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Development of an electromagnetic fields risk communication plan

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Abstract

Some health effects research has led to concern that electromagnetic field (EMF) exposures may increase the risk of certain diseases. Recent publicity about research results has resulted in numerous inquiries from anxious utility customers. Moreover, the public has shown greater opposition to actions that may be seen as increasing exposure to EMF, such as construction or upgrading of transmission lines. Utilities thus need effective means of communicating accurate information about potential EMF risks and securing appropriate public involvement. Increasing such public concern that exposure to EMF may cause adverse human health effects poses difficult communications problems for utilities. This paper will assist utilities in clearly conveying the current scientific understanding of EMF and explaining corporate positions on the issue. Moreover, the paper should help utilities achieve appropriate levels of public involvement in EMF issues. It provides a comprehensive menu of communication and public involvement methods for helping utilities respond to customers concerns about EMF and offer examples of message development and readily comprehensible information about EMF.

Keywords: Electromagnetic field; Risk plan; EMF exposure

1. Introduction

The major stimulus for electromagnetic field (EMF) research has been and continues to be public concern that exposure to low-frequency electric and magnetic fields from overhead transmission lines may cause adverse health effects in humans. This concern has now expanded to include electric and magnetic fields exposure from sources in and around the home and in the workplace. The increase in research over the past two decades has spurred a concurrent growth in public awareness and concern; people apparently feel that a health threat must indeed exist to justify the volume of scientific study underway. However, research to date does not support the hypothesis that there is a causal relationship between electric and magnetic field exposure and adverse health effects [1–16].

EMF exposures vary considerably among residential and workplace environments. Available data indicate that human exposures to fields of the magnitudes found close to transmission lines are infrequent. Also, indoor fields are not confined solely to 60 Hz, but are dispersed over a frequency spectrum characteristic of indoor equipment and appliances. Several recent studies indicate an association between residential and workplace exposure to magnetic fields and the risk of cancer, especially leukemia and brain tumors and none supports the causal relationship [1–16].

Epidemiologic studies have all been based on proxy exposure measures: job title for the occupational studies, and spot measurements and/or electric supply system wiring configuration for residential exposures. The validity of these measures as indices of historic magnetic field exposure has not been determined. Further investigations should include an epidemiologic study of residential magnetic field exposure conducted in more than one community. Careful attention must be given to selection of controls and to measurement of actual exposures of the study population. Also needed is an investigation of occupational exposure and cancer incidence with improved documentation of actual EMF exposures [1–16].

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Chronic exposure of animals to electric fields has in most cases failed to elicit adverse effects. Important exceptions include behavior, neurophysiology, and endocrinology. Overall, the effects are subtle and have not been proven to pose long-term health hazards. Several studies have shown that laboratory animals can detect 60 Hz electric fields, and when given a choice, they prefer to avoid the field. The role of field perception in mediating the observed effects must be examined, particularly in determining the extrapolate results in animals to effects on people. However, further research is needed, particularly in the area of neurophysiology. Low-frequency magnetic fields appear to influence some neurophysiologic, behavioral and developmental end points, although most of these effects appear to be completely reversible. Nonetheless, some of these isolated findings warrant further investigation. There is also some evidence of a biologic resonance between the geomagnetic field and 60 Hz magnetic fields. If validated, this finding implies that elucidation of effects may be dependent upon the local strength and orientation of the geomagnetic field [17–22].

Extremely-low-frequency (0–300 Hz) electric and magnetic fields produce effects in cells and tissue exposed in vitro. The biological responses appear to be sensitive to the magnitude of the applied field, as well as its wave shape and frequency. Field interactions with cells, when they occur, appear to be at the cell surface rather than at internal sites, such as the nucleus, perhaps by acting on membrane receptors and altering ion transport across the membrane. The relevance of these findings to environmental exposure and the behavior and physiology of humans and animals has not yet been established, although some of them are lending support to the AC magnetic field/cancer hypothesis.

Although research results have in many cases been ambiguous, public opinion remains clear: People continue to suspect that EMF exposure may be detrimental to human health, and they favor a continued program of health effects research. It is apparent that 60 Hz electric and magnetic field exposures will remain of public health concern for the foreseeable future.

This paper includes specific guidance for developing EMF risk communication programs that will assist utilities achieve appropriate levels of public involvement in EMF issue.

2. Factors affecting risk perception

Since the mid-1980s, researchers have been studying the rules the public applies in assessing risk. They have discovered that there are a number of key issues that cause people to perceive a risk as being higher or lower [23–26]. These factors include:

2.1. Benefits

One of the first questions the public asks is: 'Why is this project needed?' That's because one of the most important judgments the public makes is whether the benefits to be derived from an action outweight the risk. If the benefits are large, then risks may seem low in comparison. Recent experience in siting power lines shows that questions of EMF health effects are less likely to be important if the public is fully convinced of the need for the project. In general, the public is somewhat sympathetic to claims that a utility will not be able to provide sufficient electric power without additional transmission. The public is considerably less sympathetic to lines built primarily for reliability purposes. Reliability seems too abstract to the public; it seems like something the utility wants, not something the public wants.

2.2. Availability of alternatives

The next question the public ask is: 'What are the alternatives?' In effect, people say 'Before accepting that this risk is necessary, people want to be sure that taking this risk can't be avoided by using an alternative approach'. This is one of the reasons that, in siting power lines, the public immediately asks about undergrounding. If undergrounding reduces EMF, they figure, we can solve two problems at one time. We reduce the risk of EMF, and get rid of ugly lines. Of course it's still not clear that undergrounding reduces exposure to EMF.

2.3. Equity

If there is a risk, people generally feel it is fairer, or more equitable, if that risk is shared equally. If you're part of a group of people who experience most of the risk, with others not experiencing the same risk, you will perceive that risk as much more significant. If it were to turn out that exposure to EMF from power lines is a public health hazard, then those who live near the power lines will see this as a much more significant risk, deserving of social attention, than those who do not. If it were to turn out that there are health hazards associated with EMF from home wiring, something to which most people in our society are exposed, then the perception of the importance of this risk may change substantially.

2.4. Choice

The key question here is whether or not an individual has a choice about whether to be exposed to a risk. People see any risk imposed on them by others as much greater than risks they assume themselves. This is why

people see no contradiction between skydiving on weekends, but complaining about any risk imposed on them by their local utility. This is why someone who smokes, may still be deeply concerned about air pollution. One activity, with all its attendant risks, they choose to engage in. The other risks are created by someone else's choice. The public generally sees electrical facilities—generating plants, substations, power lines—as something imposed on them. They do not see them as a voluntary risk, even though they use electrical power themselves. One of the strong arguments for consulting the public about siting issues is that if the public feels it has a choice; its perception of risk will be much lower.

2.5. Control

The key question here are: 'Can I, as an individual, control the amount of risk to which I'm exposed?'; 'Can I move away from it for a while, turn it down, insulate against it?' When people can exercise some control, they experience the risk as smaller. In general, EMF is not seen as something subject to individual control. There are some indications, however, that one of the values of conducting field measurements in peoples' homes is that as people understand exposures in their own home, their sense that they can exercise control over their exposure to EMF is increased, with some reduction in anxiety.

2.6. Effect on children

Any risk that affects children, particularly if it uniquely affects children, is seen as a much greater risk. Children are seen as innocents who cannot protect themselves, or don't understand the implications of their own behavior. Therefore, the risk to the child is seen as involuntary, even if the child somehow engaged in behavior that led to exposure. Unquestionably, EMF became a much important issue as soon as several studies suggested that magnetic fields are a possible contributed to childhood leukemia.

2.7. Dread

Some risks have become, over time, more feared, more dreaded than others. Often this is because they are associated with major events—such as Three Mile Island, Love Canal, Chernobyl—which were frightening, and received considerable media attention. Anything 'nuclear', for example, is seen as having much more risk than other hazards that, statistically, are more dangerous. Preliminary research on EMF suggests that while the amount of dread associated with it is nowhere near as high as anything nuclear, there is still a moderate amount of dread associated with EMF. This dread may be increased by a fear of what EMF studies may portend: If living near a transmission line may be a danger to us, what else are we going to find out about being around electricity that we didn't know about? If being around electricity is dangerous after we spend so many years feeling it was safe, what other familiar things are in fact dangerous?

2.8. Human origin

Many people accept risks that occur in nature—floods, hurricanes, earthquakes, landslides—while they become upset by statistically lesser risks that are of human origin. If human beings created the risk, then people are responsible for the risk and for its consequences, and this makes the public angry. EMF is definitely perceived as of human origin.

2.9. Media attention

The mass media exert a powerful influence on public perceptions. People are influenced by the total number of times a risk is mentioned. The crucial role that a media plays is to tell people what an event means. If research results are announced, it is not just the fact that they are announced by the mediate that is important, but the fact that the media tells you this is something to be worried about.

2.10. Familiarity

As a general rule, if people are familiar with a risk, it seems less threatening. To most people, the idea that there may be health effects from exposure to EMF is a new and unfamiliar idea. This heightens the perception of risk.

2.11. Understanding

If people can understand why something is risky, or how it works, they see it as less risky. Since the scientists do not know any mechanisms by which EMF contributes to health problems, the public certainly cannot understand the nature of the risk. So it seems riskier that it might otherwise be.

2.12. Trust in institutions

Over the last 20 years, confidence in institutions has declined sharply. In fact, many people suspect any institution, believing it will be insensitive and uncaring about the impact of its actions upon individuals. Many utilities are suffering from a lack of trust. They are not seen as environmental 'good neighbors'. They are seen as insensitive to environmental concerns, unwilling to acknowledge, opposed to regulation, unwilling to share

decision making, withholding crucial information. Many people suspect that EMF is just 'more of the same'.

3. Developing an EMF risk communication plan

This section outlines an approach that utilities can follow to develop an EMF risk communication program that is appropriate to the individual circumstances facing each utility [23–26].

3.1. Steps in developing strategy

The basic steps to be followed in developing an organizational program are:

1. Establish an internal EMF planning team,
2. identify utility policy,
3. identify and prioritize audiences,
4. develop risk communication objectives,
5. identify program components (communication mediums and communicators), and
6. develop detailed risk messages.

A more detailed description of each of these steps is provided in the following sections.

3.1.1. Establish an Internal EMF Planning Team

In most utilities, the expertise needed to implement an EMF risk communication plan is located in different places throughout the organization. The people you will need to develop and implement a plan will likely include:

1. A representative from management (to ensure that you get timely decisions on policies, program goals, etc.),
2. an EMF specialist (someone capable of evaluating scientific research materials related to EMF),
3. a media relations expert,
4. publications specialists (could include writer and graphics person),
5. a video specialist,
6. engineers (to evaluate the technical impacts of design changes, evaluate the impacts of programs on the construction schedule, communicate about facility design, etc.), and
7. public participation/risk communication specialists.

Others who might be included in the team include: lawyers, medical/health personnel and labor union representative (because exposure to EMF may increasingly become a labor/management issue).

Experience suggests that the risk communication plan should not be developed by a single individual or department, although one individual or group may take the lead in pulling the program together. The challenge, particularly in large organizations, is to deliver a unified program. If the plan is developed by only External Affairs, for example, then the rest of the organization doesn't have that much commitment to the plan. When people participate in developing a plan they develop an emotional sake in making that plan work. Also, by developing a plan, it is possible to avoid turf battles over whose program this is. People will relinquish control to a plan they may be unwilling to relinquish to another department. The plan should be 'our plan', not External Relation's plan, or Engineering's plan.

The other reason for developing a plan is that each person in the planning team, and the organizations they represent, will need to deliver their part of the program in a timely and integrated manner. By working together to develop the plan, people come to understand the role they play in the program.

3.1.2. Identify utility EMF policy

The next step is a discussion between management and the EMF risk communication team about the organization's EMF policy. Utilities may-based on alternative values, interpretations of the research, or circumstances-adopt different philosophies or policies.

What's important is that there be a discussion between management and the members of the team. Each team member brings a slightly different perspective on the issue. Just as a policy should not be established without a discussion of the impact of that policy upon the organization's credibility and ability to communicate about risk, there should also be a discussion of impacts upon project schedules, construction costs, legal liability, etc. One of the reasons that this needs to be a dialogue, not just a decision made by management, is that knowledge about the issue is changing so rapidly that if management is a year or two behind in its understanding of the issue, it may not have the information it needs to recognize when a change in policy is appropriate.

In any event, a review mechanism should be established so that any policy statement is reviewed periodically. Interpretations of the scientific information that are legitimate today may no longer be legitimate tomorrow. If an organization has an 'issues management' program, EMF should be identified as a strategic issue of some importance, and updated for management on a regularly scheduled basis.

3.1.3. Identity and prioritize audiences

The sequence of steps shown above suggests a linear progression in which you do one step, then the next, and so on. In reality, it is hard to complete some of these steps without thinking about several at the same time. This is particularly true of this and the next step, identifying objectives. Logically and rationally, one should probably proceed from policies to objectives then on to audiences. Practical experience suggests, however, that focusing on audiences is a very useful

exercise for clarifying objectives. There are really three questions to ask:

1. Which audiences (individuals, groups, interests, categories of people) within our service are likely to have an interest or concern about EMF?
2. Which audience might want to influence utility programs because of public interest or concern about EMF?
3. Which audiences could significantly influence the attitudes of the audience identified in questions (i) and (ii) in regards to the EMF issue?

The answer to Question (i) might include anyone who is exposed to EMF or otherwise might see themselves as impacted by EMF. This might include: (a) residents near existing lines or substations, (b) residents near possible future lines or substations, and (c) utility employees. The second question deals with those people who have a position on the EMF issue and want to influence utility programs, or may be put in the position of answering questions or making decisions related to EMF, if the public becomes concerned about the EMF issue. The audiences might include: utility board members, local elected officials, state regulatory bodies, EMF activists (people from either within or outside the community who are organized to express their concern about EMF), and labor union officials. The third question deals with the fact that attitudes held by many of the target audiences will be influenced by other people in the community, such as: members of the scientific/medical community, technical staff of state and local governmental agencies, media, EMF activists and labor union officials. Even though these people may not be the primary audience, you may be more effective in reaching your primary audience by designing a program to communicate with these secondary audiences. The primary audiences often view these 'amplifying' audiences as more credible than the utility, because they do not see them (rightly or wrongly) as having a self-interest in influencing the result. Exactly which audiences are a priority will vary from utility to utility,

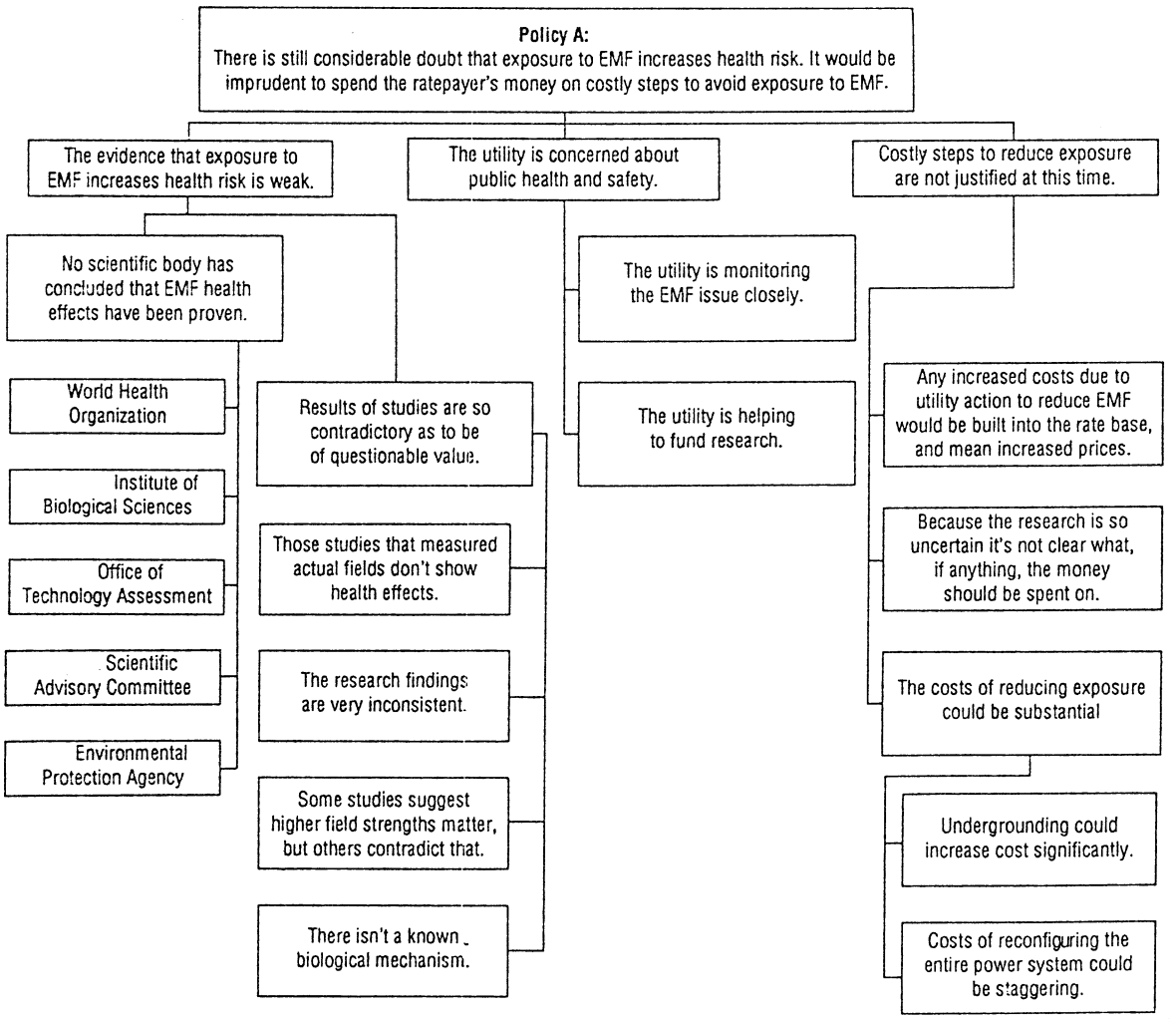

Fig. 1. Message Logic of Policy 'A'.

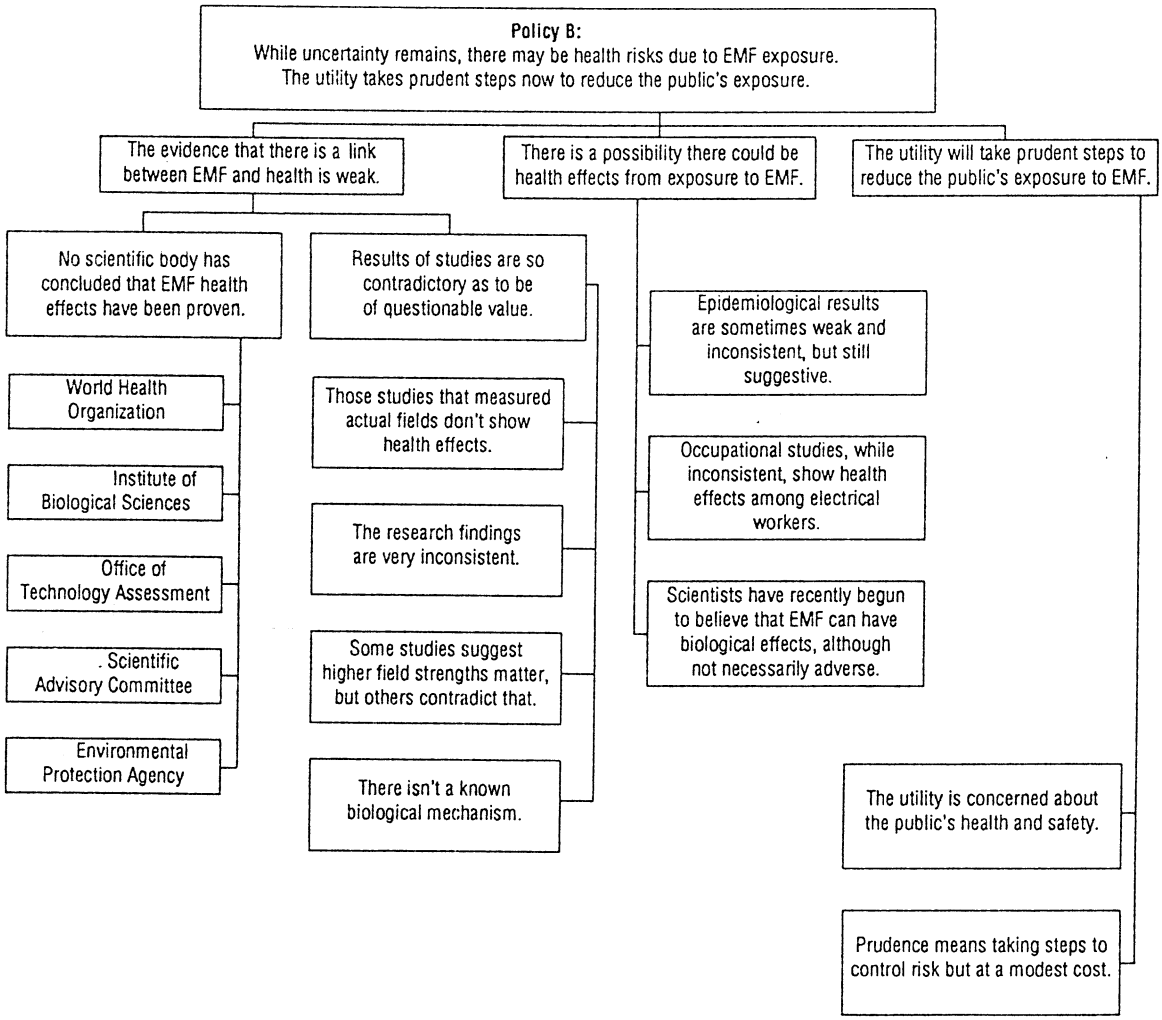

Fig. 2. Message Logic of Policy 'B'.

so you will need to establish priorities that fit your specific circumstances.

3.1.4. Develop risk communication objectives

One or more risk communication objectives for each priority audience are developed. For each target audience, the question to be asked is: 'What do we hope to accomplish with this audience?' Efforts to convince the public that utility's viewpoint is correct are likely to be backfire. Utilities can say 'here are the facts, and here's how we interpret them'. Utilities are already seen as having self-interest in the outcome, either in terms of avoiding expensive actions to limit exposure, or simply having the political clout to obtain necessary permits or authorities. As a result, risk communication from a utility is already somewhat suspect. You should be held to a higher standard of objectivity than virtually any other action in this situation.

It is clear that risk communication suggests that, it is most effective when it is two-way communication or interactive. Programs will need to be designed to have a genuine dialogue with audiences. Objectives might be set legitimately regarding:

1. The amount and kind of information an audience has before being asked to make a judgment,
2. the atmosphere in which the risk communication takes place, e.g. that communication about EMF risk take place in a non-adversarial and open-minded manner, and
3. the timing of the risk communication, e.g. before a specific project is being discussed, or before EMF becomes controversial in the community.

Putting this into practice, objectives might be something such as:

1. Provide the Policy Committee with a balanced summary of the EMF research before the public asks them to make decisions related to EMF (such as undergrounding power lines),
2. provide reporters with full and complete information on the EMF issue at least six months prior to announcing intent to site a transmission line, and

3. establish a program to provide full information on EMF to those technical, medical, and scientists in the community to whom the public is likely to turn for independent judgments in the event of controversy.

3.1.5. Identify program components

Specific programs to accomplish the objectives are developed. This requires: (i) to identify the most effective communication mediums to reach the targeted audience, and (ii) to select the most effective communicators.

3.1.5.1. Identify communication mediums. The question to ask is: 'What is likely to be the most effective mechanism to reach a targeted audience?' Most appropriate mediums would probably include the actual scientific papers, and related commentaries on those papers and doing EMF measurements in people's homes.

3.1.5.2. Identify communicators. The key point is to match the communicators with their audience 'who will be the most credible source for this particular audience?'

Utilities are already carrying out:

1. A number of utilities offer to conduct measurements in people's homes, so that they can see what fields are related to power lines and appliances in the home,
2. utilities have carefully targeted those influential people they believe will be called upon to render independent judgments on EMF in case of controversy,
3. several utilities prepare advertisements giving the background on EMF, and purchase advertising space in newspapers and / or magazines,
4. some utilities set up a speakers bureau to make presentations to civic groups, appear on television and radio talk shows etc.,
5. some utilities have set up symposia on the EMF issue, to educate both employees and influential people in the community, and

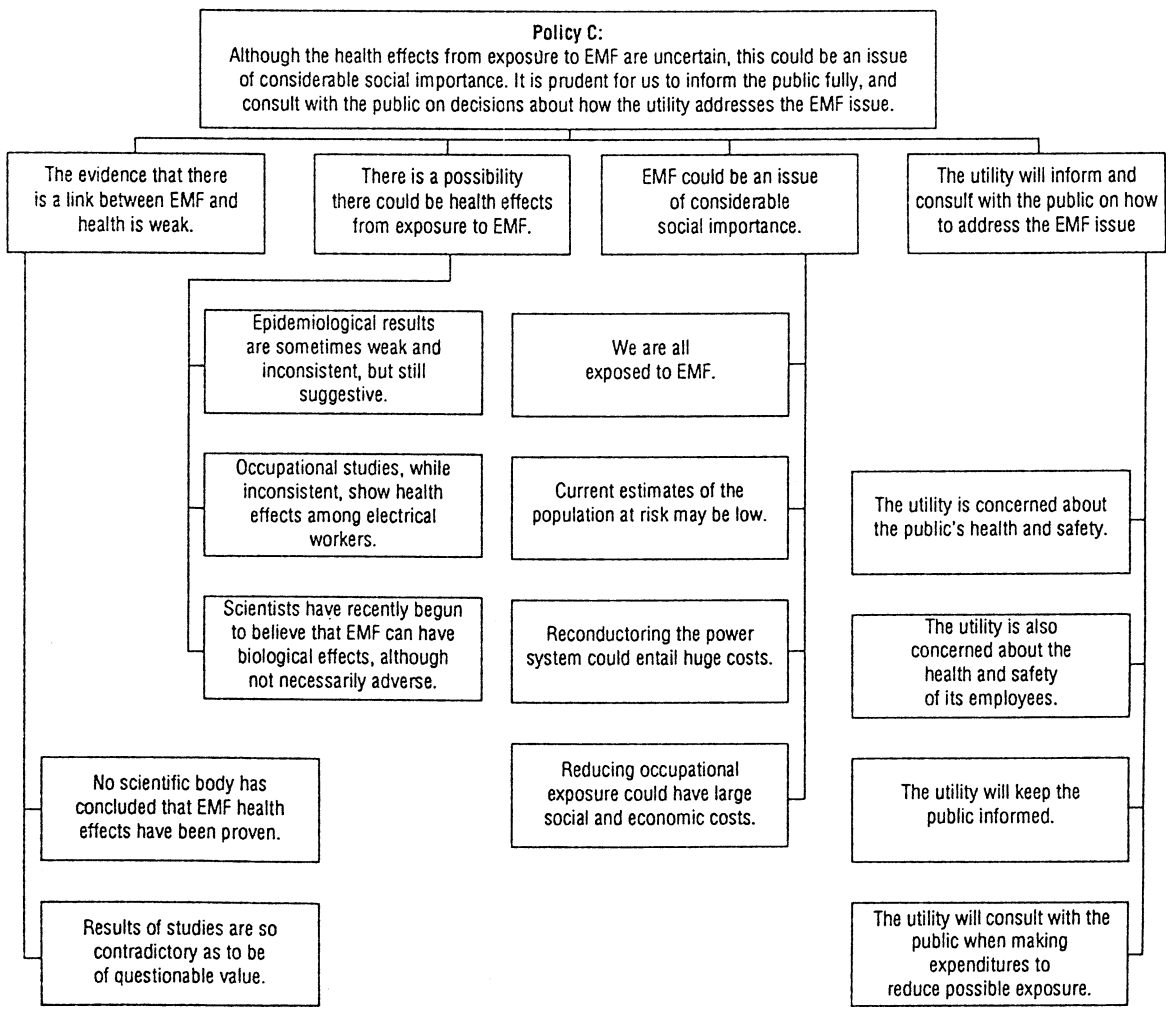

Fig. 3. Message Logic of Policy 'C'.

6. some utilities conduct regular tailgate meetings with electrical workers to discuss EMF, or even take EMF measurements around substation equipment.

3.1.6. Develop detailed risk messages

Since there may be several programs, and numerous communications, it is going to be essential to communicate a consistent message targeted to the audience. This is resolved by conducting the message in a hierarchy or 'message logic'. At the top of the hierarchy are primary messages which reflect a utility's basic philosophy or policy on the EMF issue. Then there are a number of supporting messages, each of which is consistent with the primary messages. Secondary messages can also be tailored to reflect the interests of a particular audience. The key questions in these messages are:

1. Will this message attract the audience's attention?
2. Will this audience understand the message?; and
3. will the message be credible to this audience?

3.2. Developing policies

While each utility may have a different policy or philosophy about how to approach the EMF issue, there are certain physical properties that must be communicated regardless of approach. There are three policies that can be represented as policy positions currently held by most utilities. These policy positions are:

3.2.1. Policy A

There is still considerable doubt that exposure to EMF poses a human health risk. Until things are much more certain, it would be imprudent to spend the ratepayers' money on costly steps to avoid EMF exposure when these steps may ultimately prove to have served no useful purpose. Fig. 1 present policy A message logic.

3.2.2. Policy B

While uncertainty remains, there may be health risks due to EMF exposure. Utilities should take prudent steps now to reduce public exposure, while avoiding more costly actions that are not justified as long as uncertainty remains. Fig. 2 present policy B message logic.

3.2.3. Policy C

Although health effects from EMF exposure are uncertain, if it is ultimately established that there are effects, this will be an issue of considerable social importance. It is prudent for utilities to inform the public fully, and to consult with the public on decisions about how the utility addresses the EMF issue. Fig. 3 present policy C message logic.

4. Conclusions

This paper presents a menu of potential components for a risk communication program. Not all of these options may be appropriate for every utility as utilities have different philosophies. Some of these options may be consistent with their philosophy, while others are not. Also, each utility faces different circumstances, and operates in a different climate of public opinion. Alternative policies were explained and are an effort by utilities to be responsible and prudent. Any of these policies can be justified given the current state of scientific knowledge. Each emphasizes a possible consequence of failure to act in the current situation. Each utility must make its own assessment of these possibilities, and factor that into the policy it establishes regarding the EMF. This is true regardless of whether or not a utility has to present an explicit policy on EMF to a regulatory agency. The choice involved in establishing an EMF policy can be difficult. But it is important to have an explicit policy. Without a policy, there is no guidance for the many decisions about EMF which most utilities will need to make over the next few years, and failure to set a policy may make utilities vulnerable to criticism for failing to act and being indecisive.

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