Fundamentals for Establishing a Risk Communication Program

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ABSTRACT

This paper provides a suggested outline for developing a risk communication organizational plan that could be used by a variety of federal, state, or private agencies. Drawing on various techniques presented in the literature and on the authors' insights, suggestions are provided as to how to formulate and convey risk messages. First, the paper provides a few risk communication fundamentals including definitions, the goal of informing vs. influencing, the importance of public participation in risk managment, building trust and credibility, the consideration of outrage, and the importance of oral and visual communications. Second, a stepwise approach synthesized by the authors is presented that can be applied in developing a risk communication program. The approach is a 13-step method based on the premise that the risk communication program should be dynamic, flexible, and involve interaction with the public at every possible step.

Fundamentals for Establishing a Risk Communication Program

INTRODUCTION

We present a method for understanding and designing an organizational risk communication plan. The format is flexible enough to accommodate the varied needs of those responsible for the communication programs of federal and state agencies as well as private companies. Broadly applicable suggestions are made concerning the formulation and dispersion of risk messages. An overview of relevant risk communication principles is provided first, followed by the authors' thirteen step program in effective risk communication with an interpretation of recommendations by several prominent scientists and psychologists studying the effectiveness of various communication techniques.

The definition of risk is very broad, however, this paper refers to the risk of health effects from exposure to chemical or radiological hazards. Risks addressed herein are those imposed on employees of a chemical or nuclear facility or members of the general public that live in the vicinity of these hazards. In this context, this risk communcation outline is meant to be applicable for a number of agencies, both public and private, those with responsibility for maintaining occupational and public safety in facilities or operations dealing with hazardous substances.

RISK COMMUNICATION PRINCIPLES

Definition of risk communication. Historically, risk communication was largely a one-way form of communicating, with the public being told what the experts think to be important. The risk communicators have been the interpreters, clarifiers, and simplifiers of technical jargon. This is no longer considered acceptable or sufficient by the public; the public wants to be involved. Risk communication is now frequently a two-way, interactive and long-term process, one where the public and risk communicators are engaged in a dialog, rather than acting as senders and receivers (Bradbury 1994). This requires the risk communicators to develop listening skills. The communicators must acknowledge people's concerns and respond to opinions, emotions, and reactions. The risk communicators must take part in guiding, developing, implementing, and evaluating communication efforts. They act as a bridge between the technical experts and the public. The communicator is also the amplifier, not the buffer, between management and the public (Meeker et al. 1991).

The many forms of risk communication can be broken into four areas (Covello et al. 1988): (1) information and education, where people are informed and educated about risks and risk assessments in general; (2) behavior change and protective action, which encourages risk reduction behavior by trying to influence the perceptions of the audience; (3) disaster warnings and emergency information, which provides direction and behavioral guidance in disasters and emergencies; and (4) joint problem solving and conflict resolution, which involves the public in risk management decision-making and in resolving health, safety, and environmental controversies.

Risk communication, unlike many other communications, often involves statements about threatening and poorly understood hazards and consequently, the dialog is often riddled with disagreements, apathy, misunderstanding, and suspicion (Rowan 1994). Therefore, risk communication can evoke very hostile emotions towards the risk communicator. The communicator must be able to diffuse the anger directed towards himself, otherwise, trust and credibility can quickly be eroded. The communicator must acknowledge the hostility, must practice self-management, be prepared, communicate empathy and caring, and turn negative messages into positives. Negotiating is the central process for resolving conflicts; the risk communicator must be conversant in negotiation skills, especially in situations where the reactions are hostile.

When communicating with the public, the risk communicator must consider other issues including property values; decline in lifestyle resulting from traffic, noise, odor and dust; decline in community image; and any aesthetically objectionable qualities of the facility (Sandman 1985). The risk communicator must also recognize the reasons behind the differences in views between the public and the organization and be able to act on them (Kasperson et al. 1992). According to Kasperson et al. (1992), there are five goals to risk communication: (1) diagnosing and creating trust; (2) creating awareness strategies; (3) understanding why concepts are hard to grasp and finding ways to overcome the problem; (4) developing mediating skills; and (5) motivating the public to act.

Inform or influence? The goals of the communication effort will dictate whether the prime objective is to influence or inform. To influence is to convince the audience to accept the communicator's values and prescribed actions. Influencing strategies are used when the risk communicators believe that the public needs persuasion more than education (Hall and Crawford 1992). This type of strategy is often used to change the public's behavior to one of a less risky lifestyle, for example, smoking cessation, reduction of fat consumption, and radon measurement and remediation. Careful consideration must be given before deciding on an influencing strategy of risk communication. If, however, attempts are obviously to manipulate, the audience may feel resentful

and distrustful; the whole risk message may be discounted. The communicator's credibility may also be a casualty in this process (NRC 1989).

Informing the audience requires equal forethought. The main job of the communicator must be to foster an environment where exchanges of information and ideas can take place so that the audience can make judgments and risk management decisions.

***Risk Communication and Risk Management*.** Many social scientists have shown that humans have intrinsic needs that have to be realized before full growth and realization can be achieved. Once the basic needs such as survival, security, and safety have been fulfilled, humans target their attention towards a higher level of needs. These needs include the desire to control one's self-direction and destiny (Nathwani et al. 1989). Because of this need for self-direction, it is important to include the public in the risk management process.

Some of the benefits of public involvement include: (1) community participation can make the decision more palatable to the public (Sandman 1985); (2) communities are more likely to accept decisions made with their input (Chess and Hance 1989); (3) communities often have local information that the company may not have, and consequently, can help the company make better decisions; (4) the involvement of the community may lead to a greater understanding of the risk; (5) cooperation will increase the company's credibility within the community; and (6) including the community will decrease the possibility of legal delays, political pressure, legislative exemption, and gubernatorial exemption brought on by the community (Sandman 1985). .

The risk communicator cannot include the public in risk management decisions unless the company's management allows this to happen. If the company does not wish to include the public in risk management, information still should be provided. The public must be made to recognize, however, that openness with information does not necessarily mean empowerment (NRC 1989).

There are a few important points to consider if a strategy is selected which includes the public in risk management decisions: (1) first and foremost, risks imposed on the public are considered to be externalized costs of production thereby making the public valid stakeholders in the company (Otway 1989); (2) consideration should be given as to how the public should be invited, how questions should be phrased, and what issues are to be discussed (Sandman 1985); (3) public input should be sought at the early stages of the project; (4) rules and goals of the public's input should be explained early and reinforced throughout the process; (5) the public must have sufficient information to become effective participants (Conservation Foundation 1986); (6) the

decision-maker must be accessible to the public (Conservation Foundation 1986); (7) public input should be included into plans and policies that are adopted; and (8) explanation should be given as to how the public's input was used and what decisions resulted (Benjamin and Belluck 1990).

Trust and Credibility. In recent years, accidents related to the petroleum industry (e.g. oil spill in Prince William Sound (Alaska), rig explosion in the North Sea (U.K.), fire at the Footscray Terminal (Australia)) and the chemical industry (e.g. Bhopal incident (India)) have made the public perceive that companies cannot be trusted to carry out their environmental responsibilities. Risk communication is often riddled with suspicion, therefore, initial strategies are needed that build trust. Trust is an important pre-requisite for effective orientation and action. There are four key issues on which trust must be based, including: perceptions of commitment, competence, caring, and predictability (Kasperson et al. 1992).

Trust takes time to build, it is fragile - it can be destroyed in an instant. It requires continuous reinforcement and maintenance. It is very important to remain candid and honest; this means being ready, able, and willing to be forthcoming and to reveal all that is known or believed about the issue (Conservation Foundation 1986) and that possible controversial information should be quickly distributed. If there is a communications void between the risk communicator and the public, this void will be filled by speculation, rumors, or misinformation. It will then seem that the organization was withholding information (Shovlin and Tanaka 1990). Communications must be made to the public early, often, and fully. Even if no new information is available, the public must know that the risk is still being studied and has not been forgotten (Lundgren 1994). Once trust is destroyed by events such as accidents, lies, discoveries of errors, or mismanagement, there is a tendency to perpetuate and reinforce distrust (Slovic 1993). A risk communicator can build trustworthiness by making his actions consistent with his words, and showing, over time, respect for the perspectives of others.

Consideration of Outrage. Sandman (1993) has popularized the concept that risk perception is a function of hazard and outrage. This means that in any risk communication effort, the risk communicator cannot afford to ignore any outrage that is felt by the audience. Sandman (1993) talks of twelve principle outrage components, providing a detailed explanation of each (Table 1). From these components, Sandman (1993) draws seven conclusions about hazard and outrage: (1) the public responds more to outrage than to hazard; (2) activists and media may amplify the outrage but they do not create it; (3) outraged people do not pay much attention to hazard data; (4) outrage is not just a distraction from considering the real hazard - both are legitimate and must be addressed; (5) when the hazard is high, risk communicators try to induce more outrage; (6)

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conversely, when the hazard is low, risk communicators try to reduce the outrage; (7) companies and agencies cannot do much about outrage until their own organizations are changed.

Risk communicators should analyze every risk communication effort and see what outrage factors are prominent since these are the factors that may have the most influence on communication exchange. Once the major outrage factors have been identified, risk communication strategies should be designed to address these concerns.

Communication Channels. There are many forms of media by which risk communicators can disseminate information, e.g., public meetings, newspaper, radio, television, and even the Internet. It is best to use multiple media sources while remembering that the basic information on each risk message must be consistent. Audience analysis can assist with the selection of the most appropriate forms of media. Communication channels also should be selected to make the best use of resources while still meeting overall objectives. Direct techniques of communicating with individuals include: brochures, information packets, newsletters, videotapes or slide shows, advertisements, fact sheets, and press releases. Interactive forms of communication include community meetings, community advisory groups, service group presentations, educational activities with schools, face-to-face meetings, and telephone interviews (Santos 1990).

Communication can be carried out orally and/or visually. Oral messages have the advantage of getting immediate audience feedback, however, these messages can easily be misunderstood. Providing the audience with literature for future reference will reinforce the message. The person delivering the oral message must have sufficient technical knowledge to answer most questions, while at the same time have superior presentation and listening skills. Visual messages are those that use graphics and relatively little text and are excellent for raising awareness of a particular issue. However, visual messages can be expensive and time-consuming to produce, and the amount of information contained may be limited (Lundgren 1994). Effective written messages are those that are short, use lay-language, do not capitalize on the public's fears, explain how risks were estimated, and provide risk comparisons. They also make recommendations on reducing risks, provide the public some control over risk, and are sensitive to nuances in the language.

To increase the public's participation in risk communication efforts, there are many methods for facilitating interaction, communication, increasing trust, and agreement (Sandman 1985). Some of these facilitating methods include: (1) the Delphi methodology, a formal technique for encouraging consensus through successive rounds of position-taking; (2) role-playing, where stereotyped roles of participants are played out to help all sides understand the issues better; (3)

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gaming-simulation, a variation of role-playing but participants interact with each other and a complex simulated situation; (4) co-orientation, which helps participants to understand each other's position; (5) efficacy-building, designed to increase a group's sense of its own power; (6) focus groups, a small assemblage of individuals selected as typical of a particular constituency; and (7) fact-finding, mediation, and arbitration, or the use of third-party interventions in conflict situations. These approaches may not be applicable in all situations and it is assumed that both parties want to find a solution, not a deadlock or litigation.

Risk Communication May Not Always Work. It is wrong to expect that risk communication will always reduce conflict and that smooth risk management will result. There will always be benefits to some and harm to others. Although good risk communication may not improve the situation, bad or no risk communication will certainly make it worse (Hall and Crawford 1992). The risk communicator must recognize that he or she will never convince everyone that the risk management decisions are appropriate; there will always be some segment of the community that will feel slighted. Whether the communication effort was successful depends largely on its original objectives. As the National Research Council (NRC 1989) suggests, "risk communication is successful to the extent that it raises the level of understanding of relevant issues or actions that satisfies those involved that they are adequately informed within the limits of available knowledge".

COMMUNICATIONS PROGRAM OUTLINE

The outline suggested here consists of 13 steps that the authors' have synthesized from the literature toward building a risk communication program. A flow model is given in the diagram of Fig. 1, beginning with program initiation, working through communication methods, and finishing with program evaluation. Each step is detailed below.

Step 1: Obtain Organizational Support

To have a successful risk communication program, management support must be strong. Management may have to be convinced to start a risk communication program and they must be willing to commit resources: money and personnel, incentives, and training. Management must be committed to the idea that informing and involving the public are legitimate activities. This commitment has to be communicated to all staff who may have the opportunity to interact with the public. Communicating with the public is part of everyone's job and not just be the job of the spokesperson (Santos 1990). The organization should have an internal environment that

encourages dialogue, informal interaction, and creative problem solving to encourage staff to interact with the community (Chess and Hance 1989).

To maintain credibility and trust, it is very important that consistent messages be sent out by the company. In addition, the best way to gain credibility and trust is to be open. In some instances, however, the need may arise to communicate information that neither the company's lawyers nor the public relations department wants released. Ground rules must be established with these and any other relevant departments before the program begins (Lundgren 1994). If the risk communicator is communicating on behalf of the company, he/she must comply with the company's risk management decisions. In cases where the risk communicator has to write a communication document for management, the communiqué has to be written in management's style.

Step 2: Determine Risk Communication Needs

The communication program will vary greatly depending on the message and the audience. Seven communication needs are described below.

Employee Communications. Communication with employees involves both information transfer and, at times, influencing workers' behavior. Communicating the meanings of various safety signs in a particular facility is an example of information transfer. Many controls, such as hearing protection, helmets, safety shoes, etc., are utilized in the plant to protect the health and safety of workers. To ensure routine use these controls, workers will have to be convinced or influenced to wear such equipment. This is often very difficult since personal protective equipment can be uncomfortable, hinder the worker, and may make tasks more time demanding. To improve health and safety in the plant, top management must demonstrate its own commitment and work constructively at all supervisory levels to manage safety. This can be done by setting health and safety as an important organizational goal (Kivimaki et al. 1995).

Green-Site Plant Communications. A green-site plant is a facility that is built on a new site. In this case, risk communication is often the provision of informing the public of the planned facility's operation. Green-site projects must include time to execute the risk communication effort. As an initial step, the problem has to be defined; the risk communicators have to convey the actual seriousness of potential problems so that they are not overstated or likely to be misperceived. Especially for new sites, the laypublic may not have an opportunity to appreciate the hazards and controls. Therefore, a longer period must be allowed for the public to learn of the facility's operations. Any attempt to rush the community into a decision may, in the end, result in resistance.

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Since new equipment may not act in a prescribed manner, the limitations of the planned technology must be described in some detail. The communications program must include a phase that informs the community of available controls. The inclusion of the community into decision-making can perhaps help the public view the risk more as a voluntary risk (Michaud 1989).

        Plant Modification Communications. This can be linked to on-going plant communication, however, it is certainly easier when there is already an established community communications program. The main points to make in this type of risk communication are to explain to the public the intentions of the modification, what it will mean to the community, what are the benefits, and what are the consequences for no action. However, even though the plan is clearly communicated, recognize that some segments of the community may oppose the modification. When the plant has no prior communication with the community, greater efforts must be spent to gain consensus.

        Crisis Communication. Crisis communication is very different from other forms of risk communication. Here, there are two aims to the communication effort. In the first case, during an emergency, the communication purpose is to motivate people to act quickly in response to an acute hazard. In the second case, after the emergency has passed, the communication effort is focused on addressing the public's concerns and outrage. Companies resist communicating during emergencies because a communication plan may not have been prepared in advance. The company as a whole may also fear interacting with the media or have fears of accountability, fears of revealing proprietary information, desire to avoid panicking the public, lack of a spokesperson, and legal implications. The best protection from this is to ensure that a communication plan is in place (Covello et al. 1988).

        Planning is the key for handling any potential crisis. In the planning stages, the company must determine likely crisis scenarios like bomb threats, fire, chemical releases, and explosions. Objectives of the communication plans have to be developed with the cooperation of local authorities. Principal questions to be answered before developing plans should include: what are the major accidents that can potentially affect the public?; how far can the effect be felt?; what are the credible warning procedures?; what information should be shared with the public and how should it be communicated? The plan should reflect that a quick response time is extremely important. The company must be able to respond within the first 24 hours after the onset of the incident. Facts must be assembled quickly, the company must be organized to communicate, and key spokespersons must be trained and ready for the unforeseen event.

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In most disasters and emergencies, the primary objectives are to avoid injuries and minimize property damage. Time pressures are very important. Recognizing that people are very reluctant to evacuate their homes, the public will look for confirmation of the emergency message before reacting. Mass media can provide vital communication links during these times. However, once warned, the community will still need to know how to respond. After the crisis, many questions will have to be answered. People are interested in how, what and why the crisis happened. The community who may have been exposed will want to know (Hadden 1989): "what substances have I been exposed to?"; "what are the health effects of such an exposure?"; "what are the long term health effects?"; "will I get cancer?"; "what are the effects on my children?"; "what is being done to prevent future accidents?"

An example of how one plant prepared a crisis communication plan is seen at the ESSO Fawley plant. Fawley representatives prepared a letter to the community to explain the emergency warning card and the off-site alarms. Esso employees were informed about the exercise so that they may act as company ambassadors and community groups were involved prior to the information distribution. A video was made and a local radio station was also involved in the emergency response as well as publicizing the communication activity (Pullen 1989).

On-Going Community Communication. On-going community relations is the part of the risk communication effort that ensures that a particular company keeps in contact with the community, thereby building trust and goodwill. This can be established by forming a Citizen Advisory Committee that meets regularly with company representatives to address the community's concerns. Newsletters are also useful avenues of communication and work well when the communication is on-going and the surrounding population is relatively stable (Lundgren 1994). "Companies that do their own community outreach and keep the community involved receive less static or controversy when it comes to get or renew a permit or install equipment" (Krukowski 1993).

New Product Communications. Recent successful lawsuits by plaintiffs in the United States have shown the importance of communicating product risks to the public. This is an area that will require significant improvement. A chemical/petroleum company communicates the hazards of the products they manufacture by using labels, material safety data sheets (MSDSs), and product health and safety bulletins. Other than product health and safety bulletins, these forms of communications are mandated by regulations and usually are not presented in an easy to understand format for the layperson. For example, many MSDSs found in the U.S. are often longer than 5 pages, some even exceed 10 pages. Most of the information presented uses technical

jargon that only a trained health and safety person could interpret. The challenge to most companies is to make information that is comprehensive, yet easy to understand.

After the company has designed and prepared labels, MSDSs and other product safety information, there must be a system where this information is disseminated to the customers and, where possible, the end-users. The company can also supplement the information by providing on-site assistance to customers for safe-handling of the product. This not only increases health and safety awareness at the customer's site, but may also provide valuable additional after-sales service. This kind of assistance may include site assessments, ventilation evaluation, or air monitoring.

Governmental Communications. Approvals for the vast majority of industrial projects must first be obtained from the federal government. Like communicating with the public, the risk communicator must communicate the same issues with the government. A mixture of strategies may be employed that blends both influencing and informing sides of risk communication. The risk communicator also communicates with the government regarding the regulations governing its use of various chemicals.

Step 3: Develop Objectives for Risk Communication

To have a successful risk communication program, communication efforts must have a defined purpose. Typical objectives set for risk communication are problem definition, options generation, solution selection, and implementation. Each of these can have the public's involvement, the degree of which may vary. While developing objectives, it is important to keep in mind that effective risk communication programs are ones that are proactive, ongoing, and cooperative. It is vitally important for the company to understand which objectives require cooperation and the nature of this cooperation (Benjamin and Belluck 1990). Fisher (1991) recommends that objectives should also include helping the audience to understand the science behind the risk assessment.

Step 4: Form Communication Teams

Although verbal risk communication is normally delivered by one person, risk communication programs require teamwork to make them successful. The expertise, for example, of risk assessment specialists is needed to estimate potential human impact for a particular hazard, public relations people to determine how the public should be notified, lawyers to ensure compliance with federal and state laws, management to coordinate the entire effort, and focus

groups to evaluate and critique the communication message before public dissemination. A different team may be formed for each of the various risk communication needs.

Step 5: Train Team Members

All personnel that may be involved in conducting risk communication programs have to be trained in risk communication fundamentals and negotiation skills. Unfortunately, the best risk communication skills are obtained through experience. One way to build skills is to observe successful risk communicators at work, build a small library of examples of good risk communication practice, and critically evaluate risk communication techniques against these examples. Understanding ones' own limitations is essential since no one person will have all the necessary attributes to be an effective risk communicator.

Step 6: Evaluate Potential Audience

For every risk communication, the communicator has to understand the demographics of the audience. By knowing the audience, the communicating team can better design the risk message, select appropriate communication channels, etc. Learning more about the public's concerns may lead to convergence between the experts' risk assessment and the public's risk perceptions. Whenever possible, all audiences should be identified that have a stake or interest in the issues to be addressed. It may be easier to deal with broad-based groups, since they are more likely to seek co-operation and constructive relationships given that the group's survival is not dependent on a single issue (Shovlin and Tanaka 1990).

The next step is to identify the audiences' concerns and background. Audience concerns are typically: (1) lifestyle and health; (2) data information and uncertainty; and (3) process and risk management. This often translates to: "What will this do to me?" or "Can I drink the water", or "Will I get cancer?" Since these are the most commonly asked questions, the risk communication program must be poised to address these issues (Santos 1990). The risk communicator also needs to know background issues such as the audience's reading level, mathematical level, knowledge of the subject, and level of hostility towards the company (Lundgren 1994). The audience is often interested in the broader spectrum of risk assessment, as well as losses in property value and quality of life, erosion of the sense of community, disruption of social relations, and the stigma associated with various facilities and operations (Kasperson et al. 1992).

If it is determined that the audience is made up of minority communities, the risk communicator must address the issue of distributive and procedural justice. The phrase "distributive justice" deals with fairness in the allocation of resources and costs in dealing with the siting of hazardous facilities in lower socioeconomic neighborhoods. Many in these communities feel to have been singled out for unfairly bearing the risk burden. "Procedural justice" refers to the fairness of processes in which decisions are made. This includes consistency in decisions or rules, perceived neutrality of the authorities, competence, respect for rights, and interpersonal dynamics. Hence, the communication in these cases may include communications related to racial equality, participatory democracy, empowerment, and control over risk management (Vaughan 1995).

Step 7: Evaluate Media

From the audience analysis, an understanding will be gained of which media route seems most effective at reaching the audience. To some extent, media selection is dependent on the risk message. It is very important that the following actions be followed when communicating with the news media: do not disseminate self-serving data; do not make irrelevant comparisons; do not downplay risk potential; do not use technical jargon; do not employ non-credible or incompetent sources; do not take adversarial postures; do not stonewall or act inaccessible; and do not ignore public concerns. And, most importantly, be proactive establishing dialog with journalists (Adams 1993).

Step 8: Design Risk Message

The risk message should be designed such that the audience can comprehend. Reading level, feelings about the risk, and experience with the hazards are important factors. Even with a detailed audience analysis, a portion of the audience may still find certain ideas hard to understand. A few of the reasons why people find concepts difficult to understand are: (1) use of technical terms - to overcome this, substitute more easily understood terms if doing so will not mislead, or if the difficult term is really the best choice, use it and define it by its critical attributes rather than its variable attributes; (2) structures or processes of concepts may be hard to envision - provide a sense of the big picture, use main points, diagrams, or use text features that highlight connections among main points; (3) concepts may be hard to believe - some ideas are counterintuitive, conduct a stepwise method of stating the erroneous but plausible notion, acknowledge its apparent plausibility, demonstrate its inadequacy by noting inconsistencies between it and evidence familiar to the audience but not yet considered, and present the more accepted view and demonstrate its greater adequacy (Rowan 1994).

To assist with the audience's comprehension of risk, comparisons are often used. However, there may be many pitfalls arising from risk comparisons that are irrelevant or misleading, including increased outrage and destruction of trust and credibility. Since risk is a multi-dimensional concept, it may be hard to find a comparison that is analogous. One way to overcome this is to compare the risk to itself at different times or with national standards (Hadden 1989). The best type of risk comparisons are either the comparisons of similar risks, comparisons of risks with different benefits, comparisons of alternatives, comparisons of the same risks at two different times, comparisons to natural background levels, and comparisons with regulatory standards (Covello 1991). Risk messages should also contain practical actions for individuals to reduce their risk. The message should be conveyed in clear, concise language, having respect for the audience's concerns, and should only inform unless conditions warrant the use of influencing techniques (NRC 1989).

Communicating uncertainty is an important part of the risk message. Uncertainties must be acknowledged by explaining data gaps, levels of confidence, and expert disagreements (Hatfield 1994). Even though people may be unfamiliar with the concept of uncertainty, an overall understanding is more likely if this uncertainty is presented in a clear and simple way. However, sometimes this backfires and the audience feels that uncertainty is a sign of incompetence (Johnson and Slovic 1995). Every risk message should provide factual information that has statistical significance, is successfully duplicated by other research, is specific to the particular conditions, and describes the study's limitations.

Each risk message should always include a risk summary and overview to help the audience understand the potential hazard. Accuracy of the risk message is vital; those preparing the message should be held accountable for its accuracy and the risk message must be reviewed by an expert panel. The acceptability of the risk message to the public can be checked by using an outside focus group (NRC 1989). Finally, ensure that the message is complete; the National Research Council (1989) provides a checklist for developing a comprehensive risk communication (see Table 2). This checklist addresses hazard risks and benefits, as well as alternatives and control. The NRC also recommends providing management contacts in public communications in order to strengthen relationships between facility management and the community.

Step 9: Develop Schedule

A schedule will assist the team leaders to ensure that the risk communication program will not fall behind the project or the development of a new product. The plan has to be communicated

to all departments whose input is vital to the risk communication effort. Regular meetings should be held with all relevant personnel so that any unexpected delays will not jeopardize the program. The plan must have sufficient flexibility so that these delays can be absorbed. In addition to including the outlined steps into the schedule, the schedule should also include time for scientific review of risk assessment information; management, legal, and public affairs reviews; and time for the audience to assimilate information.

Step 10: Communicate Plan with Organization

After specifying the objectives, completing the schedule, and evaluating the message, the plan should be circulated throughout the various departments to gain concurrence. This is an important step since it will ensure that the company understands and is in agreement with the risk communication plan. It will also provide a form of feedback from management on how to further improve the plan.

Step 11: Form Focus Groups

The use of focus groups are of paramount importance, particularly in those instances where risk communication is an ongoing program. Focus groups consist of a facilitator, company officials, and those who are representative of the community. Focus groups are useful for identifying obstacles to effective risk communication. These groups will reveal local concerns about: (1) exposure to children; (2) apparent media sensationalism; (3) the public's lack of involvement; (4) regional perceptions of risk; and (5) how risk issues should be communicated (Golding et al. 1992).

Focus groups also provide answers that are not found in questionnaires. Structured questionnaires are useful, however, they only measure responses to the concerns addressed and the context in which they were focused. Open-ended questionnaires do not allow the individual to consult with others before forming answers. Focus groups can supplement the questionnaires by providing a way to incorporate social interaction and learning into the process. Giving people a chance to learn about the risks associated with a certain process and the forum to discuss their interests, values, fears, and concerns with peers helps to clarify some factual consequences and to test the social acceptance of different opinions (Webler 1995).

Lynn and Busenberg (1995) have investigated the use of Citizen Advisory Committees which are very similar to focus groups. They have shown that this process has many benefits,

including: (1) educating the sponsor in regard to community attitudes; (2) educating the participants (and the public) in regard to company activities; (3) providing a forum for citizen involvement in decision making; (4) improving public support for decisions; and (5) allowing the company to deal with a small body of people rather than the whole community. However, the formation of the advisory committee must consider how representative the group is of the community, what it is accountable for, and what role it has in the decision-making process. If it is realized that citizens' advice is not taken sincerely, it can generate anger, frustration, and alienation. Limitations on citizen advisory committees are that there is no assurance that the public will accept the idea of an advisory group speaking on its behalf, that the desire to have all viewpoints represented may mean some viewpoints will be under-represented and others over-represented when compared to broader public opinion, and that advisory groups may become elitist and lose touch with their constituents (Lynn and Busenberg 1995).

Step 12: Practice

As the old cliché goes, practice makes perfect. This is especially true where presentations have to be made; during practice the presenter should include the fielding of questions so that he/she can better prepare for potentially hostile audiences. According to Morgan et al. (1992), "one should no more release an untested communication than an untested product." The presentation or the written/visual risk messages should be tested on groups similar to the focus group before broad-based dissemination.

Step 13: Evaluate Communication Program

Each risk communication effort within an overall program has to be evaluated so that improvements can be made. It can be done as a self-evaluation or by using independent evaluators. Early evaluation of the effort allows the risk communicator to change the plan mid-stream. However, measuring non-tangible items is not easy. It is often more evident when the effort is not working than when it is (Fisher 1991). Each aspect of a particular communications effort must be met for the communication to be successful. The questions to ask in the evaluation are: were the objectives met?; did changes occur as a result of the communication effort?; what went well and why?; what could have been improved and why?; what lessons were learned?; with whom should these lessons be shared?

Part of program evaluation includes soliciting feedback from the audience. In addition to gaining its perceptions on how to improve the risk communication program, it also may improve team work between the company and the public. The feedback may identify poor or conflicting problem definitions, conflicting expectations about responsibilities, confusion over working rules (power sharing), and/or indirect communication barriers between members. By addressing these issues, the risk communication program will ensure the continual improvement of the process (Benjamin and Belluck 1990). Weinstein and Sandman (1993) recommend evaluating the audience's response to the message by asking how the audience comprehended the message, if the group was in agreement with the recommendations, and if the message was interpreted similarly across the board.

An overall program evaluation must be completed to ensure that all the communication efforts are cohesive and consistent. Since risk communication programs may involve more than one team, this allows one team to learn from the experiences of other teams. Program evaluation is an on-going practice which will strengthen any given risk communication program and result in a more robust and effective communication effort between the management of hazardous facilities and the residents of surrounding communities.

SUMMARY

Effective risk communication is a difficult task. Clearly, however, a detailed communication plan with full management support can certainly ease the burden. The author's have discussed several fundamental principles of risk communication and have provided a suggestion for a

program outline. Basic principles of risk communication dictate that the audience be included in risk management decisions, that trust and credibility is paramount, and that public outrage must be acknowledged and addressed. Our program outline is developed on the premise that all risk communication is different and is dependent on several factors, including hazard and facility type, and audience demographics. Additionally, focus groups and repeated practice and evaluation of the risk communications program are extremely important to polish the risk message.

REFERENCES

Adams, W.C. The role of media relations in risk communication. Public Relations Quarterly. Winter. 28-32; 1993.

Benjamin, S.J.; Belluck, D.A. Risk feedback: an important step in risk communication. Management Operations. November: 50-55; 1990.

Bradbury, J.A.; Risk communication in environmental restoration programs. Risk Analysis. 14:357-363; 1994.

Chess, C.; Hance, B.J. Opening doors: making risk communication agency reality. Environment. 31:10-15; 1989.

Conservation Foundation. Selected readings from risk communication. Proceedings of the National Conference on Risk Communication. J. C. Davies, V. T. Covello, and F. W. Allen (eds.). Washington: DC; 1986.

Covello, V.T.; von Winterfeldt, D.; Slovic, P. Risk communication. Carcinogen Risk Assessment. C. C. Travis (ed.). Plenum Press. NY; 1988.

Covello, V.T. Risk comparisons and risk communication: issues and problems in comparing health and environmental risks. Communicating Risks to the Public. R. E. Kasperson, and P. J. M. Stallen (eds.). Kluwer Academic Publishers. Netherlands. 79-124; 1991.

Fisher, A. Risk communication challenges. Risk Analysis. 11:173-179; 1991.

Golding, D.; Krimsky, S.; Plough, A. Evaluating risk communication: narrative vs. technical presentations of information about radon. Risk Analysis. 12:27-35; 1992.

Hadden, S.G. A citizen's right to know: risk communication and public policy. Westview Press. Boulder: CO; 1989.

Hall, S.K.; C. M. Crawford, C.M. Risk analysis and risk communication. Pollution Engineering. November: 78-83; 1992.

Hatfield, T.H. A risk communication taxonomy for environmental health. Journal of Environmental Health. 56:23-28; 1994.

Johnson, B.B.; Slovic, P. Presenting uncertainty in health risk assessment: initial studies of its effects on risk perception and trust. Risk Analysis. 15:485-494; 1995.

Kasperson, R.E.; Golding, D.; Tuler, S. Social distrust as a factor in siting hazardous facilities and communicating risks Journal of Social Issues. 48:161-187; 1992.

Kivimaki, M.; Kalimo, R.; Salminen, S. Perceived nuclear risk, organizational commitment, and appraisals of management: a study of nuclear power plant personnel. Risk Analysis. 15:391-396; 1995.

Krukowski, J. Risk communication as preventative medicine. Pollution Engineering. September. 35-40; 1993.

Lundgren, R.E. Risk communication: a handbook for communicating environmental, safety, and health risks. Battelle Press. OH; 1994.

Lynn, F.M.; Busenberg, G.J. Citizen advisory committees and environmental policy: what we know, what's left to discover. Risk Analysis. 15:147-162; 1995.

Meeker, D.A; Schrum, R.P.; Williamson, S.P. Meeting the challenge of risk communication. Public Relations Journal. January: 28-29; 1991.

Michaud, G.R. Accepting new technology: community relations for mobile incineration in Illinois. In: Proceedings of the Annual Meeting of the Society for Risk Analysis. 525-530; 1989.

Morgan, M.G.; Fishhoff, B.; Bostrom, A.; Lave, L.; Atman, C.J. Communicating risk to the public. Environmental Science and Technology. 26: 2049-2056; 1992.

Nathwani, J.S.; Lind, N.C.; Siddall, E. Risk-benefit balancing in risk management: measures of benefits and detriments. In: Proceedings of the Annual Meeting of the Society for Risk Analysis. 599-613; 1989.

National Research Council (NRC). Improving risk communication. National Academy Press. US Committee on Risk Perception and Communication. Washington: DC; 1989.

Otway, H. Communicating with the public about major hazards: challenges for european research. Communicating With The Public About Major Accident Hazards. 26-37; 1989.

Pullen, R.J.F. Esso Fawley refinery. Communicating With The Public About Major Accident Hazards. 170-172; 1989.

Rowan, K.E. Why rules for risk communication are not enough: a problem-solving approach to risk communication. Risk Analysis. 14:365-374; 1994.

Sandman, P.M. Getting to maybe: some communications aspects of siting hazardous waste facilities. Seton Hall Legislative Journal. 9:242-265; 1985.

Sandman, P.M. Responding to community outrage: strategies for effective risk communication. American Industrial Hygiene Association. Fairfax: VA; 1993.

Santos, S.L. Developing a risk communication strategy. Management Operations. November. 45-49; 1990.

Shovlin, M.G.; Tanaka, S.S. Risk communication in Los Angeles: a case study. Management Operations. November. 40-44; 1990.

Slovic, P. Perceived risk, trust, and democracy. Risk Analysis. 13:675-681; 1993.

Vaughan, E. The significance of socioeconomic and ethnic diversity for the risk communication process. Risk Analysis. 15:169-180; 1995.

Webler, T.; Rakel, H.; Renn, O.; Johnson, B. Eliciting and classifying concerns: a methodological critique. Risk Analysis. 15:421-436; 1995.

Weinstein, N.D.; Sandman, P.M. Some criteria for evaluating risk messages. Risk Analysis. 13:103-114; 1993.

CAPTIONS

Fig. 1. Flow model suggested for establishing and maintaining a risk communication program.

FOOTNOTES

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