United States
Department of
Agriculture

Forest Service

**Southern Forest
Experiment Station**

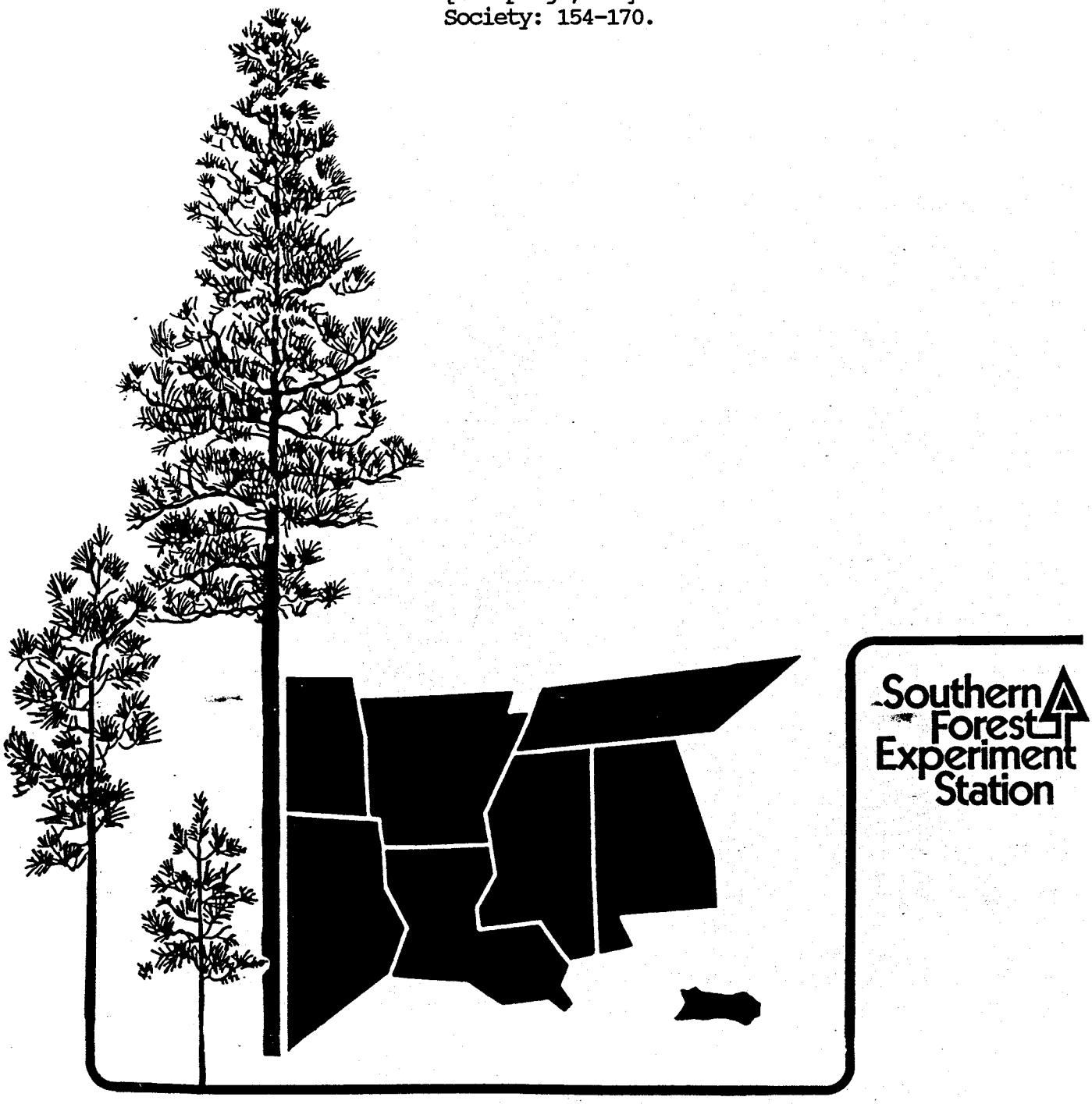
New Orleans,
Louisiana

Proceedings Reprint

HERBICIDES AND FOREST ECOSYSTEMS-APPROACHES TO RISK COMMUNICATION

McMahon, C.K.

In: Proceedings of the 45th Annual Meeting Southern Weed Science Society; 1992 January 20-22; Little Rock, AR. [Champaign, IL]: Southern Weed Science Society: 154-170.



HERBICIDES AND FOREST ECOSYSTEMS - APPROACHES TO RISK COMMUNICATION. **C. K. McMahon; Southern Forest Experiment Station, USDA Forest Service, Auburn, AL 36849.**

ABSTRACT

It has become apparent to many risk experts that without good communication, risk assessment and risk management efforts may be largely in vain. For the public, perception is reality when it comes to the interpretation of risk information and the shaping of regulatory policy. The findings of several risk communication experts are reviewed and presented in the context of herbicides used in forest ecosystems. An emphasis is placed on (1) how to recognize and deal with public outrage, (2) how to make "good" and "bad" risk comparisons, and (3) guidelines for developing a formal risk communication program.

INTRODUCTION

Having just gone through the registration process for this annual meeting, I am sure most of you are aware that our theme this year is "Communicating Modern Weed Science." But I'm wondering how many of you are asking... "Is this an appropriate theme for a scientific conference?" or "What does communication have to do with science?" On the other hand, I am also wondering how many of you have ever used the expression... "they just don't understand"... when referring to the public's reaction to the use of herbicides in forestry? How many of you have had a hard time explaining to friends, employees, or concerned citizens, the "numbers" found in risk documents or environmental impact statements? Perhaps you've had an environmental activist pose a question about forest herbicides which caused you to use "techno-babble" in your response.

If you've had these experiences, you probably would agree that communication is important to science and that we must find ways to improve our risk communication skills if we expect to continue with this forest management practice in the future.

My objective in this presentation today will be to draw your attention to some recent findings and recommendations by risk communication experts. I hope this will prompt you to further explore the topic on your own. Toward that end, I will be suggesting some books, manuals and a video on the topic. These can be used as learning/training devices by anyone interested in improving their own skills on introducing this concept to other scientists, managers, and policy makers at institutions where you work.

RISK

Risk is one of the most important and least understood topics in our society today. Issues that range from board global policies

to routine daily decisions involve risk appraisals by individuals, organizations, and governments. We all encounter risks every day; driving a car, flying, smoking cigarettes, taking prescription drugs, and participating in recreational and occupational activities. Somehow we make decisions to accept, reject or modify these activities using an appraisal process that seems largely instinctive. However, the formal process of risk analysis is much more complex and quantitative.

To the risk scientist, every risk involves a combination of two principle factors: (a) the probability of an undesirable occurrence, coupled with (b) the severity of that occurrence.(1) The following example of a dice role is often used to illustrate the process.

> "the probability of losing at a single roll of the dice in craps is 51.3%; the severity of losing is exactly the money that was bet. The gamble may be an acceptable risk if the bet is an amount of money that the bettor can easily afford to lose. The same gamble may be an unacceptable risk if the bet is the bettor's life savings. Whether the bet is "worth it" is determined by balancing the risk involved (i.e., losing) against the odds and magnitude of the benefit (i.e., winning). This decision is a "value judgement" and is to a great extent an individual choice.
>
> But just as a risk may go from acceptable to unacceptable as the severity of the consequence is increased, so also may it worsen if the probability of occurrence increases. An acceptable risk at five dollars with 60-40 odds may become unacceptable as the odds rise against the gambler."(1)

This process is similar in principal for evaluating chemical herbicide risks in forest ecosystems. The assessment consists of an estimation of the probability of harm---an undesirable occurrence---to human and/or ecosystem health coupled to the severity of that occurrence caused by exposure to a certain level of the herbicide over a defined period of time. This is often simply referred to as chemical toxicity or hazard.

It should be obvious that herbicide risk assessments for complex ecosystems will never be as simple or definitive as the assessment one can perform with a "roll of the dice." We simply cannot conduct human and ecosystem experiments as easily as we can repeatably throw the dice.

The formal scientific appraisal of risk, known as risk assessment, is used to alert people to problems as well as prompt others to reduce risk to "acceptable" levels. This latter action

is known as risk management. Risk management often involves value judgements that integrate social, economic, and political concerns with the scientific risk assessment.

I'm sure many in this audience are familiar with some of the risk assessment documents for chemical herbicides. Documents in support of the product registration, or perhaps a recent environmental impact statement. Perhaps some of you have been involved directly or indirectly with managing the risks associated with the use of herbicides. However, how many of you have been involved, or even thought about "risk communication" as a part of the process?

According to Glickman and Gough (10), many risk assessment experts have not been successful in communicating their findings to the general public. And the risk managers who base their decisions on the expert's advice have often failed to convince the public that risks can be kept to acceptable levels. As a result of these failures, the topic of risk communication is receiving more and more attention.

THE IMPORTANCE OF RISK COMMUNICATION

It has become apparent to many risk experts that without good communication, risk assessment and risk management may be largely in vain.(10) According to Peter Sandman, Director of the Environmental Communication Program at Rutgers University, "risk assessment and risk management personnel are now beginning to focus on the risk communication process because they now realize that how people perceive risk determines how they respond to it, which in turn sets the stage for influencing public policy".(14) For the public, perception is reality when it comes to the interpretation of risk information. "Public opinion" mobilized through the mass media often has more influence than "science" on shaping regulatory policy.

Prior to 1986 there were only a few essays in the scholarly and policy literature with risk communication in their titles. Since that time, scores of titles along with conferences, workshops, videos, and training sessions have appeared with a focus on risk communication. According to Plough and Krimsky (13) ..."risk communication is more than a research framework. It has become a concept that is strongly marketed by specific interest groups to achieve particular ends." The Environmental Protection Agency (EPA) has elevated the concept of risk communication to a strategic level in both its regulatory activities and its research agenda. Industries that are regulated by the EPA also see risk communication as a key policy and management issue.(13) The 1988 Superfund Amendments and Reauthorization Act (SARA) Title III, state right-to-know laws, and the Occupational Safety & Health Act (OSHA) hazard communication standard of 1990 have underscored the importance of risk communication to groups concerned with environmental health hazards. Over the past few years, the risk communication consulting business has become a "growth industry"

with a wave of seminars on "why is it necessary...?" and "how best to do it...!" While it is clear that some people are now motivated to improve their risk communication skills simply because "its the law," although behavioral scientists tell us they will not make good risk communicators; others are drawn to more important **benefits of risk communication** as suggested by Covello and others (7):

1. **To help turn societal attention and resources from trivial problems to major problems.**

2. **To better understand public perceptions, needs, and concerns.**

3. **To reduce the tension between communities, agencies, and industrial groups.**

4. **To make more informed risk management decisions.**

5. **To reduce levels of public outrage.**

THE OUTRAGE CONCEPT

Over the years, one of the most perplexing factors recognized by risk communication experts is the poor correlation between the list of risks that harm people and the list of risks that make people upset or outraged. In the past, risk managers in industry and government often concluded that the lack of correlation was simply a lack of scientific literacy, or just an irrational perception on the part of the public. To overcome the problem, attempts were made to "better explain the numbers" that described the hazard. However, it was quickly realized that more slides, better presentations, and improved educational devices to explain the hazard were not working. The correlation between real risks and the risks that alarmed or outraged people was still poor.

Some risk experts began to suggest that the public's definition of risk was different than the "professional" definition. While misperception of the hazard was a factor, it was not the only factor. Other variables seemed to play a role. The public's definition of risk went beyond hazard and included many subjective, emotional factors that caused them to be upset or outraged. More importantly, it was the public definition of risk that was shaping public policy and influencing the regulatory process. Sandman summed it up this way,... **"while the scientists were claiming...**

RISK = HAZARD

the public was claiming...

RISK = HAZARD + OUTRAGE

...For many years, while the experts focused on the hazard and ignored outrage, the public focused on outrage and ignored the hazard".(14)

The good news from this hypothesis is that we now have two ways to lower risk from a public policy context. While we can and should continue the important work to lower hazards, we should also devote more attention to lowering outrage factors (for those risks that involve minor or trivial hazards). The converse is also true. When dealing with risks with high hazards, risk communicators have an obligation to amplify outrage. Through this process, society's limited resources can be better mobilized and directed to solve the most serious environmental problems. Lowering or amplifying outrage is as much a part of risk management as working to minimize health and environmental hazards.(14)

Sandman maintains that hazard misperception is not the core problem in risk communication. He is not suggesting that misperceptions are a myth, rather he explains... "In most risk controversies, people do misperceive the hazard; they also feel outraged. The question is which is cause and which is effect. If people are outraged because they misperceive the hazard, then the solution is to explain the hazard better. On the other hand, if people misperceive the hazard because they are outraged, then the solution is to find a way to reduce the outrage".(14) He offers the following (thought experiment) to illustrate the point.

> Imagine a roomful of citizens listening to an expert on pesticide risks, perhaps someone like Bruce Ames of the University of California. Ames has conducted research suggesting that natural carcinogens in food are several orders of magnitude riskier than pesticide residues. To summarize Ames's argument in a single oversimplified sentence: broccoli is more carcinogenic than dioxin. Imagine Ames trying to convince his audience of this. It's going to be a tough sell, obviously. But the audience is calm, there is no cancer cluster in town, the food is good, there's plenty of time, and Ames is a persuasive speaker with a lot of data to back him up. So over the course of an hour or two he succeeds in convincing people that, in fact, broccoli is more carcinogenic than dioxin. They had a misperception and it has been corrected.
>
> Now up comes another speaker. Now that we know that broccoli is more carcinogenic than dioxin, the second speaker inquires, which one do we want the EPA to regulate, the broccoli or the dioxin? What would the audience respond? The dioxin.

This thought experiment tells us that the hazard misperception wasn't our problem in the first place. As long as dioxin generates a lot of outrage, and broccoli very little, teaching people about their relative hazard is unlikely to affect the publics concerns, fears or policy choices.

THE OUTRAGE FACTORS

Before one can begin to lower outrage, one must know about the broad array of outrage factors that have been identified by risk experts. Sandman discusses 20 outrage factors in his risk video.(14) The following is a brief summary of ten factors discussed by Hance and others in the "Industry Risk Communication Manual" (12) and by Covello and others in the "Effective Risk Communication Manual".(6) While you will find most of these factors explained from a chemical industry perspective, they have broader applications. Especially to issues that deal with the use of pesticides in agriculture and forestry.

1. **Voluntary vs involuntary or coerced risk** -- People feel much less at risk when the choice is theirs. When people don't have choices, they become angry. Consider the difference between getting pushed down a mountain on slippery sticks and deciding to go skiing. *This factor helps explain why people readily accept repeated herbicide treatments on their lawns but may be outraged over a single unannounced herbicide treatment on adjacent public forest land. Find ways to share decisions with concerned citizens.*

2. **Natural vs industrial risks** -- People rarely become outraged over natural risks. A natural risk like a flood is midway between a voluntary and a coerced risk; we are all more forgiving of "God's coercion" than of corporate coercion. You can't make industry risks into natural ones, but you can avoid comparing your pollution to aflatoxin in peanuts. *The public will generally accept abundant amounts of "natural" pesticides in foodstuffs and reject trace "industrial" pesticide residues found in the same foods or "forests".*

3. **Fair vs unfair risks** -- Even if a situation entails more benefits than risks, the people who bear the risks often reap little of the benefits. This unfairness naturally provokes outrage. Reduce risks where you can -- then compensate where you cannot reduce. To find out what sort of compensation is most appropriate, conduct a survey or ask the community. *This factor explains, in part, why communities that depend on a particular industry for jobs sometimes see pollution or environmental impacts from that industry as less risky.*

4. **Familiar vs exotic risks** -- Familiar risks and familiar surroundings diminish outrage. That's why homeowners generally don't fear radon and workers sometimes don't pay enough attention to safety rules. Facility tours, mall displays, school programs, and media messages can increase familiarity and reduce outrage - especially if they don't evade the tough issues. *While the public is familiar with the need for weed control on their own lawns and gardens, weed control in a forest setting is viewed as a somewhat exotic and therefore an unnecessary risk. Public education programs will make this risk more familiar and therefore less "risky".*

5. **Not memorable vs memorable risks** -- Whether through personal experience or media experience, memorable incidents and images of risk exacerbate outrage. When such incidents and images are present in people's minds, ignoring them just makes the problem worse. Discuss them before you are accused of them. *The mere mention of "chlorinated" herbicides is enough to trigger in some people minds visions of agent orange, dioxin, Vietnam, and other memorable events which generates high outrage. Much of this outrage can be defused by addressing the issue before a confrontational question is asked.*

6. **Knowable vs unknowable risks** -- Do the experts agree? Do they seem to understand the hazard? How big are the error bars in the risk estimate? Is the hazard visible or otherwise detectable? Often you can increase knowability by giving concerned citizens access to the data -- for example, a japanese firm put a large thermometer on top of an incinerator, so citizens knew that it was burning hot enough. *In forestry, we need to make herbicide use data more available. Facts as reported by Artman (4) at this meeting are one example. He reports that in 1990, Virginia forestry treated 66,252 acres or only 0.5% of the land available for treatment within the Forestry Herbicide User Group. An average rate of 1.37 lb ai/ac/rotation was used. This kind of information needs to go beyond scientific meetings and be delivered to regulators and citizens as an informational message. We need to make our forestry practices and procedures more knowable and therefore less risky in the minds of the public. The message needs to be delivered before, not after a conflict or crisis arises.*

7. **Morally irrelevant vs morally relevant risks** -- To many, pollution isn't just harmful; it's wrong. Its moral relevance makes the language of costs-risk and benefit-risk tradeoffs seem callous and worthless. As one EPA official put it, speaking to some people about an optimal level of pollution is like talking about an acceptable number of child molesters. *In some instances, an outrage based on a moral point of view cannot be reduced. But you*

can avoid amplifying that outrage by not making smug remarks about the people who hold this position.

8. **Risks controlled by the individual vs risks controlled by "the system"** -- Most people feel safer driving than riding as a passenger. Being at the mercy of someone else provokes the most outrage when "someone else" is a faceless corporation or government agency. Techniques to share control range from informal surveys that ask people their concerns to formal advisory committees. *The scoping process, public announcements, invitations for public review, and other steps used in environmental assessments and environmental impact statements are all aimed at sharing "control".*

9. **Risk information from trustworthy sources vs risk information from untrustworthy sources** -- Polluting industries and government agencies are widely distrusted, and people make the conservative assumption that an untrustworthy institution might well be dangerous as well. In general, people trust their physician and mistrust their auto mechanic and behave accordingly. *The rule of thumb here is to "stop asking to be trusted" and instead build in accountability. If people are outraged over the possible contamination of their reservoir from adjacent forest land treated with herbicides, allow them to participate in decisions on how and where to monitor for residues. Before the results are in, create dummy tables of possible outcomes balanced against drinking water standards (if known). Try to reach some agreement on where follow-up action would be unnecessary.*

10. **Risks from open responsive process vs risks from a closed unresponsive process** -- What sort of relationship has your organization built with the community? Do you admit past errors or deny or ignore them, release information promptly or hide it? How do you deal with people's concerns - courteously and responsively, or with arrogance, defensiveness, or techno-babble? *A number of corporations and government bodies have recently learned that admitting the bad news, apologizing where appropriate, and responding with compassion quickly deflates public outrage. A technical discussion that follows an apology will be more successful and more apt to lead to conflict resolution.*

Only some of the outrage factors summarized above or listed elsewhere will be found in specific risk scenarios. However, the greater the number that do apply, the greater the likelihood of public concern about the risk, regardless of the hazard data. In those instances, it is as important to pay attention to the outrage factors as it is to the hazard in order to effectively manage the risk.

RISK COMPARISONS

Back in 1979, Wilson (15) compiled a long list of everyday activities (such as smoking 1.4 cigarettes, drinking a half liter of wine, and eating 40 tablespoons of peanut butter), which were estimated to increase the probability of death in any year by one chance in a million. Other comparisons soon followed and began to be widely used by industry and government agencies to help explain public and occupational risks. The process often backfired, generating outrage rather than quelling fear. These "mixed" comparisons were seen by some citizens as trivializing their concerns and as an attempt to coerce their acceptance of the risk.

Whether or not risk comparisons work or backfire is largely a matter of timing and knowing your audience. Comparing the health risk of herbicides to eating peanut butter may work when addressing a scientific audience but is guaranteed to fail if used before an outraged group of citizens; especially when the concern of the citizens is focused on forest wildlife that "don't eat peanut butter"! Equally counterproductive are attempts to quell public fears by "drinking a glass of herbicide contaminated water" or claiming that you would "bathe your kids in it".

In addition to the risk message content; the attitude, delivery, and mannerisms of the communicator are extremely important. Flippant or cavalier comments or comparisons are bound to generate outrage and be rejected, especially when conveyed at a gathering of concerned workers or the general public.

Covello and others (9) have prepared a manual on risk comparisons providing numerous guidelines and concrete examples based on a variety of risk scenarios. While the manual is aimed primarily at the chemical industry, there are many generic principles which can be used by others. A categorization and ranking system for risk comparisons is suggested in terms of public acceptability. The manual describes 14 kinds of risk comparisons arranged in 5 ranks (from most to least acceptable). The reader is cautioned that the findings are not based on empirical research but rather the combined experience of ten risk communication scholars and industry practitioners. The ranking seem to work best when applied to situations where tension and hostility is running high.

A general rule of thumb is: Select from the highest ranking risk comparisons whenever possible. When you have no choice but to use a low-ranking risk comparison, do so cautiously, being aware that the risk comparison could backfire. Examples from Covello's manual (9) with adaptations to forest herbicide risk scenarios are listed below:

FIRST-RANK RISK COMPARISONS--MOST ACCEPTABLE

COMPARISONS WITH A STANDARD

Examples:

- The amount of herbicide X found is 100 times below the level permitted by EPA standard Y.
- Exposure of forest workers to herbicide X is 100 times below the level Y considered safe by the Occupational Safety and Health Administration.

SECOND-RANK COMPARISONS--LESS DESIRABLE

COMPARISONS OF ALTERNATIVE SOLUTION TO THE SAME PROBLEM.

Example:

- The ecosystem disturbance from the herbicide vegetation management treatment is X, while the disturbance from mechanical treatment is Y and the disturbance from prescribed burning Z. Rather than... the herbicide treatment causes less disturbance to the ecosystem than a group of boy scouts camping out for a week.

THIRD-RANK RISK COMPARISONS--EVEN LESS DESIRABLE

COMPARISONS OF THE RISK FROM ONE SOURCE OF A PARTICULAR ADVERSE EFFECT WITH THE RISK FROM ALL SOURCES OF THAT SAME ADVERSE EFFECT.

Example:

- The risk of cancer posed by a lifetime exposure of workers to herbicide X is 0.00003 percent of the total cancer risk. (note: some people operating out of fear or outrage will personalize this risk and assume they or their unborn child will be the 0.00003 statistic).

FORTH-RANK RISK COMPARISONS--MARGINALLY ACCEPTABLE

A. COMPARISONS OF BENEFITS WITH RISK--MARGINALLY ACCEPTABLE

Example:

- The use of herbicide X in forest ecosystems increases seedling survival by Y percent and shortens crop rotation time by Z years. Ecosystem disturbances caused by the herbicide are only temporary and the use of stream side management zones minimizes off-site herbicide movement. Note: Risk/benefit comparisons tend to be more acceptable when the benefits accrue to the people being addressed. Otherwise they may be viewed as bribery, especially when communicated in a confrontational environment. The

benefits message is important but the general rule of thumb is to separate the benefit message from the risk message.

B. COMPARISONS OF OCCUPATIONAL RISKS WITH ENVIRONMENTAL RISKS--MARGINALLY ACCEPTABLE

Example:

- The local community near the forestry nursery is exposed to far less herbicide contamination than our nursery workers and medical tests show no evidence of adverse health effects to our workers.
  Note: This goes back to involuntary risk being more "risky" than voluntary risks in the eyes of the public.

C. COMPARISONS WITH OTHER RISKS FROM THE SAME SOURCE--MARGINALLY ACCEPTABLE

Example:

- Risks arising from the use of 2,4-D herbicide in forest ecosystems are far less than risks which result from the use of this herbicide on domestic gardens and lawns.
  Note: Unfamiliar risks are perceived as more risky than familiar risks.

D. COMPARISONS WITH OTHER SPECIFIC CAUSES OF THE SAME DISEASE, ILLNESS OR INJURY--MARGINALLY ACCEPTABLE

Example:

- Animal studies show that the carcinogenicity potential from a lifetime exposure to herbicide X is less than that produced from exposure to natural background levels of geological radon.
  Note: Industrial risks are perceived as more risky than natural risks.

FIFTH-RANK COMPARISONS--RARELY ACCEPTABLE - USE WITH EXTREME CAUTION!

According to Covello and others (9), "all of the types of comparisons listed above have some claim to relevance and legitimacy - a strong claim in the top ranks, a much weaker claim in the bottom ranks. Within the fifth rank are all risk comparisons that have little or no claim to relevance or legitimacy. Central among these are comparisons of two or more completely unrelated risks."

Even in the fifth rank, however, distinctions can be made. For example, the more a risk comparison disregards factors that people consider important in evaluating risks, the more likely it is to be ineffective. One example of a comparison that violates

these distinctions is to tell people at a public meeting that their risk from herbicide X is lower than the risk they took when they drove their cars to the meeting or when they enjoyed a cigarette during a break. Unless there is already a high level of trust between the speaker and the audience, this sort of comparison is guaranteed to provoke outrage (9).

Comparing the risk from herbicide X to such things as the risk of food additives is also far from ideal. There is no special reason to believe that the risks of food additives are relevant to risks of herbicide X. But at least the comparison does not appear to do major violence to any of the most important outrage distinctions. By contrast, comparing the risk of herbicide X to the risk from driving without a seatbelt violates most of the major risk distinctions. The latter risk is voluntary, familiar, and controlled by the individual. Comparing this risk to that of herbicide X - which is likely to be perceived as involuntary, unfamiliar, and beyond the citizen's control - is bound to infuriate the audience.

To sum up Covello's risk comparison strategies:

- **Avoid comparisons that ignore the outrage factors.**
- **Avoid comparisons that seem to minimize or trivalize the risk.**
- **Develop comparisons of similar situations or substances.**
- **Always acknowledge uncertainty.**

THE RISK COMMUNICATION PROCESS

To be effective, the process of risk communication must be a continuum of deliberate steps by committed, well-informed people rather than a "shoot from the hip" burst of public relation announcements. Covello and Allen (5) sum up the process into seven cardinal rules and guidelines...

RULE 1. ACCEPT AND INVOLVE THE PUBLIC AS A LEGITIMATE PARTNER.

A basic tenet of risk communication in a democracy is that people and communities have a right to participate in decisions that affect their lives, their property, and the things they value.

Guidelines: Demonstrate your respect for the public and sincerity by involving the community early, before important decisions are made. Involve all parties that have an interest or a stake in the issue under consideration. If you are a government employee,

remember that you work for the public. If you do not work for the government, the public still hold you accountable.

RULE 2. PLAN CAREFULLY AND EVALUATE YOUR EFFORTS.

Risk communication will be successful only if carefully planned.

Guidelines. Begin with clear, explicit risk communication objectives--such as providing information to the public, motivating individuals to act, stimulating response to emergencies, or contributing to the resolution of conflict. Determine if you have sufficient information to discuss the risks. Classify and segment the various groups among your audience. Aim your communications at specific subgroups in your audience. Recruit spokespeople who are good at presentation and interaction. Train your staff--including technical staff--in communication skills; reward outstanding performance. Whenever possible, pretest your messages. Carefully evaluate your efforts and learn from your mistakes. There is no such entity as "the public"; instead, there are many publics, each with its own interests, needs, concerns, priorities, and preferences. Different risk communication goals, audiences, and media require different risk communication strategies.

RULE 3. LISTEN TO THE PUBLIC'S SPECIFIC CONCERNS.

If you do not listen to people, you cannot expect them to listen to you. Communication is a two-way activity.

Guidelines. Do not make assumptions about what people know, think, or want done about risks. Take the time to find out what people are thinking: use techniques such as interviews, focus groups, and surveys. Let all parties that have an interest or a stake in the issue be heard. Identify with your audience and try to put yourself in their place. Recognize people's emotions. Let people know that you understand what they said, addressing their concerns as well as yours. Recognize the "hidden agendas", symbolic meanings, and broader economic or political considerations that often underlie and complicate the task of risk communication. People in the community are often more concerned about such issues as trust, credibility, competence, control, voluntariness, fairness, caring, and compassion than about mortality statistics and the details or quantitative risk assessment.

RULE 4. BE HONEST, FRANK, AND OPEN.

In communicating risk information, trust and credibility are your most precious assets.

Guidelines: State your credentials; but no not ask or expect to be trusted by the public. If you do not know an answer or are uncertain, say so. Get back to people with answers. Admit mistakes. Disclose risk information as soon as possible (emphasizing any reservations about reliability). Do not minimize or exaggerate the level of risk. Speculate only with great caution. If in doubt, lean toward sharing more information, not less--or people may think you are hiding something. Discuss data uncertainties, strengths and weaknesses--including the ones identified by other credible sources. Identify worst-case estimates as such, and cite ranges of risk estimates when appropriate. Trust and credibility are difficult to obtain. Once lost they are almost impossible to regain completely.

RULE 5. COORDINATE AND COLLABORATE WITH OTHER CREDIBLE SOURCES.

Allies can be effective in helping you communicate risk information.

Guidelines: Closely coordinate all inter-organizational and intra-organizational communications. Devote effort and resources to the slow, hard work of building bridges with other organizations. Use credible intermediaries. Consult with others to determine if you or someone else is best able to answer questions about risk. Try to issue communications jointly with other trustworthy sources (for example, credible university scientists, physicians, or trusted local officials). Few things make risk communication more difficult than conflicts or public disagreements with other credible sources.

RULE 6. MEET THE NEEDS OF THE MEDIA.

The media are a prime transmitter of information on risks; they play a critical role in setting agendas and in determining outcomes.

Guidelines: Be open with and accessible to reporters. Respect their deadlines. Provide risk information tailored to the needs of each type of media (for example, graphics and other visual aids for television). Prepare in advance and provide background material on complex risk issues. Do not hesitate to follow up on stories with praise or criticism, as warranted. Try to establish long-term relationships of trust with specific editors

and reporters. The media are frequently more interested in politics than in risk; more interested in simplicity than in complexity; more interested in danger than in safety.

RULE 7. SPEAK CLEARLY AND WITH COMPASSION.

Technical language and jargon are useful as professional shorthand, but they are barriers to successful communication with the public.

Guidelines: Use simple, non-technical language. Be sensitive to local norms, such as speech and dress. Use vivid, concrete images that communicate on a personal level. Use of examples and anecdotes make technical risk data come alive. Avoid distant, abstract, unfeeling language about deaths, injuries, and illnesses. Acknowledge and respond (both in words and with actions) to emotions that people express-anxiety, fear, anger, outrage, helplessness. Acknowledge and respond to the distinctions that the public views as important in evaluating risks, e.g., voluntariness, controllability, familiarity, dread, origin (natural or man-made), benefits, fairness, and catastrophic potential. Use risk comparisons to help put risks in perspective; but avoid comparisons that ignore distinctions that people consider important. Always try to include a discussion of actions that are under way or can be taken. Tell people what you cannot do. Promise only what you can do, and be sure to do what you promise. Regardless of how well you communicate risk information, some people will not be satisfied. Never let your efforts to inform people about risks prevent you from acknowledging--and saying--that any illness, injury, or death is a tragedy. If people are sufficiently motivated, they are quite capable of understanding complex risk information, even if they may not agree with you.

PUBLIC IMAGE

Many of the public's concerns associated with the use of forestry herbicides are rooted in a basic distrust of the chemical industry. According to the Chemical Manufacturing Association (CMA) the chemical industry currently ranks second to last among 10 U.S. industries in public attitudes.(2) Only the tobacco industry, ranks lower. In addition, about two-thirds of the public consider the chemical industry "very harmful" to the environment. Perhaps more disheartening are results of a survey by Covello (8) who found the public's perception of the health risk posed by chemicals changing dramatically over the past ten years. His research shows that 10 years ago most people believed that 10% of all cancers were caused by exposure to chemicals in the environment, today the majority of people believe 85% of cancers are due to chemical exposure.

Given this "bad news" about the public image of the chemical industry, you might be wondering how your risk communication efforts can ever be effective. Don't despair, there is some good news to report. The American Chemical Society (ACS) has begun a major long-term effort to improve chemistry's public image.(3) Known as "public outreach" it draws on the expertise of the 180,000 members of the organization to prepare and present positive images of the risk of chemistry in society. News releases, expert testimony, television news features, fixed and travelling exhibits, and other educational activities are a part of the program. In addition, in June 1991, the Chemical Manufacturers Association (CMA) opened a 6 million dollar national advertising campaign aimed at improving the U.S. public's image of the chemical industry.(2) This is part of a large five-year 50 million CMA campaign to communicate broadly with the U.S. public. The campaign's goal is to increase public understanding of a program started in 1988, known as "Responsible Care". According to E. McBrayer CMA chairman, "Responsible Care is the most comprehensive, most ambitious health, safety, and environmental initiative ever put together by a manufacturing industry in this country."(2) Member companies have pledged to follow 10 guiding principles under the program. Six codes are being developed and four are in place: addressing community awareness, emergency response, pollution prevention, and process safety and distribution. Codes covering employee health and safety, and product stewardship are soon to follow. Equally important, the program makes use of a national public advisory panel to review codes and shape initiatives.

THE NEXT STEP

Against the backdrop of this encouraging good news and public outreach let me close by refocusing once again on the theme of this years meeting ..."Communicating Modern Weed Science,"... and encourage you to further explore risk communication topics by consulting some of the citations listed at the end of the paper. These authors are the experts in this field and their works can be used to simply build awareness, or to go all the way towards developing a formal risk communication program.

REFERENCES

1. American Chemical Society, 1984. Chemical Risk: A primer. Dept. of Government Relations and Science Policy, American Chemical Society, Washington, DC: 12p.

2. American Chemical Society, Chemical and Engineering News, June 17, 1991 p 32.

3. American Chemical Society, Chemical and Engineering News, December 2, 1991 p 50.

4. Artman, J.D. 1992. Forestry herbicide use data - fact or fiction. IN: Proceedings, 45th Annual Meeting Southern Weed Science Society; 1992 January 20-23; Little Rock, AR. [Champaign, IL] Southern Weed Science Society. In Press.

5. Covello, V. T.; and Allen, F.W. 1988. Seven cardinal rules of risk communication. IN: National Air Toxics Information Clearinghouse: Case Studies in Risk Communication; EPA-450/5-88-003, Research Triangle Park, N.C.: Appendix A.

6. Covello, V.T.; McCallum, D.B.; and Pavlova, M.T., eds. 1989. Effective Risk Communication, Plenum Press. New York. 370p.

7. Covello, V.T.; McCallum, D.B.; and Pavlova, M. 1989. Principles and guidelines for improving risk communication. In: Covello and others, eds., Effective Risk Communication. Plenum Press, New York: 3-19.

8. Covello, V.T. 1991. Presented at the 21st International Symposium on Environmental Analytical Chemistry, Jekyll Island, GA, May 1991.

9. Covello, V.T.; Sandman, P.M.; and Slovic, P. 1989. Risk Communication, Risk Statistics, and Risk Comparisons - A manual for Plant Managers. IN: Covello, V.T. and others, eds., Effective Risk Communication, Plenum Press, New York:297-359.

10. Glickman, T.S.; and Glough, M., eds. 1990. Readings in Risk. Resource for the Future, Washington, DC 262 p.

11. Hance, B.J.; Chess, C.; and Sandman, P.M. 1989. Improving Dialogue with Communities: A risk communication manual for government. IN: Covello and others, eds., Effective Risk Communication, Plenum Press, New York: 191-297.

12. Hance, B.J.; Chess, C.; and Sandman, P.M. 1990. Industry Risk Communication Manual. Lewis Publishers, CRC Press Inc., Boca Raton, FL. 151 p.

13. Plough, A.; and Krimsky, S. 1990. The emergence of risk communication studies: Social and political context. IN: Glickman, T.S., and Glough, M., eds. Readings in Risk. Resources for the Future, Washington, DC: 223-233.

14. Sandman, P.M. 1991. Risk=Hazard + Outrage - A formula for effective risk communication. Video available from American Industrial Hygiene Association. Akron, OH.

15. Wilson, R. 1979. Analyzing the daily risks of life. Technology Review 81: 40-46.