from The Daily Tribune, July 23, 1994.

The letters supporting the sports complex downplayed any potential for harm from playing on the site. Comparisons were drawn between the risks calculated in the IDPH risk assessment and those cited by National Safety Council statistics for choking to death on food (~150 X risk from playing on the sports complex site) and drowning (~120 X risk from playing on the sports complex site). One letter admitted that the thorium concentrations measured in soil samples taken from the site were higher than the average of measurements taken for soils from selected sites scattered throughout the city but discounted any potential for harm from such levels in soils.

These letters contained no discussion of voluntary vs. involuntary risk, the special sensitivity of small children to environmental toxicants, or the appropriateness of risk comparisons between environmental risks that can be avoided and those from the ordinary acts of life (e.g., eating).

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ETHICAL COMMUNICATION: ANALYSIS

Stakeholders may have little reason to trust risk managers, or even ample reason to distrust them. An attitude of mistrust, rather than being a symptom of irrationality, may be warranted by past history. Barton recognized the importance of openly acknowledging past mistakes and incorrect statements. Attempting to hide past wrongs provides stakeholders with little rational hope that future interactions will be more ethical. However, without evidence that policies and personnel have improved, stakeholders have every reason to view risk managers' assertions with suspicion. The lies, unethical behavior, or simple but serious mistakes of one agency or era can provide the public with a good reason to enter risk discussions with skepticism. Indeed, the letters from the Ames' group most critical of the proposed sports complex, and most accusatory and inflammatory, may be partially attributable to lingering mistrust. The public may suspect that a "new era of openness" has more to do with a "new era of PR," even if this is not the case. Trust must be earned and does not come automatically.

Conversely, agency personnel may have little reason to trust stakeholders. If they have little previous positive experience with stakeholders, they may have no faith that the public can understand technical data and exert a positive influence on the decision-making process. Often it is necessary to act quickly (e.g., when funds become suddenly available for a brief period of time) and having to discuss actions and reach consensus decisions can seem to be counterproductive. Stereotypes of stakeholders as uninformed, irrational, obstructive, etc., can damage risk communication efforts from the outset.

The terminology used by risk professionals can signal that stakeholder participation is not valued, or that stakeholders are seen as irrational or unintelligent. For example, it has been noted that regulatory agencies can discourage public participation by altering language to suit their needs while making it more difficult for the public to understand the problems being discussed. Rupp & Jones noted (9):

> *Past regulatory development practice has resulted in the redefinition of some standard, non-technical English words. Furthermore, different government agencies can define the same non-technical word to mean different things … . This practice may jeopardize the public's right to know and, more importantly, it's right to understand environmental legislation and must be avoided. The involved agencies must be encouraged to negotiate terminology that is consistent with common usage and mutual understanding.*

In our case study, this did not seem to be a major factor. However, much of the argument about the sports complex site was about "thorium" in the environment. Many people understood the term mesothorium (used for radium-228) as thorium, and thus assumed that thorium rather than radium was the primary contaminant. The avoidance of the archaic term "mesothorium" may have helped promoted mutual understanding.

Moral concerns regarding risk are sometimes characterized as "emotional" or "non-scientific," even when the speaker is arguing for the importance of including such considerations in risk management. Such labels have a negative connotation, even if the speaker does not intend it. This is similar to characterizing or stereotyping women as emotional and arguing that we have to consider the fact that women are emotional in communicating with them. If "emotional"

concerns in risk management are more accurately labeled as *moral* concerns or considerations of justice or issues of trust, they should be described as such.

On the other hand, sometimes stakeholders *are* emotional. If they have been subjected to risks that may affect (or may have already affected) their health or that of their loved ones, and particularly if they have been misled in past risk communications, emotional reactions such as anger and fear are perfectly natural and appropriate. Professionals may be impatient to put aside the emotions to more objectively discuss the scientific issues. Again, it is important not to appear to ignore such emotions when they occur. It may be necessary to begin by acknowledging that they are appropriate or at least understandable. Showing empathy and validating emotions are useful in building trust. They send the message that stakeholders have been heard. As the NRC argues (2),

> *"… legitimacy is inherently reciprocal in nature; only if a source acknowledges the legitimacy of the audience's felt concerns will it have a chance to be seen as legitimate itself …" (p. 168).*

Stakeholders and risk professionals often have different assumptions regarding the burden of proof. Scientists may work from the assumption that no risk exists unless it can be scientifically proven (i.e., the null hypothesis). Stakeholders, in the absence of considerable benefits that might offset potential risks and with former incidents in mind where scientists have claimed that something was safe only to be later proven quite wrong, may be inclined to assume the worst. In the Ames case, the sampling density chosen during site characterization was an issue. Stakeholders felt that more data was needed because they "knew" there were "hot spots" that would be found if search for carefully. Stakeholders had no input into the site characterization plan; an open meeting discussing how samples would be taken would have gone a long way to addressing this concern.

Effective risk communication does not mean risk communication that leads to the alternative preferred by the government, but rather communication where all parties are sufficiently informed and empowered to fully participate in decision making (2). While the public may not be able to set the agenda or make the final decisions, there should be an emphasis on letting their concerns be heard and discussed—whether the concerns be of a technical nature, or of distrust, or of (in)justice, or simply conflicting values. This will require a rich language for risk communication—one where non-technical issues are not lumped together as "emotional" or "irrational." Technical experts may be less than comfortable talking about the ethical dimensions of risk communication and management because they often have little or no formal training in ethics. However, until these concerns are acknowledged as legitimate and addressed explicitly, risk communication will often be ineffective and frustrating for both sides of the table—particularly when different cultures are involved, but even within a culture, as we have seen in our example. Each party will be left wondering, "Why don't they understand?"

Risk analysts and managers may have to come more than halfway in understanding and addressing the concerns of stakeholders. Even when communities are empowered by, e.g., grants to fund their own independent risk assessment, stakeholders generally have less power and knowledge in risk management decisions (though often equal or greater personal investment in the issue). Moreover, rather than being paid to participate in risk communication and

management, members of the public often pay financially and otherwise in order to participate, e.g., by taking time off of work or away from family to attend public forums and investigate the issues. By virtue of their increased power and knowledge, risk analysts and managers have increased responsibility to ensure that risk communication is effective and ethical. Often the lament, "Why don't they understand?" is an expression of frustration rather than a genuine question. Nonetheless, it is a question that must be taken seriously, and with a look at both sides of the failure to communicate.

WEBS OF DEPENDENCY

New forms of risk analysis and risk communication are being developed particularly where it is necessary to communicate between cultures. For example, constructing "webs of dependency" to represent risk to the Columbia River have been proposed as part of the Columbia River Comprehensive Impact Assessment (10) to help communicate with Native American communities. As noted above, the communication of risk in the environmental dispute in Ames, IA (a fairly homogeneous and progressive city) is difficult. How much more difficult is the communication of risk across cultural boundaries, and do we believe these new methods will be effective?

Contrary to Western views, Eastern and Native American philosophies often reject materialism and the importance of economic values, view nature as cyclical, life as a struggle for balance within nature, and value science less than Western culture. This has obvious implications for risk communications. Cultures that are less individualistic and egoistic than ours are likely to take issue with some of our decision making strategies and values. Our cultural imperatives of manifest destiny and our faith in the ability to dominate nature through science and engineering may actually appear irrational to other cultures, where nature is seen as most powerful. Together with our emphasis on economic values, we may appear both greedy and full of hubris to them. Claims that the risks of some project are "minimal," or that contamination can be effectively contained or cleaned up, may be seen as part of this hubris.

As the NRC points out (2),

> *Improving risk communication is…more than merely crafting "better messages." Risk communication procedures as well as risk message content must be improved. Because risk communication is so tightly linked to the management of risks, solutions to the problem of risk communication often entail changes in risk management and risk analysis….Two broad themes run through the process and content recommendations. The first is the recognition that risk communication efforts should be more systematically oriented to the intended audience. The most effective risk messages are those that quite self-consciously address the audiences' perspectives and concerns. The second is that openness is the surest policy (p. 8-9).*

It should be no surprise that openness promotes effective, ethical risk communication and management. But how can attempts at ethical risk communication and management affect risk analysis? In "Risk and Impact Analysis for the Groundwater-Vadose Zone-Columbia River Project: Dependency Webs as an Integrating Approach" (11) Stuart Harris, Barbara Harper, and Pam Doctor describe the use of location-specific dependency webs to improve not just risk

communication but also risk analysis by better adapting it to the concerns of stakeholders. Rather than approaching the risk analysis by developing a "mega model" and crunching numbers, they argue that we should begin by "find[ing] out what people value about the places that are or will be contaminated and what information they need from the project." This includes assessing who/what uses the area or lives there, what activities happen there, identifying sensitive populations, identifying why the area is important and what values are at stake, and identifying important and unique attributes of the site. The risk characterization generates dependency webs, and different parts of the web can be described or emphasized in communicating the risks to audiences with different concerns. It may include things that are often not an explicit part of conventional risk analysis, such as the impact upon sacred sites, cultural resources, and the aesthetic value of the land.

Harris et. al. provide a model for following the NRC's advice to find out what's bothering people. Failing to address values in the risk analysis sets the stage for later failures of risk communication. Effective and ethical risk *communication* requires that the risk *analysis* addresses stakeholder issues, otherwise the stakeholders (and probably the risk managers) are likely to walk away wondering, "Why don't they understand?"

Risk assessments sometimes do not collect the right sorts of information. It is not obvious how to measure risks to intangibles such as the aesthetic or religious significance of a site. Creativity may be necessary to address these concerns. Risk assessments also sometimes fall short by relying on inappropriate default values and failing to consider the particular customs of the effected populations. For example, one might measure the likely effect of polluted water on the humans who eat fish from those waters, using an average amount of fish eaten per year per person in the US. However, in particular regions or for particular cultural/religious groups, this assumption may be wildly inappropriate. It is of crucial importance to address the stakeholders' lifestyle, values, and concerns in risk assessment as well as risk communication and management. However, if stakeholders feel that their primary concerns have not been addressed by the risk analysis, they are unlikely to be impressed by risk communication efforts. Complexity of the risk model, accuracy, transparency, and thoroughness are three values that cannot always be simultaneously optimized; one must then make decisions regarding their relative importance for the particular risk management scenario. The most scientifically sophisticated model may be the least appropriate for risk communication and management efforts because it is the least transparent. By beginning with an exploration of the stakeholders' concerns, one can tailor the risk assessment to those concerns; these may be different for different groups of stakeholders in a given project. If any group's questions are not addressed, both the stakeholder group and the risk communicator wind up feeling as though the questions and answers are not on the same planet. If risk communication is to be a two-way process, stakeholders should have a chance to influence the risk assessment itself, rather than simply reacting after the fact and attempting to influence the ultimate risk management decision.

In the Ames case study described above, the notion of locating a youth sports complex near a former hazardous waste spill site probably struck many people in the community as an inherently poor idea. The site may have been released as safe for any use, but why *this* use? Since the risk to children was a primary concern, it would be important to use risk models that could gauge the impact of radiation on children, as a specially sensitive population. Also, better acknowledgment of the types and magnitudes of uncertainty would have been helpful in the risk communication

process; conservatism in risk assessment is no substitute for proper understanding of uncertainties. Uncertainty was a major concern of the public in this debate—they may have been assured that the site was safe, but did they want to bet their kids' future health on this assessment? For many, the bet was clearly not worth the gains. The public was never consulted about sampling density or the type of risk analysis that was to be performed. Rather, the risk analysis was performed long after the debate began and was then "released" to the public. Many in the public were concerned that the sampling density was insufficient to uncover the "hot spots" they were sure existed. If they had been given the chance to influence the risk analysis itself, the findings of the risk analysis would have been better designed to address their concerns and facilitate more efficient and less frustrating risk communication. In addition to greater sampling density, the risk analysis might have been more focused on the risk to children in particular, if the public had been involved earlier in the process.

In the end, risk managers must often make difficult decisions between incommensurables. On the one hand, the most health-conservative approach would have been to site the sports complex elsewhere. On the other hand, the available scientific data did suggest that the site was safe, and economic reasons (the fact that the city already owned the land in question, and would not have to purchase new land) weighed in favor of using the site.

Regulatory agencies have a particular ethical obligation to make risk management decisions carefully, using the best science but also weighing competing values. On the one hand, disasters such as Love Canal figure prominently in the public's memory. On the other hand, the costs of making health-conservative decisions are not always so dramatically apparent and memorable. A recent article has taken regulatory authorities to task for "unethical" practices in radiation protection (12). The author claims,

> *Many radiologists have come to realize that their overreaction to theoretical (actually imaginary) health-harming effects of radiation is unethical in that it leads to the consumption of funds that are desperately needed to deal with real health problems. ... Each human life hypothetically saved in a Western industrial society by implementation of the present radiation protection regulations is estimated to cost about $2.5 billion. Such costs are absurd and immoral ... .*

Risk managers must consider not only the webs of dependency for a single project, but also the webs of dependency between that project and others that society values. The true challenge is to find an ethical balance between the control of hazards impacting each segment of society—workers, exposed populations, children and other sensitive groups, disadvantaged groups—while operating within a framework of consensus decision-making. This will require sensitive communications on the part of every participant as well as wisdom on the part of the decision makers.

CONCLUSIONS

We began our discussion by looking at risk communication associated with the development of a piece of land into a sports complex in Ames, IA. Despite considerable time and effort, consensus was never fully reached in the community on the advisability of that project. However, the sports complex was approved by the Ames City Council and is now a fact. The health concerns of critics have been muted and other community issues (e.g., the land use plan and city expansion)

have assumed top priority. However, as is true whenever true consensus has not been reached, it will take only one untoward incident to bring this issue to the boiling point once again.

The authors believe that effective decision making requires that the principles of ethical communication be applied wherever possible. With proper appreciation of the power of ethical communication to achieve lasting consensus where it is possible, and to isolate issues so that they may be addressed effectively where consensus appears difficult, imaginative agency personnel and stakeholders should be able to develop the resolve to apply the principles successfully. For example, in the instance of the dispute in Ames, IA, technical expertise could have been made available at low cost through the university and, more broadly, through state agencies to promote better stakeholder understanding of the technical issues. Had the IDPH considered the importance of stakeholder participation, they could have released their risk study sufficiently ahead of the meeting where it was to be discussed so that the interested public was better prepared to receive it. Had the most strident critics felt part of the process, they would have had reason to eliminate invective and hyperbole in their communication, which alienated them from many in the community.

Ethical communication promotes understanding and, as we have defined it in this paper, represents an ideal that may be difficult to implement. Assuring that stakeholders have the resources needed to fully participate in decision making may be expensive. Allowing stakeholders to fully participate in decision making may cause schedules to slip because they may require time to fully understand agency positions and because it may require time *for agency personnel to fully address the stakeholder positions that they may have neglected in their analyses.* Ethical communication may not appear to be efficient communication in the same sense that, at first glance, democracy does not appear to be an efficient form of government. However, the world has learned that shared governance that strives towards consensus and honors the rights of individuals results in decisions that have far greater staying power than those resulting from the proclamations of autocracies.

The concept of "webs of dependency" requires careful attention by agency staff and risk assessors. It can provide a useful, "user friendly," interface for both the public and the risk analysis professional. By discussing the local customs, discovering the areas of stakeholder concern in the community, and carefully understanding regulator positions the risk professional should be in a better position to understand what needs to be measured to respond to the concerns of all parties. These results can then be reported back to stakeholders in a customized format that presents to each stakeholder the information that the stakeholder is truly interested in knowing. Of course, the full data set will always be available to anyone who wishes to see it.

By tailoring the results of the risk assessment so that it meets the needs of each affected community and fully reflects their values, there is a good chance that everyone will leave the meeting room with a useful understanding of how they are impacted by environmental contamination and how proposed remediation efforts will mitigate those impacts.

No one will leave the meeting shaking their heads and saying, "Why don't they understand?"

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ATTACHMENT

A new spirit of openness at Ames Lab

Good evening and welcome to the Ames Laboratory Department of Energy Public Information Session which, based on the "letters to the Editor" in *The Tribune,* and quite frankly, my own experiences during the fast few weeks, is a sorely needed event.

I'll begin by boring you for a minute or two with some necessary history of the Ames Lab, which will help us understand how we got where we are tonight. The Ames Lab informally began in 1942 when the U.S. Government asked Iowa State College chemist Frank Spedding to organize an effort to produce new technology for the production and purification of uranium for the 'Manhattan Project," which ultimately produced the world's first atomic bombs.

Over two million pounds of uranium was processed at Ames during the war years and in 1947 the newly established Atomic Energy Commission formally established the Ames Lab to perform fundamental research directed toward solutions for, our nation's energy problems.

The Ames Lab, like the much larger and better known government labs such as Argonne, Oak Ridge, Brookhaven and Las Alamos, is a so-called GOCO laboratory, which stands for Government Owned and Contractor Operated. What that translates to for the Ames Lab is that Iowa State University operates the Ames Lab for the U.S. Department of Energy, and thus we have the seemingly dichotomous situation that every single one of us in this DOE laboratory is actually an employee of lSU. In fact, a very high percentage of the Ames Lab's scientific staff also holds academic appointments in ISU departments and approximately 20 percent of our work force are graduate students working on advanced degrees in science and engineering.

During the 1940s and '5Os, the Ames Lab, through pit dumping of chemical and metallurgical waste and in one case through an accidental release of radioactive material to the Ames Sewage system, created environmental hazards for our community. Through the intervening years there have been efforts to evaluate the condition of these sites and some effort to remediate one of them, and those efforts and current plans will be both reviewed and subjected to public scrutiny this evening. With regard to that latter point, public scrutiny, I need to start the ball rolling by making my own position and convictions very clear at the onset of this forum. That position is that public involvement is essential. It is not just tolerable, it is not just something that can't be avoided anymore — it is absolutely essential.

In recent months we have seen a flurry of letters to the Ames paper which make it clear that a polarization has occurred which is arguably unhealthy for our community. On both sides some of these letters have on occasion contained factual inaccuracies which hopefully can be cleared up tonight.

I certainly don't wish to in any way imply that I suspect any ulterior motives or intents. To so imply would be the grossest of hypocrisy since the Ames Lab has also been a party to the dissemination of information which is now known to be incorrect. I refer to statements by Ames Lab officials, most recently including myself, that after the initial remediation of the old sewage

plant and radiological evaluation of the site, there was additional remediation of. this site before Rust Environmental Inc. performed the most recent evaluation.

Prompted by questions from a concerned public, we embarrassingly discovered that this secondary remediation had never actually occurred. This was apparently a classic case of everyone believing that someone else had actually done what had been discussed.

I have instituted a formal investigation as to how Ames Lab staff could have become confused on this important point, not in any way as a punitive measure but to prevent anything like it ever occurring again. To me the painfully learned bottom lines from this are (1) we do make errors, we are not as infallible as we might have wished to think we were, (2) the public has both a right and a duty to check us, and (3) it probably wouldn't have happened if we had been working with the concerned public as closely as we must in the future.

Thus I announce tonight that I am recommending that the Ames Lab establish a Citizen's Advisory Group to help us in being open and responsive and responsible to this community in which we are all stakeholders. The Atomic Energy Commission and the agencies into which it evolved do not have a pretty record of concern for, or openness with, the American public. Those days have changed due to public demand and a new Secretary of Energy, Hazel O'Leary, who is truly committed to her "openness initiative" for all of DOE and all of its national labs.

Please accept this invitation to join the team which must exist for this vision to become reality.

And speaking of teams, I need to say that until very recently I didn't much involve myself in the sorts of things which we are here to discuss tonight, leaving it to those in the Lab far more knowledgeable than I in this area. However in recent weeks it has become necessary and I think desirable for me to become intimately involved and thus I have had the opportunity to work closely with such people as Steve Schainker and Tom Neuman of the city of Ames, Judie Hoffman of the City Council and Don Flater of the Iowa Department of Public Health, and I have been truly impressed with both their expertise and dedication. We of this community are fortunate indeed to have a team like this to safeguard our interests.
Now, before I introduce our next speaker, let me tell you how the rest of the evening should go.

We are going to have some formalized presentations on the history, current status and future plans for the sites in question and then we are going to turn it loose for questions from the audience. I expect it to be hardball and I'm ready to stay here all night to answer every question we can, and for those we can't, we will tell you when and from whom you can expect answers. With that said, it is my pleasure to introduce our next speaker, the manager of the Chicago Operations Office of the DOE, Cherri Langenfeld.

Presentation by Tom Barton at a public forum in Ames, IA on April 5, 1994 later published in The Daily Tribune.