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Guidance on Developing Effective Radiological Risk Communication Messages: Effective Message Mapping and Risk Communication with the Public in Nuclear Plant Emergency Planning Zones

Office of Nuclear Security and Incident Response

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Abstract

This document provides guidance for nuclear power plant licensees and local response organizations on message development for radiological emergencies. Message development skills are critical to successful radiological risk communication to the public, the media, and other stakeholders. Message development skills are particularly critical to successful emergency communications with those living in close proximity to a nuclear power plant.

This document contains principles, strategies, and tools for producing messages before, during, and after a radiological emergency that are understandable, timely, accurate, consistent, and credible. The document contains nearly 400 questions the public and media may ask during a radiological emergency.

The document describes one of the most important tools for message development: the message map. Message maps are used by a large number of public and private sector organizations. Message maps are risk communication tools used to help organize complex information and make it easier to express current knowledge.

Message mapping is a science-based message development process by which users can:

- anticipate questions of stakeholders (interested, affected, or influential parties) before they are raised;
- decide what questions they want or need to answer and what questions should be answered by other organizations;
- develop responses to stakeholder questions in a clear, concise, and accessible format;
- promote dialogue about messages both inside and outside the organization;
- provide spokespersons with a user-friendly guide to a set of vetted organizational messages;
- ensure the organization has consistent messages;
- ensure the organization speaks with a single voice or with many voices in harmony.

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1.0 Introduction

This document is organized into four sections. Section 1 (Introduction) provides a brief overview of the topic. Section 2 (Guide to Message Mapping) provides a "how to" guide outlining the background, benefits, and steps of message mapping. Section 3 (Message Mapping Products) provides: (1) a list of anticipated questions asked by the public living in an Emergency Planning Zone in a radiological emergency; and (2) sample message maps in response to selected questions. Section 4 (Appendices) contains supporting documents and references. The document contains nearly 400 questions the public and media may ask during a radiological emergency.

The document provides guidance on effective message development for radiological emergencies. Message development skills are particularly critical to successful risk communication with members of the public living with the emergency planning zone of a nuclear power plant.

This document focuses on one of the most important tools for message development: the message map.

Message maps are "risk communication tools used to help organize complex information and make it easier to express current knowledge."[1] Message mapping is "a science-based risk communication tool that enables members of the emergency response and environmental protection communities to quickly and concisely deliver the most pertinent information about an emergency." [2]

Message maps are sets of organized statements or messages that address likely questions and concerns in an emergency. Each map identifies up to three to four unique messages that address a specific question or concern. Each message can be expanded with several layers of supporting information.

Message mapping distills information into easily understood messages. Communicating clearly, especially in the first few hours of an emergency, can save lives.

Message maps are particularly helpful in radiological emergencies. Communication during a radiological emergency must be timely, clear, accurate, and frequent. This can best be accomplished by having template radiological risk communication products readily available that can be modified as needed at the time of the event. Message maps can serve as one of these template products. Since the message maps can be prepared in advance, they can also be approved in advance, saving valuable time during an event.

Message mapping has become widely accepted by emergency responders as a method of preparing, ahead of time, responses to questions frequently asked by interested or affected parties (stakeholders) during emergencies and crises. In recent years, numerous government agencies

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[1] http://www.pandemicflu.gov/news/pre_event_maps.pdf

[2] http://www.epa.gov/nhsrc/news/news040207.html

and private sector organizations have sponsored message mapping workshops and exercises focusing on different types of risks and emergencies. At the federal level, these agencies include the U.S. Department of Energy, the U.S. Department of Health and Human Resources, the U.S. Department of Defense, the U.S. National Institutes of Health, the U.S. Food and Drug Administration, the U.S. Department of Agriculture, the U.S. Environmental Protection Agency, and the U.S. Centers for Disease Control and Prevention. Local agencies have also developed message maps. For example, the County of Santa Clara, California, has developed message maps for biological agents (including anthrax, botulism, plague, ricin, smallpox, tularemia, and viral hemorrhagic fever); chemical agents (such as chlorine, cyanide, lewisite, sarin, and sulfur mustard); and radiological events (a dirty bomb and a nuclear blast).[3] These message maps are the basis for various risk communication products produced by the county, including facts sheets and the county's Web site. The message maps are also used in trainings, exercises, and drills.

Message mapping is a science based message development process by which users can:

- anticipate questions of stakeholders (interested, affected, or influential parties) before they are raised;
- decide what questions they want or need to answer and what questions should be answered by other organizations;
- develop responses to stakeholder questions in a clear, concise, and accessible format;
- promote dialogue about messages both inside and outside the organization;
- provide spokespersons with a user-friendly guide to a set of vetted organizational messages;
- ensure the organization has consistent messages;
- ensure the organization speaks with a single voice or with many voices in harmony.

1.1 Message Mapping and Radiological Emergency Risk Communication Planning

Message mapping should be a central element in radiological emergency risk communication planning (See Appendix 4.1, "Nuclear Regulatory Commission Documents Relevant to Message Development." See also NUREG "Guidance on Developing an Emergency Risk Communication/Joint Information Center Plan for a Radiological Emergency.")

The message maps included in an emergency risk communication plan allow for a proactive, quick, and effective response during a radiological emergency. One advantage of a having a written emergency risk communication plan containing message maps is that many of the necessary communication decisions and activities in a radiological emergency will have already been decided. If carefully designed, an emergency risk communication plan containing message maps can save precious time when an emergency occurs. It enables leaders and spokespersons to focus on the specifics of the emergency at hand. An emergency risk communication plan

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[3]http://www.sccgov.org/portal/site/phd/agencychp?path=%2Fv7%2FPublic%20Health%20Department%20(DEP)%2FAdvanced%20Practice%20Center%20(APC)%2FCrisis%2C%20Emergency%20%26%20Risk%20Communication%20(CERC)%2FMessage%20Maps%20and%20Fact%20Sheets

containing message maps can also improve the quality, accuracy, and speed of responses to questions from the public, the media, and other stakeholders.

1.2 Message Mapping and the National Incident Management System (NIMS)

Message mapping is consistent with the goals of the National Incident Management System (NIMS). NIMS[4] was established by Presidential Directive–5. It directs the US Secretary of Homeland Security to develop and administer a comprehensive, consistent, and nationwide system to enable all government, private sector, and nongovernmental organizations to work together during domestic incidents.

Until NIMS, there were no standards for domestic incident response that reached across all levels of government and all emergency response agencies. The events of September 11, 2001 underscored the need for, and importance of, national standards for incident operations, incident communications, personnel qualifications, resource management, and information management and supporting technology.

One central component of NIMS is "Communications and Information Management" (See Appendix 4.2, "Communications and Information Management, National Incident Management System"). Message mapping is consistent with NIMS goal that emergency response organizations develop "processes, procedures, and systems for communicating timely and accurate information to the public during emergency situations." Message mapping is also consistent with the NIMS goal of achieving "a standardized framework for communications, information management, and information-sharing support at all levels of incident management."

1.3 Message Mapping and the Incident Command System

Message mapping is consistent with the goals and guidelines of the Incident Command System (ICS). The Incident Command System (ICS) is a central component of the National Incident Management System.

ICS is a standardized, on-scene, all-hazards incident management approach.[5] The Incident Command System:

(1) Allows for the integration of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure.

(2) Enables a coordinated response among various jurisdictions and functional agencies, both public and private.

(3) Establishes common processes for planning and managing resources.

4

[5] http://www.fema.gov/emergency/nims/IncidentCommandSystem.shtm

ICS provides an organizational structure for incident management. It also guides the process for planning, building, and adapting that structure.

ICS was originally developed in the 1970s following a series of catastrophic wildfires in California. Property damage ran into the millions, and many people died or were injured. Studies determined that response problems were more often caused by communication and management deficiencies than by lack of resources or failure of tactics.

ICS is designed to be flexible. It can be used for incidents of any type, scope, and complexity. ICS allows its users to adopt an integrated organizational structure to match the complexities and demands of single or multiple incidents.

ICS is a federally mandated incident response management system and is used by all levels of government -- Federal, State, tribal, and local. Although ICS is not required for use by the private sector, its use is encouraged.

1.4 Message Mapping and the Joint Information Center

Message mapping is an essential tool in the operation of a Joint Information Center (JIC). A JIC is a recommended structure in the Incident Command System.

A Joint Information Center (JIC) is a physical location where communications staff from several organizations come together to provide information to the public, the media, and other interested parties during an emergency, regardless of its size.

The Joint Information Center:

> provides a structure for developing and delivering incident-related coordinated messages. It develops, recommends, and executes public information plans and strategies; advises the Incident Commander and supporting agencies or organizations concerning public affairs issues that could affect a response effort; and controls rumors and inaccurate information that could undermine public confidence in the emergency response effort. It is the central point of contact for all news media at the scene of an incident. Public information officials from all participating agencies/organizations should co-locate at the JIC.[6]

The Joint Information Center is designed to foster the use of common information formats. The Joint Information Center integrates incident information and public affairs into a cohesive organization designed to provide consistent, coordinated, accurate, accessible, and timely information during a crisis or emergency.

The JIC is designed to effectively coordinate communication on a larger scale than could be effectively managed by a single organization. A JIC can be expanded or contracted,

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[6] http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf, p. 29.

incorporating satellite, Internet, and Web-based systems to meet communication needs during an emergency.

All responding organizations to an emergency are typically encouraged to participate in and share the resources of the JIC. If participation in the JIC is not feasible, the non-participating organization is encouraged to conduct their communication activities in cooperation with the JIC. JIC members during a radiological emergency typically include, but are not limited to, public affairs and public information officers from:

- the nuclear power plant licensee and contractors;
- government and quasi-governmental agencies at the local, county, state, and federal level;
- police departments and other law enforcement agencies;
- fire departments and Emergency Management Services;
- offices of elected officials;
- the Red Cross and other non-profit organizations.

A critical function of the JIC in an emergency is to provide information to the public, the media, and key stakeholders in real time. Message maps are critical to this process. By working from a common set of message maps, organizations involved in managing and responding to the emergency can work together in a cohesive manner and speak with one consistent voice. By maintaining a bank of message maps at a centralized communication facility or repository, resources can be better managed and duplication of effort is minimized.

The use of message maps as part of the JIC also allows for (1) tracking and maintaining communication records; (2) analyzing the effectiveness and accuracy of message delivery; (3) identifying inaccurate or flawed message reporting by the media; and (4) tracking target audience response to messaging. This information can later be analyzed and evaluated to improve performance.

Message maps are similar in some ways to the limited number of pre-scripted news media templates developed by nuclear power plant licensees for radiological emergencies and available for use by emergency response organizations in a JIC. However, message maps differ from these pre-scripted templates in they are constructed to (1) adhere strictly to the principles of risk communication;[7] (2) serve as the foundation for wide variety of risk communication products delivered through a wide variety of communication channels (See, for example, Appendix 4.6, "Risk Communication Channels."); and (3) address the full range of questions likely to be asked by a wide range of stakeholders before, during, and after a radiological emergency.[8]

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[7] (see Section 2.1 below, "Message Mapping and Risk Communication, and Appendix 4.5 below, "Strategies and Tools for Developing Effective Risk Communication Messages".).

[8] See Section 3.1 below, "Sample Questions Likely to be Asked by Residents in the Nuclear Power Plant Emergency Planning Zone During a Radiological Emergency." This section lists nearly 400 questions that may be asked by the public and the media during a radiological emergency.

2.0. Guide to Message Mapping for Radiological Emergencies

Message maps are tools for communicating information about any type of emergency. They ensure that risk information has the optimum chance of being heard, understood, and remembered.

Message maps allow organizations to convey timely, accurate, clear, and credible information. One goal of message mapping for radiological emergencies is to help the affected nuclear power plant licensee and off site emergency response organizations establish themselves as the go-to source for information from the outset. They enable audiences to better understand issues, act constructively upon the information provided, recover more quickly from the stress of the event, and gain or regain trust in risk managers.

Message maps present concise, detailed, and hierarchically organized responses to anticipated questions or concerns. They serve as visual aids that can highlight, at a glance, the organization's messages for key issues of concern.

Figure 1 (below) provides an example of a message map produced by the Centers for Disease Control and Prevention.

Figure 1: Sample Message Map for Smallpox (Box Format)
(Keywords in Italics)

Stakeholder: Public		
Question or Concern: How contagious is smallpox?		
Key Message 1	**Key Message 2**	**Key Message 3**
Smallpox *spreads slowly* compared to many other diseases.	This allows *time to trace* those who have come into contact with the disease.	Those who have been traced *can be vaccinated.*
Supporting Information 1.1	**Supporting Information 2.1**	**Supporting Information 3.1**
People are only infectious when the rash appears.	The incubation period for the disease is 10–14 days.	People who have never been vaccinated are the most important to vaccinate.
Supporting Information 1.2	**Supporting Information 2.2**	**Supporting Information 3.2**
Smallpox typically requires hours of face-to-face contact.	Resources are available for tracing contacts.	Adults who were vaccinated as children may still have some immunity.
Supporting Information 1.3	**Supporting Information 2.3**	**Supporting Information 3.3**
There are no carriers without Symptoms.	Finding people who have been exposed and vaccinating them has proved successful in the past.	Adequate vaccine is on hand.

As shown in the message map template below (see Figure 2), the top portion of a message map identifies the issue, the stakeholder (the intended audience), and the specific question or concern the map is intended to address.

The next layer of the message map contains the key messages in response to the question. Key messages are intended to address, in a concise form, the information needs of the key stakeholder or audience. The key messages can also serve as the basis for various risk communication products. For example, key messages can serve singularly or collectively as media talking points or sound bites (a very short comment or phrase suitable for use in a broadcast or print news story). When properly used by trained spokespersons, talking points and sound bites are critical to successful media interviews. However, the key messages contained in a message map differ substantially from traditional media talking points. As indicated in Appendix 4.5, the construction of key messages in a message map follows a strict and exacting research-based discipline regarding the number and content of the messages.

The bottom tier of the message map contains supporting information, blocked in groups under the key messages. Supporting messages amplify the key messages. They provide additional facts, details, explanations, credible third part support, or graphics.

As shown in Figure 3, message maps can also be constructed using a bullet format.

Figure 2: Message Map Template (Box Format)

Issue:		
Stakeholder:		
Question or Concern:		
Key Message 1	**Key Message 2**	**Key Message 3**
Supporting Information 1.1	**Supporting Information 2.1**	**Supporting Information 3.1**
Supporting Information 1.2	**Supporting Information 2.2**	**Supporting Information 3.2**
Supporting Information 1.3	**Supporting Information 2.3**	**Supporting Information 3.3**

Additional Supporting Information:

Figure 3: Message Map Template (Bullet Format)

I. Issue:
(Insert here the issue, topic, or concern)

II. Stakeholder:
(Insert here the name of the key stakeholder, i.e., the intended interested or affected party or audience)

III. Question or Concern:
(Insert here question or concern to be mapped)

IV. Key Messages in Response to Question

Key Message 1:
(Insert here the first Key Message in response to the question, using approximately 9 words)

Key Message 2:
(Insert here the second Key Message in response to the question, using approximately 9 words)

Key Message 3:
(Insert here the third Key Message in response to the question, using approximately 9 words)

Figure 3: Message Map Template (Bullet Format) -- continued

V. Supporting Information for the Three Key Messages

Key Message 1: (Insert here Key Message 1 from above)

(Provide in the spaces provided below supporting information, such as additional facts, explanations, credible third part support, or graphics, for Key Message 1)
Supporting Information 1.1:

Supporting Information 1.2:

Supporting Information 1.3:

Key Message 2: (Insert here Key Message 2 from above)

(Provide in the spaces provided below supporting information, such as additional facts, explanations, credible third part support, or graphics, for Key Message 2)
Supporting Information 2.1:

Supporting Information 2.2:

Supporting Information 2.3:

Key Message 3: (Insert here Key Message 3 from above)

(Provide in the spaces provided below supporting information, such as additional facts, explanations, credible third part support, or graphics, for Key Message 3)
Supporting Information 3.1:

Supporting Information 3.2:

Supporting Information 3.3:

VI. Additional Supporting Information:
(Provide in attached pages additional supporting information, such as footnotes, citations to credible third parties, graphics, maps, video links, or hyperlinks.)

2.1 Message Mapping and Risk Communication

Message mapping is an important tool in effective risk communication. Effective risk communication establishes public confidence in the ability of an organization to deal with a risk.

The National Research Council/National Academy of Sciences has defined risk communication as "an interactive process of exchange of information and opinion among individuals, groups, and institutions."[9] Numerous studies have highlighted the importance of effective risk communication in enabling people to make informed choices and participate in deciding how risks should be managed.

Effective risk communication provides people with timely, accurate, clear, objective, consistent and complete risk information. It is the starting point for creating an informed population that is:

- involved, interested, reasonable, thoughtful, solution-oriented, cooperative, and collaborative;
- appropriately concerned about the risk;
- more likely to engage in appropriate behaviors.[10]

Effective risk communication is critical during a radiological emergency. For example, under normal circumstances, the elaborate infrastructures and mechanisms that protect the nation's nuclear power plants generally go unnoticed. In the middle of a radiological emergency, however, such as the loss of coolant or the release of significant amounts of radiation, there will be intense interest.

The primary objectives of effective risk communication before, during, and after an emergency are to:

- build, strengthen, or repair trust;
- educate and inform people about risks;
- build consensus or encourage dialogue about appropriate actions to take in the event of an emergency;
- raise community awareness of plans for responding to an emergency;
- disseminate educational information on actions people should take before, during, and after an emergency;
- encourage people to take appropriate actions during and after an emergency.[11]

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[9] National Research Council/National Academy of Sciences, "Improving Risk Communication," National Academy Press, 1989: p. 21

[10] See, for example, Covello, V.T. (2006) Risk communication and message mapping : A new tool for communicating effectively in public health emergencies and disasters. Journal of Emergency Management, Vol. 4 No.3, 25-40

[11] Hyer, R. and Covello, V.T. (2007) Effective Media Communication During Public Health Emergencies: A World Health Organization Handbook. Geneva, Switzerland: United Nations. World Health Organization

Risk communication during a radiological emergency will directly influence events. Poor risk communication can fan emotions and undermine public trust and confidence. At worst, poor risk communication can create stress, conflict, and additional crises. Good risk communication can rally support, calm a nervous public, provide needed information, encourage cooperative behaviors, and potentially help save lives.

Effective risk communication is a key responsibility of nuclear power plant licensees and offsite response organizations before, during, and after a radiological emergency. For example, during a radiological emergency, the public, news media, policy-makers, and other stakeholders will demand timely, accurate, and quality information from the affected nuclear power plant, regulatory agencies, public officials, and other authorities about the situation. A spokesperson who communicates badly may be perceived as incompetent, uncaring, or dishonest, thus losing trust. One who communicates well, however, can reach large numbers of people with clear and credible health, safety, and security messages.

While the specifics of a radiological emergency are difficult to predict in advance, risk communication strategies for such events can be planned before the emergency occurs. Such planning greatly increases the likelihood that communication will contribute positively to emergency response efforts. Well constructed, practiced, and delivered messages will inform the public, reduce misinformation, and provide a valuable foundation for informed decision making.

Although many of the principles of risk communication involve elements of common sense, the principles are supported by a considerable body of scientific research (see Appendix 3, "Risk Communication References"). Over the past 30 years, thousands of articles on risk communication have been published in peer-reviewed scientific journals. Several reviews of the literature have been published by major scientific organizations, such as the National Academy of Sciences[12] in the United States and the Royal Academy of Sciences in Great Britain.

One of the main principles of risk communication indicates that when people are highly upset, they often have difficulty hearing, understanding, and remembering information. Research shows the mental stress caused by exposure to real or perceived risks can significantly reduce a person's ability to process information. Factors that cause the highest levels of worry, anxiety, and mental stress during an emergency include, but are not limited to, perceptions that:

- The situation is under the control of others, especially those that are not trusted;
- The situation is involuntary;
- The situation is inescapable;
- The emergency is of human origin versus natural origin;
- The emergency involves a type of risk that is unfamiliar or exotic;
- The emergency threatens a form of injury or death that is dreaded;
- The emergency is characterized by a great deal of uncertainty;

[12] National Research Council/National Academy of Sciences. (1989) "Improving Risk Communication," National Academy Press

- The emergency is likely to cause injury or death to children, pregnant women, or other vulnerable populations.

The challenge for risk communicators is to overcome the communication barriers created by such anxiety provoking factors.

2.2 Benefits of Using Message Maps

As a strategic tool, a message map affords multiple benefits. For example, message maps:

- provide a handy reference for emergency response leaders and spokespersons who must respond swiftly to questions on topics where timeliness and accuracy are critical;
- allow multiple spokespersons to work from the same set of messages to ensure rapid dissemination;
- allow multiple spokespersons to provide consistent messages across a wide spectrum of communication outlets;
- provide a unifying framework for disseminating information about a wide range of nuclear power and radiological issues;
- promote multiple partners "speaking with one voice" or "speaking in harmony with one another";
- minimize chances of "speaker's regret," which includes regretting saying something inappropriate or regretting not saying something that should have been said;
- enable spokespersons to "check off " the talking points they want to address during interviews, in order of their importance;
- prevent omissions of key facts or misstatements that could provoke misunderstandings or controversy.

Message mapping permits organizations to develop messages far in advance of a radiological emergency, such as the loss of coolant and the release of radiation. Message maps can be tailored to the specifics of the event. The effectiveness of message maps can be tested through focus groups and other standardized testing procedures.

Once developed, message maps can be brought together in one place to produce an emergency risk communication briefing book. Message maps can also be used individually or collectively as the basis for news conferences, media interviews, news releases, media advisories, telephone hotline scripts, text messaging, blogs, social media updates, Web site updates, and other communication channels during and after a radiological emergency.

Message maps are particularly useful as a tool for Message Centers. Message Centers can disseminate approved answers to frequently asked questions if so instructed by the nuclear power plant licensee or off-site emergency response organizations. They can direct callers to Web sites, hotlines, and other tools for additional information. The Message Center can use message maps to handle many of the repetitive questions that would otherwise need to be forwarded to the Public Information Officer.

Perhaps most importantly, message maps can be used for public education efforts prior to a radiological emergency. For example they can be used as the basis for information forums, community meetings, open houses, Web sites, video scripts, fact sheets, pamphlets, mailing inserts, fliers, billboards, teacher packets, radio and TV talk shows, direct mailings, personal visits, brochures, and feeds to social media outlets (see Appendix 4.6). They can also be used to produce new educational materials or improve enhance existing educational materials.

Public education is a critical component of effective risk communication during a radiological emergency. For communications to be effective when an event occurs, jurisdictions must invest resources in advance of an event to educate the public about radiation, nuclear power, and radiological emergencies. A well-tailored public education campaign must overcome misinformation about the nature of the radiological emergencies, speak to the specific concerns of a range of audiences, and build confidence in emergency response organizations. It must overcome much of the conflicting and incorrect information that has created deep fears and misunderstanding of radiation, nuclear power, and radiological emergencies.

2.3 History and Basic Principles of Message Mapping

Message maps were developed in the early 1990s as a specialized tool for communicating effectively in high-stress, high-concern, or emotionally charged situations.[13] Message mapping was first adopted by government agencies as a strategic risk and crisis communication tool in the aftermath of 9/11 and the anthrax attacks in the fall of 2001. Early in 2002, for example, the Centers for Disease Control and Prevention conducted an intensive message mapping session focused on the communication challenges posed by a potential smallpox attack. One product of this workshop was several hundred smallpox message maps.

Since 2002, agencies at the federal, regional, state, county, and local levels have conducted dozens of message mapping workshops that focus on a wide variety of risks. For example, Figure 4 and Figure 5 are products from message mapping workshops conducted by the US Environmental Protection Agency. Figure 4 provides a draft message map in a bullet format related to the use of chloramines as disinfectants for drinking water. Figure 5 provides a sample message map in a box format for a radiological emergency.

[13] See, for example, Covello, V.T. (2006) Risk communication and message mapping : A new tool for communicating effectively in public health emergencies and disasters. Journal of Emergency Management, Vol. 4 No.3, 25-40.

Figure 4: Message Map for Chloramines (Bullet Format)

Issue: Water Safety
Stakeholder: Public/Media
Question or Concern: What are chloramines?

Key Message 1: Chloramines are disinfectants used to treat drinking water.

- Chloramines are most commonly formed when ammonia is added to chlorine to treat drinking water.
- The most typical purpose of chloramines is to protect water quality as it moves through pipes.
- Chloramines provide long lasting protection as they do not break down quickly in water pipes.

Key Message 2: Chloramines of greatest regulatory interest are monochloramine, dichloramine, and trichloramine.

- If chloramines are used to disinfect drinking water, monochloramine is the most common type.
- Dichloramine and trichloramine are produced when treating drinking water but at much lower levels than monochloramine.
- Trichloramines are typically associated with disinfected water used in swimming pools.

Key Message 3: The Environmental Protection Agency (EPA) regulates the safe use of chloramines.*

- EPA requires water utilities to meet strict health standards when using chloramines to treat water.
- EPA chloramine regulations are based on the average concentrations of chloramines found in a water system over time.
- EPA regulates chemicals formed when chloramines react with natural organic matter** in water.

Additional Supporting Information:
*The drinking water standard for chloramines is 4 parts per million (ppm) measured as an annual average. More information on water utility use of chloramines is available at http://www.epa.gov/safewater/disinfection/index.html and in the 1997-1998 Information Collection Rule, a national survey of large drinking water utilities for the Stage 2 Disinfection Byproducts Rule (DBPR). Information on the Stage 2 DBPR is available at http://www.epa.gov/safewater/disinfection/stage2/.
**Natural organic matter is a complex mixture of compounds formed as a result of the breakdown of animal and plant material in the environment; source: http://www.iwahq.org/templates/ld_templates/layout_633184.aspx?ObjectId=661579.

Figure 5: Sample Message Map for a Radiological Emergency
(Source: Environmental Protection Agency (US) (2007). Communicating Radiation Risks: Crisis Communication for Emergency Responders. United States Environmental Protection Agency, Office of Radiation and Indoor Air. EPA-402-F-07-008. July. Washington, DC. Page 37)

Stakeholder: The Public		
Question or Concern: What should I do if I think I may have been contaminated?		
Key Message 1	**Key Message 2**	**Key Message 3**
Stay informed.	Remove your clothes.	Wash yourself and your valuables.
Supporting Information 1-1	**Supporting Information 2-1**	**Supporting Information 3-1**
Listen to your local Emergency Alert System and public safety officials on radio or TV.	Place the clothing in a plastic bag and seal it.	Take a long shower or clean yourself thoroughly using lots of soap and water. Be careful not to scratch or irritate your skin while washing.
Supporting Information 1-2	**Supporting Information 2-2**	**Supporting Information 3-2**
Act promptly on the guidance from local public health officials.	Place the bag as far away as possible from humans and animals.	Gently blow your nose and wash out your eyes, ears and mouth.
Supporting Information 1-3	**Supporting Information 2-3**	**Supporting Information 3-3**
Visit [insert relevant Web site address] for continued updates.	Bagged clothing can be examined later to determine if you were contaminated.	Wash valuables and identification that may have been contaminated; wash your hands again.

Several important outcomes have resulted from these mapping efforts. These include:

- identification of key and non-traditional stakeholders early in the risk communication process;
- anticipation of stakeholder questions and concerns before they are raised;
- internal and external partnering in the development of messages;
- a vetted central repository of clear, concise, and accurate information for emergency scenarios.

One important lesson learned from message-mapping exercises is that the process of generating message maps can be as important as the end product. Message-mapping exercises involve teams of scientists, engineers, communication specialists, and individuals with policy expertise.

Message mapping exercises often reveal a diversity of viewpoints on the same question, issue, or concern. They provide technical and issue-management teams an opportunity to resolve differences of opinion before they become public.

Message mapping exercises often provide an early warning that the information data base is incomplete or that policies or procedures are inadequate, ill informed, or non-existent. They provide technical and issue-management teams an opportunity to fill information, policy, or procedural gaps before these gaps are observed by others. Message-mapping exercises frequently identify changes needed in organizational strategy.

2.4 Steps in Developing Message Maps

There are six steps involved in the message mapping process.[14]

1. Identify Potential Stakeholders
2. Identify Stakeholder Questions
3. Develop Key Messages
4. Develop Supporting Facts
5. Test and Practice Messages
6. Deliver Maps Through the Appropriate Information Channels

[14] Covello, V.T. (2006) Risk communication and message mapping : A new tool for communicating effectively in public health emergencies and disasters. Journal of Emergency Management, Vol. 4 No.3, 25-40.

2.4.1 Step 1: Identify Potential Stakeholders

The first step in message mapping is to identify potential stakeholders for a selected issue or topic. For a radiological emergency at a nuclear power plant involving the release of significant amounts of radiation, key stakeholders include members of the public living within the Emergency Planning Zones (EPZ)[15] of the nuclear power plant, employees, the media, families of employees, first responders, the public at large, and all other interested, affected, or influential parties (for example, local, county, state, regional, and federal agencies, law enforcement, health providers, and elected officials). Each of these stakeholders can, in turn, be broken down into finer segments. For example, the public can be segmented according to age and other socio-economic factors. The media can be segmented by type (print, broadcast, Internet, etc.).

Table 1 contains a more extensive list (in alphabetical order) of potential stakeholders for a radiological emergency at a nuclear power plant. This list is intended to provide examples of potential stakeholders. Individual nuclear power plant licensees and off site organizations may choose to include additional or different stakeholders in their emergency communication plans, based on the demographics of the Emergency Planning Zone or other factors. Every emergency involves a distinctive set of stakeholders. Each stakeholder may have questions and concerns that are the same or different from other stakeholders.

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[15] To facilitate a preplanned strategy for protective actions during an emergency, there are two Emergency Planning Zones (EPZs) around each nuclear power plant. The exact size and shape of each EPZ is a result of detailed planning which includes consideration of the specific conditions at each site, unique geographical features of the area, and demographic information.

The two EPZs are described as follows:

Plume Exposure Pathway EPZ
The plume exposure pathway EPZ has a radius of about 10 miles from the reactor site. Predetermined protective action plans are in place for this EPZ and are designed to avoid or reduce dose from potential exposure of radioactive materials. These actions include sheltering, evacuation, and the use of potassium iodide where appropriate.

Ingestion Exposure Pathway EPZ
The ingestion exposure pathway EPZ has a radius of about 50 miles from the reactor site. Predetermined protective action plans are in place for this EPZ and are designed to avoid or reduce dose from potential ingestion of radioactive materials. These actions include a ban of contaminated food and water.

Source: http://www.nrc.gov/about-nrc/emerg-preparedness/protect-public/planning-zones.html

Table 1: Sample List of Stakeholders for a Radiological Emergency at a Nuclear Power Plant

- advisory panels
- business leaders and business community
- consultants
- contractors
- education leaders and education community
- elderly populations
- elected officials
- emergency response personnel
- employees of the nuclear power licensee
- employees of off site emergency response organizations
- environmental officials
- ethnic populations
- faith leaders
- families of employees at the nuclear power plant
- families of those involved in the response effort, such as emergency responders, law enforcement personnel, contractors, consultants, security personnel, hospital personnel, health agencies, volunteers, and others
- farmers
- fire department personnel
- government agencies
- health agency personnel
- homebound populations
- homeless people
- hospital personnel
- illiterate populations
- institutionalized populations
- law enforcement personnel
- legal professionals
- local residents who are out of town and their relatives
- media, print and electronic
- military leaders
- minority populations
- neighborhood associations
- non-English speaking groups
- non-governmental organizations
- nurses
- nursing homes
- other nuclear power plants
- other energy utilities
- physicians

Table 1: Sample List of Stakeholders for a Radiological Emergency at a Nuclear Power Plant -- continued

- paramedics and other emergency healthcare personnel
- politicians/legislators/elected officials
- prisons
- professional societies
- public-at-large
- public-at-risk
- public health officials
- radiological response personnel/teams
- religious groups
- scientific leaders and scientific community
- security personnel
- service and maintenance personnel
- suppliers/vendors
- tourists or business travelers and their relatives
- transportation dependent populations
- union officials and labor advocates
- veterinarians
- victims
- victims' families
- volunteers ready and willing to assist in the emergency response

Message maps do not necessarily need to be developed for every stakeholder group in Table 1. Providing information to the media or through Web sites, for example, will often get information to many of the stakeholders listed. Additionally, the same messages can often be used for different stakeholders.

As part of this first step of message mapping, stakeholders can be further distinguished and categorized according to:

1) their potential to affect outcomes;
2) their credibility among other stakeholders;
3) whether they are, or are likely to be, apathetic, neutral, supportive, non-supportive, adversarial, or undecided regarding policies, recommended actions, leadership, priorities, or procedures.

2.4.2 Step 2. Identify Stakeholder Questions

The second step in message mapping is to identify as complete a list as possible of potential questions for each stakeholder group. The list should be based on a profile of the stakeholder group's situation, interests, and concerns.

Messages are most effective when they are specifically tailored to the characteristics of the target audience. Developing a profile helps identify questions that will be asked. For each target audience, the audience profile should consider:

- What is their current level of knowledge about the risk?
- What are their primary concerns regarding the risk?
- What do you want them to know about the risk based on their profile, interests, and concerns?
- What actions would you like them to take regarding the risk?
- What information is likely to be of greatest interest to them?
- What information will they probably want to know once they develop greater awareness of the risk?
- How much time are they likely to give to receiving and assimilating the information?
- Are there social or economic characteristics of this group that might affect the way they will process risk information (for example, trust in authorities; fatalism)
- How does this group generally receive its information?
- In what professional, recreational, and domestic activities does this group typically engage that might provide avenues for distributing risk communication products?
- Who does this group recognize as its leaders?
- Who are the most influential members of this group?
- How have members of this group responded to risk or emergency information in the past?
- Are there any organizations or centers that represent or serve the audience and might be avenues for disseminating your communication products?

Questions and concerns typically fall into two categories:

- **Informational Questions**
  The following are examples of informational questions. What do people need to know? What do people want to know? Am I safe? Is my family safe? What should people do? Is it safe for people to breathe the air? Where are evacuation and reception centers located? What is the speed and direction of the wind carrying the radioactivity?
- **Challenge Questions**
  The following are examples of challenge questions. Why should people trust what you are telling them? Why did you not do more to prevent this from happening? Can you give an absolute guarantee that people will be safe? Are you telling us the same things you are telling your own family?

Questions can be further refined by grouping them in categories. For example, questions can be grouped based on the organization to which the question is addressed. That is, questions can be grouped according to whether they are being addressed to the affected nuclear power plant, to the company that owns or operates the nuclear power plant, to the Nuclear Regulatory Commission, to the Environmental Protection Agency, to the police department, to the fire department, to town, county, or state officials, or to the state Governor.

Another way to group questions is by the stakeholder who is asking the questions. For example, questions can be grouped based on whether they are being asked by journalists, by elected officials, by employees, or by the public. Each group can be further divided, such as the public within the 10 mile Emergency Planning Zone, the public within the 50 mile Emergency Planning Zone, the public beyond the 50 mile Emergency Planning Zone, and the public who have family and friends within the 10 Mile and 50 Mile Emergency Planning Zone.

A third way to group questions is by phase of the emergency. For example, questions can be grouped by pre-event, event, response, and recovery.

A fourth way to group questions is by emergency classification levels (ECL) for accidents at nuclear power plants. ECLs describe the specific emergency actions that must be accomplished by the nuclear power plant licensee and off-site emergency response organizations. As the emergency situation escalates from a small on-site problem to an emergency with off-site implications, each of the emergency classification levels provides for a gradual expansion of response actions as the situation warrants.

Each emergency classification level is a source of anticipated questions. For example, questions will be asked about how each classification level is defined, who designed the classification system, who determines the classification level of an event, and why the classification level has (or has not) changed.

The four classification levels[16] are:

1) Notification of Unusual Event;
2) Alert;
3) Site Area Emergency;
4) General Emergency

A fifth way to group questions is by category of concern. For example, questions can be grouped by broad categories of concern such as the following.

- Health concerns
- Safety concerns
- Environment/ecological concerns
- Quality of life concerns
- Political concerns
- Economic concerns
- Social concerns (e.g., trust, fairness, or concerns about the welfare of children, vulnerable populations, or populations with specific needs)
- Historical concerns

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[16] The four classification levels are:

- **Unusual Event**
  An Unusual Event is the lowest of the four NRC emergency classification levels. It involves a minor problem at the plant. The nuclear station, state and local emergency response organizations typically would not be activated and no protective actions for the public would be required.
- **Alert**
  An Alert is the second lowest of the four NRC emergency classification levels and involves a relatively minor event. A small release of radioactivity could occur. The nuclear station's emergency response organization would be activated. State and local response organizations would be monitoring the situation closely and key personnel could be activated or placed on standby. Usually, no protective actions for the public are required.
- **Site Area Emergency**
  A Site Area Emergency is the second highest of the four NRC emergency classification levels. It involves a relatively serious problem at the plant. A small radioactive release is possible. Typically, the consequences would be limited to the plant's site boundary. The nuclear station, state and local emergency response organizations would be activated. Precautionary protective actions may be required for protection of the public such as monitoring food, water, milk and considering placing milk animals on stored feed.
- **General Emergency**
  A General Emergency is the most serious of the four NRC emergency classification levels. It could involve serious damage to the plant's safety systems or protective barriers. The damage may result in the release of radioactive materials to an area beyond the plant's boundaries

- Cultural concerns
- Communication concerns

Risk communication case studies indicate questions may fall into 40 or more areas of concern. The following is a sample list, in alphabetical order, of categories of concern that typically are raised before, during, or after a major health, safety, or environmental emergency. This list is intended to provide examples of potential categories of concern. Individual organizations may choose to use additional or different categories.

- Accountability (who is responsible)
- Basic Informational – Who, What, Where, When, Why, How
- Bereavement
- Changes in the Status Quo
- Clean-up
- Communications
- Control (who is in charge)
- Decontamination
- Duration
- Ecological/Environmental
- Economic
- Effects on Children, Future Generations, Elderly
- Equity/Fairness
- Ethics/Morality
- Evacuation
- Expertise
- Honesty
- Human Health Concerns
    - one's own
    - children
    - parents
    - friends and family
    - elderly persons
    - expectant mothers
    - special populations
    - transients (e.g., tourists; traveling business people)
    - others
- Investigative/Data
- Irreversibility
- Legal/Regulatory
- Listening/Caring/Empathy
- Mental and Behavioral Health
- Medical Interventions (including the taking of medicines for prevention or cure)
- Openness/Transparency/Access to Information
- Options/Alternatives
- Organizational (for example, who's in charge)

- Protective Action Measures
- Quality of Life
- Recovery
- Religion
- Safety
- Sheltering-in-Place
- Scientific/Technical/Radiological
- Trust
- Unfamiliarity
- Voluntariness

Lists of specific stakeholder questions and concerns can be generated through research, including:

- Review and analysis of media stories (print and broadcast).
- Review and analysis of web sites.
- Review and analysis of public meeting records.
- Review and analysis of public hearing records and legislative transcripts.
- Review and analysis of complaint logs, hotline logs, toll-free number logs, and media logs.
- Review and analysis of blogs and social media sites (for example, Twitter, Youtube, and Facebook).
- Focused interviews with subject matter experts.
- Facilitated workshops or discussion sessions with stakeholders, special interest groups, and groups with special governance agreements (for example, Native American Tribal Governments).
- Interviews with individuals experienced in radiological or other emergency situations.
- Consultations with individuals or organizations that represent, or are members of, the target audience.
- Consultations with colleagues who have successfully developed other communication products for the target audience.

Surveys and focus groups are particularly useful for uncovering questions and concerns. For example, research conducted or sponsored by the Nuclear Regulatory Commission and other organizations on evacuations during emergencies provides invaluable insights into the questions likely to be asked by the public during a radiological emergency (see Appendix 4.4: "Evacuation Communication References"). Questions range the gamut from the overall effectiveness of evacuation during a radiological emergency, to the effectiveness of specific evacuation routes at the different times of the year, the effectiveness of school evacuation, the effectiveness of evacuation versus sheltering, the effectiveness of evacuation for populations with special needs, the effects on evacuation of traffic delays, and recommendations relating to the evacuation of pets and livestock.

Other types of disaster studies have also uncovered questions likely to be asked in a radiological emergency. For example, analysis of data from over 2,000 news conferences produced a list of

the 77 most likely questions to be asked by journalists following an emergency or disaster (see Table 2).[17]

[17] Hyer, R. and Covello, V.T. (2007) Effective Media Communication During Public Health Emergencies: A World Health Organization Handbook. Geneva, Switzerland: United Nations. World Health Organization, p. 3.

Table 2: 77 Most Frequently Asked Questions by Journalists in an Emergency or Disaster

1. What is your name and title?
2. How do you spell and pronounce your name?
3. What are your job responsibilities?
4. Can you tell us what happened? Were you there? How do you know what you are telling us?
5. When did it happen?
6. Where did it happen?
7. Who was harmed?
8. How many people were harmed?
9. Are those that were harmed getting help?
10. How are those who were harmed getting help?
11. Is the situation under control?
12. How certain are you that the situation is under control?
13. Is there any immediate danger?
14. What is being done in response to what happened?
15. Who is in charge?
16. What can we expect next?
17. What are you advising people to do? What can people do to protect themselves and their families -- now and in the future – from harm?
18. How long will it be before the situation returns to normal?
19. What help has been requested or offered from others?
20. What responses have you received?
21. Can you be specific about the types of harm that occurred?
22. What are the names, ages and hometowns of those that were harmed?
23. Can we talk to them?
24. How much damage occurred?
25. What other damage may have occurred?
26. How certain are you about the damage?
27. How much damage do you expect?
28. What are you doing now?
29. Who else is involved in the response?
30. Why did this happen?
31. What was the cause?
32. Did you have any forewarning that this might happen?
33. Why wasn't this prevented from happening? Could this have been avoided?
34. How could this have been avoided?
35. What else can go wrong?
36. If you are not sure of the cause, what is your best guess?
37. Who caused this to happen?
38. Who is to blame?
39. Do you think those involved handled the situation well enough? What more could or should those who handled the situation have done?

Table 2: 77 Most Frequently Asked Questions by Journalists in an Emergency or Disaster -- continued

40. When did your response to this begin?
41. When were you notified that something had happened?
42. Did you and other organizations disclose information promptly? Have you and other organizations been transparent?
43. Who is conducting the investigation? Will the outcome be reported to the public?
44. What are you going to do after the investigation?
45. What have you found out so far?
46. Why was more not done to prevent this from happening?
47. What is your personal opinion?
48. What are you telling your own family?
49. Are all those involved in agreement?
50. Are people over-reacting?
51. Which laws are applicable?
52. Has anyone broken the law?
53. How certain are you about whether laws have been broken?
54. Has anyone made mistakes?
55. How certain are you that mistakes have not been made?
56. Have you told us everything you know?
57. What are you not telling us?
58. What effects will this have on the people involved?
59. What precautionary measures were taken?
60. Do you accept responsibility for what happened?
61. Has this ever happened before?
62. Can this happen elsewhere?
63. What is the worst-case scenario?
64. What lessons were learned?
65. Were those lessons implemented? Are they being implemented now?
66. What can be done now to prevent this from happening again? What steps need to be taken to avoid a similar event?
67. What would you like to say to those who have been harmed and to their families?
68. Is there any continuing danger?
69. Are people out of danger? Are people safe?
70. Will there be inconvenience to employees or to the public? What can people do to help?
71. How much will all this cost?
72. Are you able and willing to pay the costs?
73. Who else will pay the costs?
74. When will we find out more?
75. What steps need to be taken to avoid a similar event? Have these steps already been taken? If not, why not?
76. Why should we trust you?
77. What does this all mean?

Together with follow up questions and questions regarding details, these questions represent over 95 percent of the questions typically asked by journalists at the first news conference following an emergency or disaster. Knowledge about what questions journalists are likely to ask in an emergency or disaster helps define what information needs to be collected and what messages need to be prepared.

2.4.3 Step 3. Develop Key Messages

The third step in message mapping is to develop key messages in response to each stakeholder question or concern.

Key messages should be based on what the target audience most needs to know or most wants to know. Key messages can be developed most effectively through brainstorming sessions with a message mapping team. The message mapping team typically consists of subject matter experts, communication specialists, policy/legal/management experts, and a facilitator. The brainstorming sessions produce message scripts, usually in the form of complete sentences or keywords. These sentences or keywords are then entered as key messages onto the message map template (See Message Map Templates, Figure 2 and Figure 3).

As indicated previously, the top section of the message map identifies the issue, the stakeholder or audience for whom the messages are intended, and the specific question or concern being addressed. The next layer of the message map contains the key messages which can function individually or collectively as a response to the stakeholder question or concern. These key messages are intended to address the information needs of the target audience.

Key messages are particularly useful as media sound bites – the quote in a media story attributed to a spokesperson. Sound bites are an essential element in effective media communication. When presented as short, memorable, and quotable messages, they will often be played repeatedly by the media. Providing the media with sound bites helps to ensure that prepared key messages are carried in news stories. Reporters and editors almost always cut interview material into sound bites. Pre-scripted sound bites also reduce the risk of inaccurate paraphrasing by journalists who are forced to meet time and space constraints.

A broad range of risk communication strategies and tools can be used to help develop effective key messages.

Several of the most important strategies and tools derive from a model developed by researchers called the "risk perception model" or the "hazard versus outrage model of risk perception."[18] The model specifies that:

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[18] See, for example, Sandman, P.M. (1989) Hazard Versus Outrage in the Public Perception of Risk. In: Covello, V.T., McCallum, D.B., Pavlova, M.T., Eds. Effective Risk Communication: The Role and Responsibility of Government and Non-government Organizations. New York, NY: Plenum Press; 1989:45-49. Also see Slovic, P. (1987) Perception of risk. Science. 236: 280-285.

1) risk perception/risk outrage factors such as fairness, familiarity, and voluntariness are as relevant as measures of hazard probability and magnitude in judging the acceptability of a risk;
2) efforts to make a risk fairer, more familiar, and more voluntary can be as significant in making a risk more acceptable as efforts to reduce the hazard itself;
3) efforts to share power (such as establishing and assisting community advisory committees) can be as significant in making a risk more acceptable as efforts to reduce the hazard itself;
4) efforts to support third party involvement (such as through research, audits, inspections, and monitoring) can be as significant in making a risk more acceptable as efforts to reduce the hazard itself.

Moreover, according to the risk perception/outrage model, because risk acceptability depends greatly on perceived knowledge and control, risks are more likely to be perceived as acceptable when:

- organizations are clear about their values and goals;
- there is openness and transparency about decisions;
- the organization is the first to announce bad news;
- early warnings have been provided;
- decisions are clearly grounded in scientific evidence;
- public values, concerns and perceptions are taken into account in decision-making;
- people perceive that authorities share their values;
- sufficient information is provided to allow individuals to make balanced, informed judgments;
- mistakes are quickly acknowledged and acted on by authorities;
- actions are consistent with words (judgments about trust often depend more on what is done than on what is said);
- the importance of uncertainty is acknowledged by authorities;
- promises are kept;
- excessive reassurance is avoided;
- "trusted voices" and credible third parties are enlisted to support messages;
- outrage and the legitimacy of fear and emotion are acknowledged.

Other risk communication strategies and tools derive from behavioral science and psychological research on how people process information in high stress, high concern, or low trust situations.[19] A detailed list of strategies and tools derived from this literature is presented in the Appendix 4.5: "Strategies and Tools for Developing Effective Risk Communication Messages". Examples of these strategies and tools include:

[19] See, for example, Hyer, R. and Covello, V.T. (2007) Effective Media Communication During Public Health Emergencies: A World Health Organization Handbook. Geneva, Switzerland: United Nations. World Health Organization. Also see National Research Council/National Academy of Sciences. (1989) Improving Risk Communication, National Academy Press, 1989.

- Develop only a limited number of key messages (ideally no more than three to five key messages or one key message with no more than three to five parts) that address the concerns of key stakeholders.
- Develop messages that are clearly understandable by the target audience, typically at the 6th to the 8th grade reading level, particularly for initial messages. The Centers for Disease Control and Prevention has prepared a useful plain English thesaurus of health terms for this purpose.[20] Guidelines for simplifying messages can be found in Table 3.

[20] Centers for Disease Control and Prevention, National Center for Health Marketing (2007) Plain English Thesaurus for Health Communications, Atlanta, Georgia (www.nphic.org/files/editor/file/thesaurus_1007.pdf)

Table 3: Guidelines for Simplifying Messages

Meet Target Audience Needs

- the higher the level of stress, fear, or anxiety, the greater the need to simplify the language and to carefully structure messages from simple to more complex;
- use the readability utility included with most word-processing software to measure the readability level of the information;
- aim to produce messages that are easily understood by the target audience.

Provide Clear Language

- provide no more than three to five message points or ideas at a time;
- use simple and correct grammar;
- use short sentences;
- be careful when providing numbers – these can easily be misinterpreted or misunderstood (for example, a 50 percent probability may be interpreted as "almost certain" by some or "relatively unlikely" by others);
- avoid the use of jargon and acronyms;
- be careful when introducing new terms
  - define new terms so that the target audience can understand them;
  - use short sentences to define new terms;
  - provide a glossary;
  - introduce the concept before introducing a new term or explain the new term soon after using it;
  - if possible, ask the audience to identify terms that are not understood;
  - check frequently for understanding;
  - use new terms only if they are important for the target audience to know and remember;
  - avoid new terms that have a different meaning from their common usage.

Plan for Message Delivery

- test messages with people who have only a limited knowledge of the topic;
- provide your audience with advance warning when complex or difficult material will be shared;
- break down complex topics into smaller parts;
- use subheadings;
- use the "Triple T Model" for presenting complex information – tell your audience briefly what you are going to tell them; tell them more about each point; tell them again briefly what you told them;
- ask questions designed to uncover the intuitive mental models used by the audience to understand the topic – correct misconceptions if needed;
- develop materials with which people can interact, such as material on web sites;
- use the active voice for writing and speaking;

Table 3: Guidelines for Simplifying Messages -- continued

- provide complex information in tiers or layers of information that increase gradually in complexity.

Enhance the Presentation of Information Through Visual Explanations

- use visuals (for example, graphics, drawings, maps, charts, flowcharts, paintings, photographs, video and highlighted text) to enhance comprehension;
- use simple graphics
  - whose main point can be grasped in less than three seconds,
  - that contain no more than one or two main points,
  - that put the main point of the graphic in writing in the graphic itself,
  - that use one graphic per point in a sequenced set of graphics,
  - that use simple formats, such as bar graphs and pie charts;
- use flowcharts or outlines for complicated issues;
- use colors to separate sections;
- use colors to highlight or enhance meaning, but do not depend on colors to convey your message;
- beware of colors that are difficult to distinguish from surrounding colors;
- when using black and white, it is often difficult to distinguish various shades of grey;
- determine if the material is consistent with culturally accepted ways of presenting or accessing information;
- respect and allow for the diverse nature of the target audience – for example, enlarge the type face and font size for audiences who are elderly or sight-impaired.

- Recognize that people who receive emergency information typically go through a sequential process that shapes their perceptions and subsequent actions and/or behavior. As defined by Mileti and Peek[21], the sequence is:
  (1) hearing and perceiving the risk information;
  (2) understanding the risk information;
  (3) believing the risk information;
  (4) deciding about personal relevance (for example, Will I be affected? Does this apply to me?);
  (5) deciding about alternative protective actions in response to the perceived risk;
  (6) performing the protective actions.
- Adhere to the "primacy/recency" or "first/last" principle by putting the most important messages in the first and last position in lists.
- Cite credible third parties that support or can corroborate key messages. Since people often have different views about who is credible and who is not, messages that come from a mix of credible sources tend to increase belief.
- Provide information that indicates genuine empathy, listening, caring and compassion.
- Use graphics, visual aids, analogies and narratives (such as personal stories).
- Balance negative information with positive, constructive or solution-oriented key messages.
- Repeat messages to reinforce risk perceptions and responses. Frequently repeated messages help to reduce the potential for misperceptions by focusing people on key messages and addressing rumors, and increasing public confidence. However, in protracted emergencies, repetition of key messages may become counterproductive.
- Recognize that trust is critical to effective messaging during an emergency. Under non-stressful circumstances, people base opinions regarding the trustworthiness of a spokesperson largely on competence and expertise. During a crisis, however, people put a high weight on factors such as empathy, caring, compassion, and active listening[22] (see Figure 6: Trust Factors in High Stress Situations). When people are stressed and upset, they typically want to know that you care before they care about what you know.

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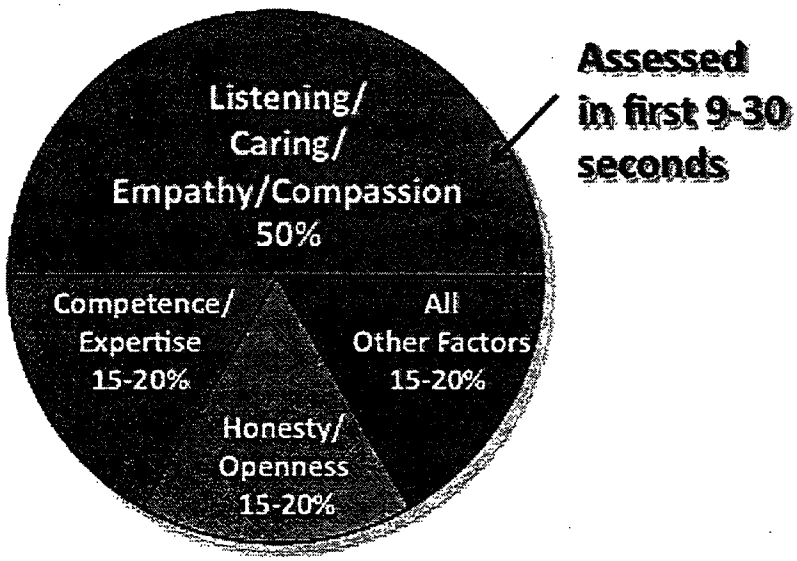
[21] Mileti, D. S. and L. Peek, L. (2000) The social psychology of public response to warnings of a nuclear power plant accident. Journal of Hazardous Materials. 75(2): 181-194.

[22] See, for example, Peters, R., McCallum, D., and Covello, V.T. (1997) The determinants of trust and credibility in environmental risk communication: An empirical study. Risk Analysis, Vol. 17(1):43-54.

Figure 6: Trust Factors in High Stress Situations



2.4.4 Step 4. Develop Supporting Facts

The fourth step in message map construction is to develop supporting facts, information, or proofs for each of the key messages. The same principles that guide key message construction guide the development of supporting information.

Supporting information is typically arranged in blocks under each key message. This supporting information amplifies the key messages by providing additional facts or details. Supporting information can also take the form of visuals, graphics, analogies, personal stories, or citations to credible information sources.

Developing supporting information is critical to effective message mapping. A key characteristic of message mapping is the layering of information. Information is presented in tiers, from simple to more complex.

The layered structure of a message map is a response to the fact that people have different information needs. For example, for some people, a simple, short warning message is sufficient. For others, more detailed information is needed for them to make a decision.

2.4.5 Step 5. Test and Practice Messages

The fifth step is to conduct systematic message testing using standardized testing procedures. Message testing should begin by asking subject matter experts who are not directly involved in the original message mapping process to validate the accuracy of information contained in the message maps. Message testing should then be done with individuals or groups who are, or who can serve as surrogates for, key internal and external target audiences.

A critical step in message testing is to share and vet messages with emergency response partners **before** a radiological emergency. For example, scenario based news releases with information organized in blocks of three should be shared and vetted by partners prior to a radiological emergency (See, for example, Appendix 4.7, "Sample Radiological Emergency News Release"). Pre-event vetting of message maps by emergency response partners promotes and enhances message consistency and coordination across organizations.

2.4.6 Step 6. Deliver Maps Through Appropriate Information Channels

The sixth and final step is to plan for the delivery of the prepared message maps through: (1) trained spokespersons, (2) trusted individuals or organizations, and (3) chosen risk communication channels (see Appendix 4.6: Risk Communication Channels.)

In the event of a significant radiological incident, the nuclear power plant is expected to work collaboratively with other responsible agencies in managing the response and communicating risk. Depending on the type of incident, this may include government officials from local, state and federal agencies, emergency response organizations, law enforcement, and other agencies or organizations.

Coordination among the partner agencies in selecting the appropriate spokespersons and the appropriate channels for delivering clear and consistent messages will enhance communication effectiveness. Having experts and trusted individuals available from the various organizations to verify information or answer questions pertaining to their areas of responsibility will also increase effectiveness in delivering messages.

3.0 Radiological Emergency Risk Communication Message Mapping Products

This section contains:
1) sample questions likely to be asked by residents in the Emergency Planning Zone (EPZ) in a radiological emergency at a nuclear power plant;
2) sample message maps for selected questions.

The sample message maps have not been reviewed by technical experts, nor have they been formally tested as specified in the message mapping process described in this document.

The sample questions and sample message maps included here are intended to serve as examples that emergency response organizations and spokespersons can use in developing their own list of questions and library of messages maps for a radiological emergency. Ideally, each nuclear power plant licensee and each emergency response organization should:
1) develop a message map briefing book for different radiological scenarios following the message mapping process described in this guidance document;
2) develop a comprehensive risk and crisis communication plan describing the use of message maps in different types of radiological emergencies;
3) conduct regular message mapping practice sessions, drills, and exercises.

3.1 Sample Questions Likely to be Asked by Residents in Nuclear Plant Emergency Planning Zones (EPZ) During a Radiological Emergency

Listed below in categories are nearly 400 questions the public and media may ask during a radiological emergency.

Sample Health. Safety, and Mental Health Questions (General)

1. Am I at risk from radiation contamination from the release?
2. What are the risks to my children?
3. What are the risks to my pets?
4. What will be the impact on natural habitats (for example, fish, wildlife, and endangered species)?
5. Can my children and pets play outside?
6. What health effects can I expect to see if I've been exposed to radiation?
7. What are the short-term health effects of exposure to radiation?
8. What are the long-term effects of exposure to radiation?
9. If I develop a health problem (i.e., headaches, rashes, etc.) that I never had before, could the exposure to radiation have caused this problem?
10. Have any health problems been reported so far?
11. How many people have become ill as a result of the release?
12. Are you going to test people for exposure to radiation?
13. How do you test people for radiation exposure?
14. Can people obtain devices for testing radiation exposure?

15. Will people in the Emergency Planning Zone be provided with devices for testing radiation exposure?
16. Have you set up a temporary, local health center or clinic where we can be tested?
17. I'm pregnant (or planning to be). Will exposure to radiation affect my unborn child?
18. Will it be safe to garden in my yard?
19. Will it be safe to eat vegetables grown in my garden?
20. Will it be safe to drink the water from my well?
21. Will you provide us with bottled water?
22. Is it safe to bathe or shower in the water?
23. Is it safe to water our lawns with the potentially contaminated water?
24. Is it safe to mow our lawns if the soil underneath is potentially contaminated?
25. Is it safe to use the river for fishing and other recreational purposes?
26. Will it be safe to eat the fish caught in rivers and lakes?
27. What's being done right now to protect my own health and that of my family?
28. How long will the affected area be contaminated?
29. How serious is the contamination?
30. What health effects are expected from exposures to different types of radiation?
31. What health effects are expected to the thyroid glands of those exposed to radiation?
32. What heath effects are expected to the lungs of those exposed to radiation?
33. What health effects are expected for those who ingest food or liquids contaminated with radiation?
34. Will the authorities be doing long term monitoring for increases in thyroid cancer, leukemia, and other cancers among people in affected communities?
35. Is there a vaccine people can take to prevent health effects from exposure to radiation?
36. Can concrete, walls and glass shield people from the health effects of radiation?
37. Are children and pregnant women more susceptible to harm than others from exposure to radiation?
38. Are people with weak immune systems more susceptible to harm than others from exposure to radiation?
39. What should parents be telling their children?
40. What is your advice for people experiencing severe mental anguish or post traumatic stress syndrome from the incident?
41. What should you say to people who [insert risk category, such as people who have lost loved ones, have lost their business, have suffered a financial loss, cannot find families or friends, or witnessed a death or injury)?

Sample Questions about KI (Potassium Iodide)

1. Why should people take KI?
2. Who should take KI?
3. When should people take KI?
4. How much protection from radiation is provided by taking KI?
5. How effective is KI in protecting against radioactive iodine?
6. Do all releases of radioactivity contain radioactive iodine?
7. How does KI protect the thyroid gland?

8. What is the function of the thyroid gland and what will happen if a person does not take KI?
9. Is the taking of potassium iodide approved by the US Food and Drug Administration?
10. Where can people get KI?
11. Does KI require a prescription?
12. Are some forms of KI better than others?
13. Can people drink the iodine used for the cleaning of wounds if they are not able to get hold of KI?
14. Does KI protect again all types of radiation?
15. What are the recommended doses of KI for radiological emergencies involving radioactive iodine?
16. Who determines what the recommended dosage of KI will be?
17. Has the recommended dosage of KI changed over the years?
18. Can KI be taken after exposure to radiation has occurred? Is it still effective?
19. For how long does the recommended dose of KI provide protection?
20. How effective was the KI given to people during the Chernobyl nuclear accident?
21. Should people outside the 10 mile Emergency Planning Zone take KI?
22. Should people outside the 50 mile Emergency Planning Zone take KI?
23. How far can radioactive iodine travel? What dosages of radioactive iodine are harmful?
24. What are the side effects if taking KI?
25. Should pregnant women take KI?
26. Can KI cause birth defects?
27. How quickly does KI work?
28. Can one overdose on KI?
29. What companies make KI?
30. Can you purchase KI on the internet?
31. Is enough KI available for all those who might have to take it?
32. Are there any groups of people that should not take KI?
33. Can KI be given to pets?
34. Can KI be given to livestock?
35. What are the recommended dosages if KI for pets and livestock?
36. Should parents consult a pediatrician before administering KI to the children?
37. If there is a shortage of KI, should parents give it to their children first?
38. Is KI considered to be a medicine?
39. If there are side effects from taking KI, who will pay for damages and medical bills?
40. How many doses of KI should people take?
41. If a person cannot get hold of KI, what are the alternatives? Can table salt help?
42. Does the government have enough KI stored for the entire US population?
43. Who is in charge of the KI stockpile?
44. If there is a shortage of KI, who will get it first? Do you have a priority list of who will get KI?
45. Will people living upwind from the nuclear power plant be advised to take KI?
46. If people are sheltering in place, how can they get KI?
47. Will schools provide KI to students?
48. Will people in institutions (for example, prisons and nursing homes) be given KI?
49. Will emergency shelters and reception centers provide KI for evacuees?

50. Where can people go to get KI if they are away from home during a radiological emergency?
51. What is meant by "65 mg" of KI?
52. What is meant by "1 mL" of KI?

Sample Radiation/Radiological Incident Questions

1. What is radiation?
2. What are the various types of radiation?
3. What is the difference between ionizing and non-ionizing radiation
4. What is gamma radiation?
5. Can a person see, feel, taste, smell or hear radiation?
6. How much radiation does a nuclear power plant release into the environment as part of its routine everyday operations?
7. Do federal regulations permit releases of radiation into the environment as part of the routine everyday operations of nuclear power plants?
8. Are radioactive releases from a nuclear power plant's routine operation fully reported to the public and public officials?
9. What is a radiation plume?
10. What are "radionuclides"?
11. How is radiation measured?
12. What is "ionizing radiation"?
13. What is "non-ionizing radiation?
14. What are "rads"?
15. What are "rems" and "millirems"?
16. What are "curies"?
17. How many "curies" are in the core of a nuclear power plant reactor?
18. What are "radioactive fission gases"?
19. What is meant by "venting" into the atmosphere?
20. Why are there so many different units for measuring radioactivity?
21. What is meant by "half-life"?
22. What are "radioactive isotopes"?
23. What are "noble gases"?
24. What is the "half life" of :
    -- radioactive iodine
    -- technetium
    -- plutonium
    -- xenon
    -- cesium
    -- tritium
    -- krypton
    -- Strontium-90
25. What is meant by "source term"?
26. Does exposure to radiation cause:
    -- damage to tissue

-- damage to cells
-- damage to DNA
-- genetic mutations
-- cancers
-- leukemia
-- birth defects
-- reproductive disorders
-- immune system disorders
-- endocrine system disorders

27. Is there such a thing as a "safe dose" of radiation?
28. According to government regulations, what are "permissible" levels of releases of radiation into the atmosphere and water?
29. Does "permissible" mean the same thing as "safe"?
30. Is there a difference between the amount of radiation to which a person has been exposed and a radiation dose?
31. Who sets radiation protection standards?
32. Are radiation protection standards set by all government agencies the same?
33. Does the nuclear industry have anything to say in the setting of radiation protection standards?
34. Are there different radiation protection standards for workers at nuclear power plants and the public?
35. Have radiation protection standards for workers and the public stayed the same over the years? If they have changed, have they become higher or lower?
36. Who's in charge of the emergency response?
37. Could this be a terrorist event?
38. Has radioactivity been released into the atmosphere?
39. Has radioactivity been released into the water?
40. What types of radioactive materials are contained in the radioactive cloud?
41. Does the radioactive cloud/vapor/plume contain:
    -- iodine
    -- technetium
    -- plutonium
    -- xenon
    -- cesium
    -- tritium
    -- krypton
    -- Strontium-90
42. Is the nuclear power plant monitoring for releases of:
    -- iodine
    -- technetium
    -- plutonium
    -- xenon
    -- cesium
    -- tritium
    -- krypton
    -- Strontium-90

43. Who is tracking the radioactive releases?
44. Who is monitoring the radioactive releases?
45. Does the Nuclear Regulatory Commission track and monitor releases or does it rely on self-reporting by the licensee?

Sample Sheltering in Place Questions[23]

1. What is sheltering in place?
2. How long will people have to shelter in place?
3. What is the maximum amount of time people will have to shelter in place?
4. What happens if my ventilation or air circulation system shuts down?
5. Can I get radiation sickness from breathing the air in my house even if the windows and doors are shut?
6. How effective is it if I close all my windows and doors?
7. How effective is it if I shut off the heating of my house or workplace?
8. How effective is it if I shut off the cooling system of my house or workplace?
9. How effective are face masks?
10. How effective are air filters?
11. If it is very hot out, should I still turn off the cooling system?
12. If it is very cold out, should I still turn off the heating system?
13. What is the use of sheltering in place if radiation can penetrate walls?
14. If I am in my workplace, should I shelter there or go home?
15. Can walls and glass shield a person from exposure to radiation?
16. Which types of walls and glass are most effective for shielding from radiation?
17. Are there types of radioactive materials that can penetrate walls and glass?
18. Are any of the types of radioactive materials that can penetrate walls and glass in the radioactive cloud? If so, why are you recommending sheltering-in-place?
19. What should people do if they are not at home when they are advised to shelter?
20. What should people do if they are in their car when they are advised to shelter?
21. What should people do if they are at the [insert location, such as at the office, restaurant, walking, at a picnic, at a shopping mall, in a government building, or at the movies]?
22. If people are away from home, should they try to go home?
23. If people live in a trailer or mobile home, should they shelter in place?
24. Should people stay in their homes after the radioactive plume has passed by?
25. What will the environment be like outside when people leave their shelters?
26. What should people do before leaving the shelter? For example, should people change their clothes or shower?
27. Will it be safe for people to walk to their cars after they exit their shelter?
28. What should people take with them when they leave the shelter?

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[23] For additional questions regarding sheltering in place, see Oak Ridge National Laboratory (2003) "Questions and Answers Regarding Actions to Take when Ending Shelter in Place." Department of Homeland Security Chemical Stockpile Emergency Preparedness Program Protective Action Working Integrated Process Team. ORNL/TM-2003/230. September.

29. Will it help if people cover their faces with a handkerchief, towel, or face mask after they leave their shelter?
30. Can people touch anything outside after they leave their shelter?
31. If a person shelters in a place other than their home, how long will they be gone?
32. Can people be forced to leave their homes or workplace?
33. How quickly do people need to find shelter? Is there a maximum amount of time that a person can be outdoors?
34. How effective are fallout shelters for sheltering?
35. How effective are basements for sheltering?
36. Which parts of the home are best for sheltering?
37. Are tunnels and underground locations good places to shelter?
38. Should people seal windows and external doors that do not fit snugly with duct tape or plastic sheeting to reduce infiltration of radioactive particles?
39. If the shelter you are in has only limited amounts of water or food, should you move to another shelter?
40. How can people determine if there is radiation in the shelter they have chosen?
41. Will trained personnel with specialized equipment be available to detect if radioactive contamination has been occurred in the shelter?
42. If you don't have a face mask, should you breathe though the cloth of your shirt or coat to limit your exposure?
43. If appropriate shelter is not available (such as if you are camping), what should you do?
44. How you know when to leave the shelter if you don't have access to a radio, television, or telephone?
45. Should people take a shower to decontaminate themselves before going inside the shelter? they believe they were exposed to radioactive materials
46. If people believe they were exposed to radioactive materials, should they leave their contaminated clothing outside the shelter?
47. What actions should people take when ending shelter in place?

Sample Evacuation Questions

1. How will you notify and warn the public (including residential, custodial, and transient populations) about on-going evacuation plans?
2. What should people do who do not have a car or other transportation?
3. Will it be safe for people to wait at the bus stop?
4. How long will people have to wait for a bus?
5. How long will people be gone from their homes and businesses?
6. What is a "staged evacuation"?
7. What is "shadow evacuation"?
8. What should I do if an evacuation seems likely?
9. What do I do with my livestock?
10. What are the boundaries of the evacuation areas?
11. Is my neighborhood part of the evacuation area?
12. My children are at school and in the evacuation zone. Where will they be taken?
13. How can I get in touch with my children who were evacuated from their school?

14. My (insert name of relative or friend) is sick and in the hospital that is being evacuated. Where are they moving him/her?
15. How can I get in touch with my [insert name of relative or friend] evacuated from [insert location, such as a hospital or nursing home]?
16. My house is right over the boundary of the evacuation area. Am I safe?
17. What happens if the wind changes directions and blows toward my house? Should I evacuate now?
18. If the boundaries of the evacuation zone change, how will people be notified?
19. Will people be escorted out of the evacuation zone?
20. If I drive my car out of an evacuated area, will the car be contaminated? Will it be confiscated?
21. I've been told they are evacuating my neighborhood. What streets should I use to get out safely?
22. Is there more than one evacuation route from where I live?
23. I've been told to evacuate. Will someone pick me up or am I supposed to drive my own car?
24. How will I know I am going the right way? What happens if I get lost?
25. Will I have to drive through contaminated areas to get to the shelters?
26. Will people be checking to see if I am contaminated before letting me out of the evacuation zone? If so, what will happen to me, my car, and my possessions?
27. How will emergency responders know if there is radiation in my yard, at the school, in the parks, etc?
28. Will the people who are being evacuated on buses be contaminated with radioactivity? How will I know? Will I have to ride with them? If they are contaminated, how will they get the radioactive material off themselves?
29. Will there be more than one shelter for each area being evacuated? What will happen if a shelter is full? Will people be sent to another shelter?
30. Will they check people for radioactive contamination before letting them into the shelter? If a person is contaminated, what will happen to them?
31. If I drive to a location other than a designated shelter, how will the location know if I am contaminated?
32. Where do I evacuate to? I don't have a radio or television.
33. Are all evacuation centers the same?
34. What is the difference between an "evacuation center" and a "reception center?"
35. Do some evacuation centers have better accommodations and amenities than others? Where can I find this information?
36. Will evacuation centers have [insert item, such as televisions, radios, telephones, toys for children; rooms for smokers, microwaves, or refrigerators]?
37. Will children being evacuated from schools be sent to the same evacuation centers as their parents?
38. How long will people have to stay at the evacuation centers?
39. I have special medication I need to take. What happens if I run out while I am at the evacuation center?
40. I am on a special diet from my doctor due to my health. Will the evacuation center be able to make the food I need?

41. I am on oxygen and I have only one canister. Will the evacuation center be able to help me get more?
42. My understanding is evacuation centers will not accept pets. Will they make exceptions for small pets [for example, turtles, rabbits, gerbils, and canaries)?
43. I don't like being around people I don't know. Will they give me a room by myself?
44. Will there be different evacuation centers for VIPs (Very Important People)?
45. Will the evacuation centers have safes or safety deposit boxes?
46. My [insert name of relative or friend] is in [insert custodial facility name, such as a hospital, nursing home] inside the evacuation zone. They are being told to stay put. Are they going to be safe?
47. Will I be able to go to the [insert custodial facility name] and pick up [insert name of relative or friend]?
48. Will the people who are not able to evacuate die?
49. A number of homeless people live under the bridge by the edge of town. Who is going to make sure they get told about the evacuation?
50. I know of campers who are in the forest. Who is going to make sure they evacuate?
51. Have arrangements been made with adjacent cities, towns, and municipalities to shelter folks evacuated from this emergency?
52. What facilities have been designated in these communities as evacuation centers?
53. Are the hospitals in the adjacent communities able to take care of people who have been evacuated and are contaminated with radioactivity?
54. Who is in charge of ensuring folks get to the right evacuation center?
55. Will an attempt be made to get families reunited?
56. What happens if the weather or situation changes and the shelters are endangered by the radioactive release? Where will people go then?
57. How are you going to get people out of the evacuation zone who are visually or hearing impaired?
58. Should I give a ride to people who are hitchhiking or need a ride out of the evacuation zone? Is it safe to give rides to strangers? How will I know if they are contaminated with radioactivity?
59. When I leave my home to go to the evacuation center, will my house be safe from vandals and thieves? Will the police stay behind to protect my property?
60. What happens if I return home and someone has broken into my house? Who will be responsible? Will those who forced me to evacuate be liable?
61. What happens if my house catches fire after I have evacuated. Will firemen stay behind to put out fires?
62. I heard they are evacuating my neighborhood. What happens if I refuse to leave my home? Will I be forced to leave? Will they arrest me?
63. Do the law enforcement officials have the legal right to force me to evacuate?
64. If I don't evacuate and get contaminated with radioactivity, will my health insurance pay if I get sick? Who will pay for treatment if a person gets sick from radioactivity?
65. Who will pay for property and personal effects that get contaminated following an evacuation?
66. Who will pay for a new house if the house cannot be returned to after an evacuation?
67. What happens to plants and trees contaminated after an evacuation? Will someone replace them? If so, who will pay for it?

68. Who will protect my business if I evacuate?
69. Will the National Guard be called in to make sure there is no looting?
70. Who will be responsible for property damage or theft at businesses in the evacuation zone?
71. Who will pay for losses to businesses closed because of the evacuation?
72. What happens if there is a traffic jam? Have you planned for traffic jams?
73. Who made the decision to evacuate? Why didn't they evacuate earlier?
74. My children go to a school outside the evacuation zone. Who will tell them they cannot go home?
75. How much time will people told to evacuate have to pack their things? What should they take with them?
76. What are you telling people not affected by this emergency but who are self-evacuating and clogging evacuation routes?
77. What are you telling people outside the evacuation zone who nonetheless want to evacuate?
78. Are you setting up roadblocks to prevent people from entering the evacuation zone?
79. If you evacuate but forgot something at home, will you be allowed back into the evacuation zone?
80. Who will stay behind in the evacuation zone? What will happen to them?
81. Can personal protective equipment protect those who stay behind in the evacuation zone?
82. What are the limits of personal protective equipment?
83. Will ambulances be allowed into the evacuated areas?
84. Will houses and businesses in the evacuation area continue to get electricity and water?
85. What are you telling your own family to do?
86. I can stay with [insert name]. Will you provide funds to get me there?

Sample Investigation/Data Questions

1. How far can the radiation spread?
2. How bad is the problem?
3. How much radiation contamination is there?
4. Is the radiation cloud moving and, if so, how fast and in what direction?
5. Are there any other contaminants in the radiation cloud beside the ones we have been told about?
6. How can you be sure there are no other contaminants in the radioactive cloud?
7. Will you conduct testing/sampling to make sure the soil in my yard is free of radiation?
8. How will you decide where to sample and where not to sample?
9. Who determines what levels of radiation are considered "safe"?
10. Will you clean up all of the radiation contamination, or will you allow some to remain?
11. How will you know whether the drinking water is contaminated?
12. How will you know whether my yard has contaminated soil?
13. How will you know that it's safe to breathe the air?
14. How will you know whether it's safe to go fishing?
15. Will you sample my well water?
16. Why are some people being offered bottled water and not others?
17. Can I see the results of all your testing of air, water, soil, and buildings?

18. Can I see the results of testing you've done in areas inside and outside the Emergency Planning Zone?
19. Do I have to give you access to sample my property?
20. What if I refuse you access to my property?
21. Do I need to be home and take time off work while you're sampling my property?
22. I'm moving into the area. Can I see the results of sampling that's already been done?
23. Who will be doing the sampling?
24. How can we be sure the sampling data is accurate?
25. How can we be sure that future sampling won't find things that you didn't find now?
26. Can you guarantee the accuracy of the sampling results?

Sample Decontamination Questions

1. What is decontamination?
2. Who will need to be decontaminated?
3. Which people will not have to be decontaminated?
4. Can people choose not to be decontaminated?
5. What will happen to people who choose not to be decontaminated?
6. Who will decide who, when, where, why, and how people will be decontaminated?
7. Who gave authorities the right to make decisions about decontamination?
8. Why will people need to be decontaminated?
9. How will people be decontaminated?
10. Where will people get decontaminated?
11. How soon after exposure to radiation do people need to be decontaminated?
12. Will people have to remove their clothes to be decontaminated?
13. Can a person not to remove their clothes during decontamination?
14. Where will contaminated clothing and personal articles be sent?
15. Will people be able to get back decontaminated clothing and personal articles?
16. Will there be long lines at decontamination centers?
17. Who will do the decontamination?
18. Do those who do decontamination have to be certified?
19. Will parents be able to stay with their children when they are decontaminated?
20. Where will people go after being decontaminated?
21. Will people who have been decontaminated be quarantined or isolated from other people?

Sample Cleanup Questions

1. How exactly are you going to clean up after the accident?
2. Why was this particular cleanup method chosen over other options?
3. How long will the cleanup take?
4. When are you going to start the cleanup?
5. Who is going to perform the cleanup?
6. What process was used (or will be used) to select contractors to perform the cleanup?
7. How will cleanup performance be monitored or evaluated?
8. How much will the cleanup cost?
9. Who will pay for the cleanup?

10. Will my tax dollars have to pay for the clean up?
11. Can taxpayers be reimbursed for any clean up costs?
12. How will you know when everything is "clean"?
13. Will you remove contaminated soil and other radioactive waste?
14. Where will you send radioactive waste?
15. What if the cleanup doesn't work?
16. Can you guarantee that all of the radiation waste and contamination will be removed?
17. How will my quality of life be affected during the cleanup (i.e., noise, traffic, etc.)?
18. After you finish the cleanup, then what? (what happens next?)
19. After the cleanup, will you continue to test to make sure it worked?
20. What happens if my water (or soil, etc.) is still contaminated after the cleanup?
21. Will people be allowed to return to their homes during the clean up?
22. How long will buildings stay radioactive?
23. If the release contains cesium or strontium, how long will the fallout stay radioactive?

Sample Communications Questions

1. Why did it take you so long to tell people about the release?
2. How can I trust what you're telling me about the release?
3. How can I trust what you're telling me about my safety?
4. How will I know if my house or property has been contaminated with radiation?
5. How will I be informed about what's going on?
6. Will you share the testing data with residents?
7. Will you let us know if something unexpected happens during the cleanup?
8. Who should people talk to if they have questions or concerns?
9. Where can people get more information about the cause of the emergency?
10. Where can people get more information about locations that have experienced similar emergencies?
11. If a cleanup plan is selected that residents disagree with, is there an appeal process?
12. How will you address public comments?
13. Will you address ALL of the public comments?
14. How will you decide which comments NOT to address?
15. If the majority of residents disagree with how the licensee is planning to cleanup, what can people do to change their plan?

Sample Economic Questions

1. If my house, property, or business location needs to be decontaminated, will I receive financial assistance or compensation?
2. If the value of my property or business decreases because of the release, will I be compensated?
3. I'm concerned that cost will be the driving force behind the selected cleanup option; does community opinion really matter?
4. I was told residents might have to relocate during the cleanup. Who will pay for my moving costs? What about other expenses I may be forced to incur (i.e., costs of

transporting my children to school because they won't be able to take the bus, or daily food costs because I won't have access to my stove and refrigerator, etc.)

5. The release has placed a "negative stigma" on our community that may affect potential investors, developers, or homeowners; what are you doing about this?
6. Will this emergency keep our community from developing?
7. Can we get jobs helping with the cleanup?
8. If we can't eat the fish anymore because of health risks, can you give us a food subsidy?
9. Do you have enough money to cover the cleanup costs?
10. What if you discover the cleanup is going to cost more than estimated, what happens then?

Sample Quality of Life Questions

1. Will martial law be declared?
2. Will there be a curfew?
3. Will water, telephone, mobile phone, internet, and electricity services be affected?
4. Will this event affect transportation schedules, such as [insert type of transportation, such as airlines, trains, and buses]?
5. What steps are being taken to control traffic?
6. What steps are being taken to control of access to the affected area?
7. What steps are you taking to prevent looting from homes or businesses that have been evacuated?
8. When will people be able to re-schedule community and social events, such as [insert name of event, such as community meetings, concerts, memorial services, and weddings]?
9. How will the radiological incident affect mail delivery?
10. How, where, and when will people get their mail?
11. Who will water my plants?
12. Who will take care of the pets I had to leave behind?
13. Who will take care of the horse I had to leave behind?
14. Who will take care of the livestock I had to leave behind?
15. Will ATMs be working for those who don't have enough cash with them?
16. Will authorities provide cash or coupons to people without cash or credit cards?

Sample Environmental Questions

1. What effects are expected on the community's water supply, including water sheds, reservoirs, and water supply intake and treatment plants?
2. What effects are expected on farm crops?
3. What effects are expected on domesticated animals?
4. What effects are expected on wildlife?
5. What effects are expected on livestock?
6. What effects are expected on dairies, milk, or milk products that people consume?
7. What effects are expected on the areas people occupy (i.e. where they work, live, play, etc.)?
8. What effects are expected on soil?

9. What effects are expected on food processing plants?
10. What effects are expected on endangered species?

3.2 Sample Message Maps for a Radiological Emergency

3.2.1 Sample Message Maps Relating to the Use of Potassium Iodide (KI) as a Protective Medicine in a Radiological Emergency

Scenario: A radiological emergency at a nuclear power plant resulting in an airborne release of radioactive materials.

Stakeholder: Residents in the 10 Mile Emergency Planning Zone and the Media

Question: What is Potassium Iodide (KI)?
Key Messages (in bold):

- **Potassium iodide, commonly called KI, is a salt of iodine that comes in tablet or liquid form.**
- **Iodine is an important chemical needed by the thyroid gland to make hormones.**
- **KI blocks radioactive iodine from being taken into the thyroid gland.**

Question: In case of a radiological incident, what does KI do?
Key Messages (in bold):

- **Potassium iodide (KI) blocks radioactive iodine from being taken into the thyroid gland.**
- **Radioactive iodine may be released into the environment during a radiological emergency.**
    - Radioactive iodine may be released to the air and breathed into the lungs.
    - Radioactive iodine may contaminate local food and get into the body through eating.
    - Radioactive iodine may contaminate the local water supply and get into the body through drinking.
- **If radioactive iodine gets into the body, it can quickly be absorbed by the thyroid gland and cause injury.**

Question: In case of a radiological incident, what can KI not do?
Key Messages (in bold):

- **KI cannot prevent radioactive iodine from entering the body.**
- **KI cannot protect parts of the body other than the thyroid.**
- **KI cannot reverse the health effects caused by radioactive iodine once damage to the thyroid has occurred.**

Additional key messages:

- **KI cannot protect the body from radioactive elements other than radioactive iodine.**
- **KI cannot protect the thyroid gland from an external radiation dose.**

Question: How does KI work?
Key Messages (in bold)

- **KI works by blocking radioactive iodine from entering the thyroid.**
- **When a person takes KI, the iodine gets absorbed by the thyroid.**

- **When a person takes KI, the thyroid gland becomes "full" and cannot absorb any more iodine for the next 24 hours.**

Question: Can iodized table salt be used as a substitute for KI?
Key Messages (in bold):

- **Iodized table salt is not a substitute for KI.**
- **Iodized table salt contains enough iodine to keep most people healthy under normal conditions.**
- **Iodized table salt does not contain enough iodine to block radioactive iodine from getting into the thyroid gland.**

Question: How well does KI work?
Key Messages (in bold):

- **KI does not give a person 100% protection against radioactive iodine.**
- **The effectiveness of KI depends on characteristics of the exposure to radiation.**
    - The effectiveness of KI depends on how much time passes between contamination with radioactive iodine and the taking of KI
    - The effectiveness of KI depends on how fast KI is absorbed into the blood
    - The effectiveness of KI depends on the total amount of radioactive iodine to which a person is exposed.
- **When instructed by health authorities to take KI; the sooner a person takes KI the better.**

Question: Who should take KI?
Key Messages (in bold):

- **Recommendations for who should take KI are different for different groups.**
    - Recommendations are different for children, adults age 18-40, pregnant women, breastfeeding women, and adults age 40 or over.
- **Recommendations for who should take KI may change as the situation changes.**
- **Instructions from health authorities on who should take KI should be carefully followed.**

Question: What are the recommendations for children taking KI during the radiological emergency?
Key Messages (in bold):

- **Health authorities recommend children at risk take KI unless they have known allergies to iodine.**
- **Children may be highly sensitive to the harmful effects of radioactive iodine.**
- **Health authorities will provide guidance on dosages of KI for children.**

Question: What are the recommendations for pregnant women taking KI?
Key Messages (in bold):

- **Because iodine crosses the placenta, health authorities recommend pregnant women take KI to protect the growing fetus.**
- **The growing fetus can be sensitive to the harmful effects of radioactive iodine.**

- **Health authorities recommend pregnant women take only one dose of KI.**

Question: What are the recommendations for breastfeeding women taking KI?
Key Messages (in bold):

- **Health authorities recommend women who are breastfeeding take only one dose of KI.**
- **Because radioactive iodine quickly gets into breast milk, health authorities recommend women stop breastfeeding.**
- **Following a radioactive incident, breastfeeding woman should feed their child baby formula or other food if available.**

Question: What are the recommendations for adults age 40 or over taking KI?
Key Messages (in bold):

- **Health authorities recommend adults age 40 or over not take KI unless exposure to a very large dose of radioactive iodine is expected.**
- **Adults older than 40 years have the lowest chance of injury from radioactive iodine.**
- **Compared to others, the chance of having allergic reactions to KI is greatest among adults age 40 or over.**

Question: When should people take KI?
Key Messages (in bold):

- **After a radiological incident, health authorities will tell the public if KI is needed.**
- **Health authorities will tell people when to take KI.**
- **Health authorities will tell people what doses of KI are recommended.**

Question: How much KI should people take?
Key Messages (in bold):

- **Recommendations are different for different groups**
    - Recommendations are different for adults, breastfeeding woman, children between three and 18, children who are adult in size, infants and children between one month and three years of age, and newborns from birth to one month of age.
- **Doses of KI come in two different forms—tablets and liquid**
    - Tablets of KI typically come in two sizes, large (130 milligrams, symbolized as 130 mg) and small (65 milligrams, symbolized as 65 mg).
    - Tablets typically have lines engraved in them so they may be cut into smaller pieces for lower doses.
    - Bottles containing the liquid form of KI typically contain 30 doses per bottle.
- **Dosages of KI recommended by health authorities should be carefully followed.**

Question: What are the recommended dosages for newborns from birth to one month of age?
Key Messages (in bold):

- **Newborns from birth to one month of age should be given ¼ of a 65 mg tablet or ¼ mL of liquid.**
- **The recommended dose for newborn infants is the same for both nursing and non-nursing newborn infants.**

Question: How often should people take KI?
Key Messages (in bold)

- **People should not KI more often than recommended.**
  - Taking KI more often than recommended does not offer more protection
  - Taking KI more often than recommended can cause illness or death.
- **A single dose of KI protects the thyroid gland for 24 hours.**
- **If radioactive iodine is present, health authorities may advise people to take additional doses of KI.**
- **Health authorities advise pregnant women, breastfeeding women, and newborn infants to take only one dose of KI.**
  - Pregnant women, breastfeeding women, and newborn infants may need to be evacuated until levels of radioactive iodine in the environment decrease.

Question: Who should not take KI?
Key Messages (in bold):

- **People who are allergic to iodine should not take KI.**
  - If you are unsure about if you allergic to iodine, consult your doctor.
  - A seafood or shellfish allergy does not necessarily mean that you are allergic to iodine.
- **People who have certain skin disorders should not take KI.**
  - Skin disorders of concern include dermatitis herpetiformis or urticaria vasculitis.
- **People with thyroid diseases can take KI.**
  - Thyroid diseases include, for example, multinodular goiter, Graves' disease, or autoimmune thyroiditis.
  - People with thyroid disease should take KI under the careful supervision of a doctor, especially if dosing lasts for more than a few days.

Question: What are the possible risks and side effects of taking KI?
Key Messages (in bold):

- **As with all drugs, there are possible risks and side effects of taking KI.**
- **Health authorities believe the benefits of taking KI outweigh the risks during a radiological incident.**
- ***Side effects caused by KI may include intestinal upset, allergic reactions, rashes, and inflammation of the salivary glands***
  - When taken as recommended, side effects of KI that specifically affect the thyroid are rare.
  - Infants who receive KI should have their thyroid hormone levels checked and monitored by a doctor.

Question: Where can people get KI?
Key Messages (in bold):

- **KI is available at pharmacies without a prescription.**
- **Pharmacists can advise on what brands of KI have been approved by the FDA.**
- **Most emergency shelters. reception centers, and congregate care centers for evacuees during a radiological emergency will have supplies of KI on hand.**
- **KI is available through the Internet.**

3.2.2 Sample Message Maps Relating to Evacuation in a Radiological Emergency

Scenario: A radiological emergency at a nuclear power plant resulting in an airborne release of radioactive materials.

Stakeholder: Residents in the 10 Mile Emergency Planning Zone and the Media

Question: What is evacuation during a radiological incident?
Key messages (in bold)

- **Evacuation is the orderly movement of people away from a hazard.**
  - Local authorities will provide reception centers for those without their own resources for temporary relocation.
  - Studies show large-scale evacuations are effective, successfully save lives, and reduce the potential number of injuries.

- **Local authorities consider all relevant information before telling people to evacuate**
  - Technical information includes plant conditions, field monitoring data, projections, and whether the release is fast-breaking or short-term.
  - Community information includes availability of transportation and appropriate in-place shelters.
  - Environmental information includes knowledge of on-site and off-site environmental conditions such as weather and traffic conditions. (NUREG-0654, I.8, 10 and Supplement 3)
- **People should listen for radio or television messages about evacuation plans.**
  - It is important for people to wait until they are told to evacuate.
  - Local officials will tell people what direction to travel to avoid the radioactive cloud.
  - People will be directed to shelters and reception centers.
  - People told to evacuate should follow instructions related to picking up children at schools.
    (NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents" - Focus Groups and Telephone Survey (NUREG/CR-6953, Vol. 2)

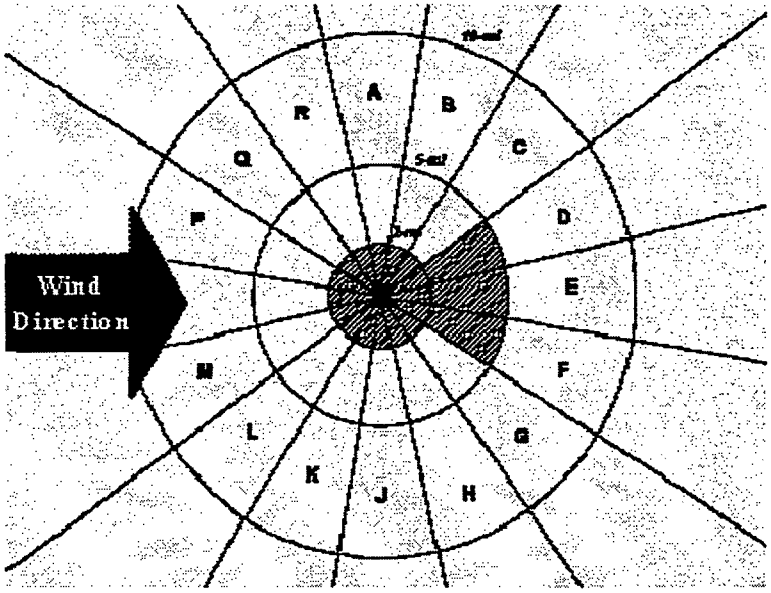
Question: What should people do if they are at home and told to evacuate?
Key Messages (in bold)

- **People told to evacuate should act quickly**
- **People should follow the evacuation instructions provided by local officials.**
- **Local officials will give specific evacuation instructions through the radio and television.**
  - Local officials may announce all people within two miles of the nuclear power plant should evacuate.
  - Local officials may announce all people living downwind from the projected path of the radioactive cloud should evacuate.

- If you are told to evacuate and have time, turn off the air conditioner, heater, or ventilation systems in your house.
- If you are told to evacuate and have time, close and lock all windows.

Question: What areas are being evacuated?
Key Messages (in bold)

- **The areas being evacuated are shown on this map.**
- **The area being evacuated provides protection from potential wind shifts.**
- **The area being evacuated is known as a "keyhole" because of its appearance.**



Question: What should people do if they are in a car and told to evacuate?
Key Messages (in bold)

- **People in their cars should keep the windows closed.**
- **People in their cars should turn off the ventilation system.**
- **People in cars should listen to the radio for instructions about what to do.**
  - Local authorities will tell people in cars if they should go to an emergency shelter or reception center.
  - Local authorities will tell people where the shelter or reception center is located.
  - Local authorities will tell people in which direction they should travel to avoid the radioactive cloud.

Question: What should people bring to the emergency shelter or reception center?
Key Messages (in bold)

- **Emergency shelters and reception centers should have most of the supplies people need.**
  - If you are concerned about supplies, take a flashlight, portable radio, batteries, first-aid kit, and supply of sealed food and water.
- **People should bring to the shelter essential medicines, a change of clothes, and cash and credit cards.**

- **People should take pets to the emergency shelter or reception center only if they know the shelter or center will accept the pet or if they can keep the pet outside at all times.**
    - Emergency shelters and reception centers usually will not accept animals except service animals such as dogs used by the visually impaired.

Question: What should people do with their pets?
Key Messages (in bold)

- **Pets may be brought to shelters and care centers provided they remain outside at all times**
- **Shelters will accept service animals such as dogs used by visually impaired people.**
- **People should contact friends, relatives, or a pet boarding facility outside the evacuation zone to see if they will accept pets.**

Question: How do authorities decide if evacuation is recommended?
Key Messages (in bold)

- **Authorities use several criteria to decide if evacuation is recommended.**
    - Technical criteria include plant conditions, field monitoring data, and data projections.
    - Community criteria include availability of transportation and the availability of appropriate shelters.
    - Environmental criteria include data relating to on-site and off-site environmental conditions, such as weather. (NUREG-0654, I.8, 10 and Supplement 3)
- **The decision to evacuate is made in coordination with technical experts.**
- **The decision to evacuate is made in coordination with local authorities.**

3.2.3 Sample Message Maps Relating to Sheltering in Place in a Radiological Emergency

Scenario: A radiological emergency at a nuclear power plant resulting in an airborne release of radioactive materials.

Stakeholder: Residents in the 10 Mile Emergency Planning Zone and the Media

Question: What is meant by "sheltering in place" during a radiological emergency?
Key Messages (in bold)

- **Sheltering in place is a protective action which includes going indoors at your current location.**
  - Indoor locations include home, business, work place, school, or a shopping mall.
  - Depending on the type of building, sheltering in place can result in a reduction of radiation of up to 80% compared to those who are outdoors and unsheltered.
  - People who shelter in place should listen to the radio or television for updates, close all windows and doors, close exterior vents, and turn off heating and air conditioning equipment using outside air.
- **People may be asked to shelter in place rather than evacuate.**
- **Staying indoors for a short time can protect people from exposure to radiation.**
  - Many radioactive materials rapidly scatter and vanish.
  - The walls of your home can help block harmful radiation.

Question: How do authorities decide if shelter in place is recommended?
Key Messages (in bold)

- **Authorities use several criteria to decide if shelter in place is recommended.**
  - Technical criteria include plant conditions, field monitoring data, projections, and whether the release is fast-breaking or short-term.
  - Community criteria include availability of transportation and appropriate in-place shelters.
  - Environmental criteria include knowledge of on-site and off-site environmental conditions such as weather and traffic conditions. (NUREG-0654, I.8, 10 and Supplement 3)
- **The decision to recommend shelter in place is made in coordination with technical experts.**
- **The decision to recommend shelter in place is made in coordination with local authorities.**

Question: If people are at home during a radiological incident, where in the home should they shelter?
Key Messages (in bold)

- **The safest place in your home to shelter is an inner room or basement.**
- **The shelter should have as few windows as possible.**
- **The further the shelter is from windows, the safer it is.**

Question: What should people take into the shelter?
Key Messages (in bold)

- **People should take into the shelter the same supplies they would in case of severe weather conditions or other emergencies.**
    - A flashlight with extra batteries
    - A portable radio with extra batteries
    - Bottled water
    - Canned food, packaged food, and a hand-operated can opener
    - A first-aid kit and essential prescription medications
    - Personal items such as paper towels, garbage bags, and toilet paper
- **People should take into the shelter essential prescription medications**
- **If people have pets, they should take the pet inside with a place prepared for them to relieve themselves.**

Question: What should people do before entering the shelter?
Key Messages (in bold):

If you were outside when the alert was given, you should do the following:

- **Remove the outer layer of your clothing and your shoes.**
    - If radioactive material is on your clothes, getting them away from you will reduce the risk of contamination.
    - If radioactive material is on your clothes, getting then away from you will reduce the length of time you are exposed to radiation.
- **If possible, place clothing in a plastic bag or leave it outside or in an out-of-the-way area.**
    - Keep people away from the clothing to reduce their exposure to radiation.
    - Keep cuts and abrasions covered when handling clothing to avoid getting radioactive material in them.
    - Removing clothing can eliminate an important source of radioactive contamination.
- **Wash all exposed parts of your body.**
    - Use lots of soap and lukewarm water to remove contamination.
    - Try to avoid spreading contamination to parts of the body that may not be contaminated, such as areas that were clothed.
    - Make sure no radioactive material enters the mouth or is transferred to areas of the face where it could be moved to the mouth and swallowed.

Question: Should people use duct tape and plastic sheeting to seal their shelter?
Key Messages (in bold)

- **Use duct tape and plastic sheeting to seal doors, windows, or vents for only a short period of time.**
- **Listen to your radio or television for instructions.**

- **Within a few hours, remove the plastic and duct tape and ventilate the room.**
- **Suffocation could occur if you keep the shelter tightly sealed for more than a few hours.**

Question: How can people sheltering in place stay informed?
Key Messages (in bold):

- **Keep your radio or television tuned to an emergency response network at all times for updates on the situation.**
- **Announcers will provide information about when you may leave your shelter**
- **Announcers will tell you whether you need to take other protective actions.**

3.2.4 Sample Message Maps Relating to Radiation

Scenario: A radiological emergency at a nuclear power plant resulting in an airborne release of radioactive materials.

Stakeholder: Residents in the 10 Mile Emergency Planning Zone and the Media

Question: What is radiation?
Key Messages (in bold):

- **Radiation is a form of energy present all around us; it travels in the form of waves or particles**
    - Radiation comes in the form of light and heat.
    - Radiation comes in the form of cosmic radiation from the sun and stars.
    - Radiation comes in the form of radioactive materials (including uranium, thorium, and radium) that exist naturally in soil and rock.
    - Radiation comes in the form of the very small amounts of naturally occurring radioactive material in our bodies.
    - Radiation comes in the form of radiation from man-made sources including electronic equipment (such as microwave ovens and television sets), medical sources (such as x-rays, certain diagnostic tests, and treatments), and nuclear power.
- **Different types of radiation exist, some of which have more energy.**
    - Radiation that has enough energy to move atoms around in a molecule or cause them to vibrate, but not enough to remove electrons, is referred to as "non-ionizing radiation."
        - Examples of this kind of radiation are sound waves, visible light, and microwaves.
    - Radiation that has enough energy to remove tightly bound electrons from atoms, creating ions, is referred to as "ionizing radiation.
        - Ionizing radiation is used to generate electric power, to kill cancer cells, and in many manufacturing processes.
        - There are three main kinds of ionizing radiation: alpha particles, beta particles, and gammy rays and x-rays.
            - Alpha and beta particles do not travel far and are easily blocked.
            - Gamma rays and x-rays can travel a significant distance and can be difficult to block (particularly for large radioactive sources).
- **Scientists use different terms to measure radiation depending on the characteristics of radiation being measured.**
    - The amount of radiation coming from a radioactive source is measured in units called **curies**.
    - The radiation dose absorbed by a person (that is, the amount of energy deposited in human tissue by radiation) is measured in units called **rads**.
    - The risk that a person will suffer health effects from exposure to radiation is measured in units called **rems**.

- A **rem** is a large unit, much like a mile is a large unit of length, so scientists use a millirem (**mrem**) instead (It takes 1000 mrem to equal one rem.)

Question: What are common ways that people are exposed to radiation and the associated doses of radiation?
Key Messages (in bold)

- **One roundtrip airplane flight from New York to Los Angeles exposes people to about three millirem from cosmic radiation.**
- **One dental x-ray exposes people to about four millirem of radiation.**
- **One chest x-ray exposes people to about ten millirem of radiation.**
- **One mammogram exposes people to about 70 millirem of radiation.**
- **One year of exposure to natural radiation (from soil, cosmic rays, etc.) exposes people to about 300 millirem of radiation.**

Addendum: Other common sources of radiation include:

- smoke detectors (less than 1 mrem per year);
- living in a brick house instead of a wood one (about 10 mrem per year due to radioactive materials in the masonry);
- cooking with natural gas (about 10 mrem per year from radon gas in the natural gas supply);
- reading a book for 3 hours per day (about 1 mrem per year due to small amounts of radioactive materials in the wood used to make the paper);
- sleeping next to someone (about 2 mrem per year because all of us have very small amounts of naturally occurring radioactive materials in our bodies).

Question: How far does radiation travel?
Key messages (in bold)

- **The distance radiation travels depends on the type of radiation.**
  - Alpha and beta particles do not travel far.
  - Gamma rays, x-rays, and neutrons can travel a significant distance,
- **The distance radiation travels depends on its ability penetrate other materials.**
  - Alpha and beta particles are easily blocked.
  - Gamma rays, x-rays, and neutrons are difficult to block.
  -

Question: How can people tell if something is radioactive?
Key Message (in bold)

- **It is difficult to tell if something is radioactive.**
- **Radiation cannot be seen, smelled, felt, or tasted.**
- **Radiation can only be detected with a radiation detector.**
  - It is important to know the type of detector and the type of radiation it can detect.
  - Scanning an object with a typical gamma/x-ray radiation detector will not detect alpha particles.

Question: Is it true releases of radiation from the nuclear power plant have occurred in the past?

Key messages (in bold)

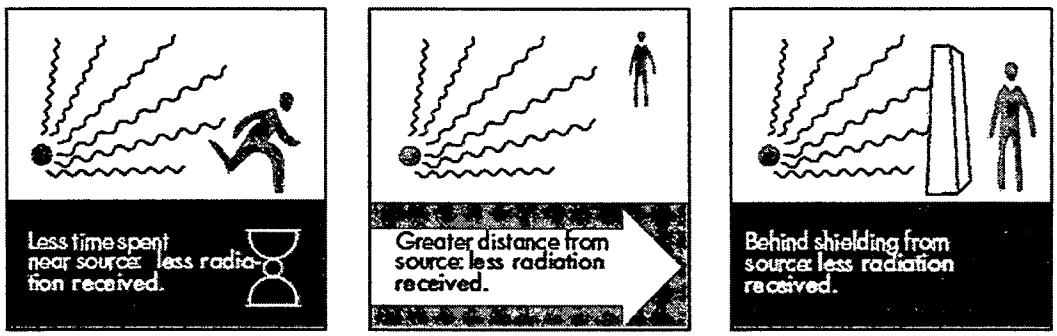
- **Nuclear power plants sometimes release radioactive gases and liquids into the environment as part of their normal operations**
- **Non-emergency releases occur under controlled, monitored conditions to ensure they don't present a risk to health, safety, or the environment.**
- **Non-emergency releases are very small and difficult to detect.**

Question: Can the nuclear power plant explode like a nuclear bomb and produce radioactive fallout?
Key messages (in bold)

- **A nuclear power plant does not contain the type and quantity of radioactive material to cause a nuclear explosion.**
- **A nuclear power plant does not contain the kind of material needed to cause a nuclear explosion.**

Question: What can people do to prevent exposure to radiation?
Key Messages (in bold)

- **People should limit the time they are exposed to radiation.**
- **People should increase the distance between themselves and the radioactive source.**
- **People should shield themselves by placing objects between themselves and the radioactive source.**



Question: What would you like people to know about the radiological incident?
Key Messages (in bold)

- **Our highest priority is to protect people and the environment.**
  - We understand this situation may cause worry, but ask people to please stay calm and listen to instructions from local officials.
  - We are working with technical experts to bring this incident to a close as quickly as possible.
- **We are working closely with local authorities on actions to protect people and property.**

    - We have activated our Emergency Operations Center and Joint Information Center.
- **We are committed to keeping the public fully informed.**
    - We will provide timely and accurate information primarily through radio and television.
    - Our Web site, at [insert web site address], will be continuously updated.

Question: What actions should people take to protect themselves from radiation?
Key Messages (in bold)

- **People should listen to radio or television for instructions.**
    - Local officials may advise people to not eat some foods and not to drink some beverages.
- **Local officials may advise people to remain indoors or evacuate.**
- **Local officials may advise people to take potassium iodide (KI).**

Question: What is the role of the Nuclear Regulatory Commission (NRC) in protecting people from radiation during a radiological emergency?
Key Messages (in bold)

- **NRC is the coordinating federal agency for events occurring at NRC-licensed nuclear power plants.**
- **NRC has technical leadership for the federal government's response to this radiological emergency.**
- **NRC's highest priority is to provide expert consultation, support, and assistance to on-site and off-site emergency response organizations.**
    - If conditions warrant, the NRC will dispatch a Site Team, consisting of technical experts and a Site Team Director, from the Regional Office to the site.

3.2.5 Draft Radiation Message Maps Produced by the US Environmental Protection Agency (EPA)

The following radiation message maps were developed by the US EPA and published in a 2007 document titled "Communicating Radiation Risks: Crisis Communication for Emergency Responders" (United States Environmental Protection Agency, Office of Radiation and Indoor Air, EPA-402-F-07-008, Washington, DC). EPA workgroups developed responses to questions frequently asked during radiological emergencies. The workgroups selected health and safety issues likely to be of greatest concern to the public. The EPA workgroups noted the choice of appropriate messages depends on the type and magnitude of the event and the evolving nature of the response.

1. How do I detect radiation?
    - You cannot sense radiation.
    - Radiation can only be detected using specialized instruments.
        - With the correct instruments, radiation is easily detected.
    - Emergency responders are skilled in using these instruments.

2. How can radiation exposure occur?
    - Radiation from natural and man-made sources is always around us.
    - We cannot eliminate radiation in our environment.
    - We can reduce our health risks by controlling our exposure to it.

3. What are common sources of radiation?
    - Low levels of radiation come from a number of sources.
        - These include natural background.
        - They also include sources such as medical x-rays.

4. What should we do about low levels of radiation?
    - There may be some risk from low levels of radiation.
    - It is reasonable to assume that less radiation exposure is better.
    - To be safe, take all reasonable precautions to reduce exposure.
        - It may be difficult to reduce exposure to low-level radiation in our everyday lives.

5. What are the reasonable steps to take in an emergency?
    - Follow safety instructions from public officials.
    - Minimize the time you spend in areas with elevated radiation levels.
    - Avoid areas where radiation levels are elevated.

6. What happens when I am exposed to radiation?
    - You may not experience any health effects.
    - A very large dose of radiation may cause skin burns, nausea and vomiting.
    - If you have these symptoms, seek medical attention immediately.

7. What is radiation exposure?
    - Exposure occurs when radiation energy interacts with the body.

- Exposure can be caused from external or internal sources.
  - Internal exposure happens when radioactive materials are eaten, inhaled, injected or absorbed.

8. What is radioactive contamination?
   - Contamination occurs when radioactive material settles on a surface.
     - That surface could be your body or clothing, a structure, or an object.
   - Contamination also can be internal when radioactive materials are eaten, inhaled, injected or absorbed.

9. Are there different types of radioactivity?
   - There are three major types of radiation:
     - Alpha and beta radiation can be stopped by a layer of clothing, but can be harmful if eaten, inhaled, injected or absorbed.
     - Gamma rays are much more difficult to stop.
   - Several feet of concrete or several inches of lead may stop gamma rays.
   - They can be harmful to the body.
   - Health effects from exposure vary depending on the amount of exposure.
     - This relates to the length of time exposed, and the distance from and shielding against the radiation source.

10. What is the difference between contamination and exposure?
    - You can be exposed to radiation without contamination, such as during an x-ray.
    - You cannot be contaminated without being exposed.

11. How can I tell if I have been exposed?
    - If you are near an incident, you may have been exposed to or contaminated by radiation.
    - Skin burns, nausea and vomiting can result from large doses of radiation.
      - Seek medical attention immediately if you have these symptoms.
    - If you think you have been contaminated, shower and change into clean clothes.
      - Place contaminated clothing in a plastic bag and seal it.
      - Place the bag as far away as possible from humans and animals.
      - Bagged clothing can be examined later to determine if you were contaminated.

12. Am I going to get cancer?
    - There are many causes of cancer, both environmental and genetic.
    - Radiation is a minor contributor to our overall cancer risk.
    - The risk of radiation causing cancer increases with the level of radiation exposure.
    - Sheltering-in-place or evacuation can help minimize cancer risk.

13. What type of emergency is this?
    - Our monitors detect radiation, and we are working to identify the source.
    - Public safety officials are on the scene.
    - Public officials will provide updates with current information.

14. Was this a terrorist event?

- Law enforcement officials are working to determine if this was a terrorist act.
- Public safety and law enforcement officials will provide updates with current information.

15. What is a dirty bomb?
    - A dirty bomb is a type of radiation dispersal device (RDD) that spreads radioactive materials with explosives.
    - The effects from a dirty bomb depend on a number of factors:
        - The amount of explosive.
        - The atmospheric conditions like wind direction and speed at the time of the explosion and afterwards.
        - The relative type and amount of radioactive material used.
    - These devices are designed to cause fear and disruption in our lives.

16. What should I do if I am asked to shelter-in-place?
    - Shelter-in-place means get indoors as soon as possible.
        - Buildings provide shielding from radiation.
        - Close all exterior vents and windows.
        - If needed, use air-conditioning (and heat), preferably in recirculation mode.
    - If you think you have been contaminated, shower and change into clean clothes.
        - Place clothing in a plastic bag and seal it.
        - Place the bag as far away as possible from humans and animals.
        - Bagged clothing can be examined later to determine if you were contaminated.
    - Listen to radio and TV for additional guidance.

17. How can I lessen my exposure?
    - Follow the recommendations of your local officials.
    - You may be asked to take shelter or evacuate the area.
    - These recommendations are based on well-established public safety procedures.

18. What should I do if I think I may have been contaminated?

    First, stay informed.
    - Listen to your local Emergency Alert System and public safety officials on radio or TV.
    - Act promptly on the guidance from local public health officials.
    - Visit [Web site address] for continued updates.

    Second, remove your clothes.
    - Place the clothing in a plastic bag and seal it.
    - Place the bag as far away as possible from humans and animals.
    - Bagged clothing can be examined later to determine if you were contaminated.

    Third, wash yourself and your valuables.
    - Take a long shower using lots of soap and water.
        - If you can't shower, clean yourself thoroughly using lots of soap and water.
    - Be careful not to scratch or irritate your skin while washing.
    - Shampoo your hair.

- Gently blow your nose and wash out your eyes, ears and mouth.
- Put on clean clothing.
- Wash valuables and identification that may have been contaminated; wash your hands again.

19. What should I do if I think I am contaminated and am asked to evacuate?
    - Follow the instructions of your local emergency responders.
    - Evacuate first, then follow steps for decontamination or go to a monitoring center.

20. My dog or cat is outside and may have been exposed or contaminated. What should I do?
    - Follow instructions of your local authorities.
    - Wash yourself first if you have been exposed or contaminated.
    - If possible, wash your pet outside.
        – This prevents tracking contamination inside your shelter.
    - Wash yourself and change your clothing again after cleaning your pet.

21. I need to get my pet inside as soon as possible. What should I do if it has been contaminated?
    - Get your pet inside and confine it to a small area.
        – A cage or small room is preferable.
        – Confining the pet limits contamination inside your shelter.
    - Wash yourself first if you have been exposed or contaminated.
    - Wash your pet thoroughly using soap or pet shampoo and water.
    - Wash yourself again after cleaning your pet and change your clothing.
    - Continue to provide your pet with food and water.

22. What about livestock?
    - Follow instructions from local authorities.
    - Shelter your livestock if possible.
    - Wash your livestock thoroughly.
    - Use stored feed and covered water if possible.

23. Should I take potassium iodide during a radiological emergency?
    - Potassium iodide (KI) or iodate is used to decrease the chances of thyroid cancer from radioactive iodine.
    - Follow instructions from your local public health officials on how to and whether you should take KI.

24. What are you doing to protect public health and the environment?
    - Our primary concern is the health and safety of the public.
    - We are working closely with local, state and federal partners to determine the degree and extent of contamination and what we need to do next.
        - We are monitoring the air, water, soil and agricultural products.
    - Through this partnership, we will continue to provide updates with the most current information.

25. Are my food and water safe?
    - Avoid eating food from your garden if you suspect that radioactive material has settled on it.
        - Local officials can tell you if your neighborhood is in the area of concern.
    - You may continue to drink tap water until told otherwise.
    - Sealed or frozen foods and liquids may be used.
        - Rinse the outside of packages before opening them.
        - Rinse all plates, pots and eating utensils before use.

26. When can I return to my home?
    - Our primary concern is your health and safety.
    - Listen to your television and radio for updated information.
    - Public officials will inform you when you may return home.

27. Will my home be safe?
    - Our primary concern is your health and safety.
    - You will be informed about whether your neighborhood is in the area of concern.
    - Listen to public health officials for instruction on when to return and how, if necessary, to clean your home properly.

Appendix A

Nuclear Regulatory Commission Documents Relevant to Message Development

Nuclear Regulatory Commission Documents Relevant to Message Development

Nuclear Regulatory Commission (U.S.) (NRC). NUREG/CR-6981, SAND2008-1776P. "Assessment of Emergency Response Planning and Implementation for Large Scale Evacuations." Washington D.C.: NRC. October 2008a.

Nuclear Regulatory Commission (U.S.) (NRC). NUREG/CR-6953, Vol. II. SAND2008-4195P. "Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents. Focus Groups and Telephone Survey" Washington D.C.: NRC. October 2008b.

Nuclear Regulatory Commission (U.S.) (NRC). NUREG/CR-6953, Vol. 1. SAND2007-5448P. "Review of NUREG-0654, Supplement 3, "Criteria for Protective Action Recommendations for Severe Accidents." Washington D.C.: NRC. December 2007.

Nuclear Regulatory Commission (U.S.) (NRC). NUREG/CR - 6864, SAND2004-5901. "Identification and Analysis of Factors Affecting Emergency Evacuations." Washington D.C.: NRC. January 2005a.

Nuclear Regulatory Commission (U.S.) (NRC). NUREG/CR-6863, SAND2004-5900. "Development of Evacuation Time Estimate Studies for Nuclear Power Plants." Washington D.C.: NRC. January 2005b.

Nuclear Regulatory Commission (U.S.) (NRC). Supplement 3 to NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Protective Action Recommendations for Severe Accidents." Washington D.C.: NRC. 1996.

Nuclear Regulatory Commission (U.S.) (NRC). NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." Washington D.C.: NRC. 1980.

Appendix B

Communications and Information Management, National Incident Management System

Communications and Information Management, National Incident Management System

Source: Federal Emergency Management Agency (2008) "National Incident Management System, Component II: Communications and Information Management," pages 23-30, www.fema.gov/pdf/emergency/nims/NIMS_core.pdf

Effective emergency management and incident response activities rely on flexible communications and information systems that provide a common operating picture to emergency management/response personnel and their affiliated organizations.[24]

Incident communications are facilitated through the development and use of common communications plans and interoperable communications equipment, processes, standards, and architectures. During an incident, this integrated approach links the operational and support units of the various organizations to maintain communications connectivity and situational awareness. Communications and information management planning should address the incident-related policies, equipment, systems, standards, and training necessary to achieve integrated communications.

Establishing and maintaining a common operating picture and ensuring accessibility and interoperability are the principal goals of the Communications and Information Management component of NIMS. Properly planned, established, and applied communications enable the dissemination of information among command and support elements and, as appropriate, cooperating agencies and organizations.

A. CONCEPTS AND PRINCIPLES

The underlying concepts and principles of this component reinforce the use of a flexible communications and information system in which emergency management/response personnel can maintain a constant flow of information during an incident. These concepts and principles emphasize the need for and maintenance of a common operating picture; interoperability; reliability, scalability, and portability; and resiliency and redundancy of any system and its components.

1. COMMON OPERATING PICTURE
(An overview of an incident created by collating and gathering information—such as traffic, weather, actual damage, resource availability—of any type (voice, data, etc.) from agencies/organizations in order to support decision making)

[24] Emergency management/response personnel include Federal, State, territorial, tribal, sub-state regional, and local governments, nongovernmental organizations, private-sector organizations, critical infrastructure owners and operators, and all other organizations and individuals who assume an emergency management role.

A common operating picture is established and maintained by gathering, collating, synthesizing, and disseminating incident information to all appropriate personnel—such as those at the Incident Command Post, Emergency Operations Center (EOC), or within a Multiagency Coordination Group—to have the same information about the incident, including the availability and location of resources and the status of assistance requests. Additionally, a common operating picture offers an incident overview that enables the Incident Commander (IC), Unified Command (UC), and supporting agencies and organizations to make effective, consistent, and timely decisions. In order to maintain situational awareness, communications and incident information must be updated continually. Having a common operating picture during an incident helps to ensure consistency for all emergency management/response personnel engaged in an incident.

2. INTEROPERABILITY

Communications interoperability allows emergency management/response personnel and their affiliated organizations to communicate within and across agencies and jurisdictions via voice, data, or video in real time, when needed, and when authorized. It is essential that these communications systems be capable of interoperability, as successful emergency management and incident response operations require the continuous flow of critical information among jurisdictions, disciplines, organizations, and agencies.

Interoperability planning requires accounting for emergency management and incident response contingencies and challenges. Interoperability plans should include considerations of governance, standard operating procedures (SOPs), technology, training and exercises, and usage within the context of the stress and chaos of a major response effort.

Coordinated decision making between agencies and jurisdictions is necessary to establish proper and coherent governance and is critical to achieving interoperability. Agreements and SOPs should clearly articulate the processes, procedures, and protocols necessary to achieve interoperability.

3. RELIABILITY, SCALABILITY, AND PORTABILITY

Communications and information systems should be designed to be flexible, reliable, and scalable in order to function in any type of incident, regardless of cause, size, location, or complexity. They should be suitable for operations within a single jurisdiction or agency, a single jurisdiction with multiagency involvement, or multiple jurisdictions with multiagency involvement. Communications systems should be applicable and acceptable to users, readily adaptable to new technology, and reliable in the context of any incident to which emergency management/response personnel would be expected to respond.

Portability of radio technologies, protocols, and frequencies among emergency management/response personnel will allow for the successful and efficient integration, transport, and deployment of communications systems when necessary. Portability includes the

standardized assignment of radio channels across jurisdictions, which allows responders to participate in an incident outside their jurisdiction and still use familiar equipment.

Scalability differs from portability in that scalability allows responders to increase the number of users on a system, while portability facilitates the interaction of systems that are normally distinct.

4. RESILIENCY AND REDUNDANCY

Resiliency is the ability of communications systems to withstand and continue to perform after damage or loss of infrastructure. It requires communications systems to avoid relying solely on a sophisticated but vulnerable network of support systems. Prudent resiliency practices could include hardened dispatch centers and transmission systems or infrastructure that can withstand known risks. Repeater antenna sites, for example, are equipped with independent power systems to ensure their continued functionality during a power failure.

Redundancy is another essential element of a jurisdiction's/organization's communications structure. Although the duplication of identical services is one method of achieving redundancy, it also derives from the ability to communicate through diverse, alternative methods when standard capabilities suffer damage. For example, a public safety agency might have a high-tech voice 400-megahertz system that is used as the primary dispatch system, but maintain a redundant VHF system in its vehicles that would be able to contact the dispatch center in the event that the primary system is rendered inoperable. Resiliency and redundancy are critical to ensuring communications flow during an incident.

B. MANAGEMENT CHARACTERISTICS

Emergency management/response personnel should be able to manage incident communications and information effectively. Regardless of the communications method or the information being transmitted, procedures and protocols should be followed. As technologies change and the methods of exchanging information improve, management procedures likewise should evolve.

1. STANDARDIZED COMMUNICATION TYPES

Successful communications and information management require that emergency management/response personnel and their affiliated organizations use standardized communications types. The determination of the individual or agency/organization responsible for these communications is discussed in the Command and Management component and in Appendix B, Incident Command System.

The following is a list of standardized communication types:

• **Strategic Communications**: High-level directions, including resource priority decisions, roles and responsibilities determinations, and overall incident response courses of action.

• **Tactical Communications**: Communications between command and support elements and, as appropriate, cooperating agencies and organizations.

• **Support Communications**: Coordination in support of strategic and tactical communications (for example, communications among hospitals concerning resource ordering, dispatching, and tracking from logistics centers; traffic and public works communications).

• **Public Address Communications**: Emergency alerts and warnings, press conferences, etc.

2. POLICY AND PLANNING

Coordinated communications policy and planning provides the basis for effective communications and information management. Although communications and information management is important during routine operations, well-established procedures and protocols become critical during incident response activities.

Careful planning should determine what communications systems and platforms will be used, who can use them, what information is essential in different environments, the technical parameters of all equipment and systems, and other relevant considerations.

Information flow among all stakeholders is crucial, but interoperability presents additional challenges when nongovernmental organizations (NGOs), the private sector, and critical infrastructure owners and operators are considered. All relevant stakeholders should be involved in meetings and planning sessions in order to formulate more thorough and integrated communications plans and strategies. Technology and equipment standards also should be shared when appropriate, to provide stakeholders with the opportunity to be interoperable and compatible.

Sound communications management policies and plans should include information about the following aspects of communications and information management:

• Information needs should be defined by the jurisdiction/organization. These needs are often met at the Federal, State, tribal, and local levels, in concert with NGOs and the private sector, and primarily through preparedness organizations.

• The jurisdiction's or organization's information management system should provide guidance, standards, and tools to enable the integration of information needs into a common operating picture when needed.

• Procedures and protocols for the release of warnings, incident notifications, public communications, and other critical information are disseminated through a defined combination of networks used by EOCs. Notifications are made to the appropriate jurisdictional levels and to NGOs and the private sector through defined mechanisms specified in emergency operations plans and Incident Action Plans.

• Agencies at all levels should plan in advance for the effective and efficient use of information management technologies (e.g., computers, networks, and information-sharing mechanisms) to integrate all command, coordination, and support functions involved in incident management and to enable the sharing of critical information and the cataloging of required corrective actions.

3. AGREEMENTS

All parties identified in the planning process used in a jurisdiction's emergency operations plan need to have agreements in place to ensure that the elements within plans and procedures will be in effect at the time of an incident. The agreements should specify all of the communications systems and platforms through which the parties agree to use or share information.

4. EQUIPMENT STANDARDS AND TRAINING

Communications equipment used by emergency management/response personnel often consists of components and systems that may be connected through common interfaces, many of which rely on the private sector to provide their operational backbone.

Public/private communication systems and associated equipment should be regularly enhanced and updated, as their maintenance is essential to effective emergency management and incident response activities. The wide range of conditions under which communications systems will be used should be considered when developing standards associated with the systems and equipment. Training and exercises that employ interoperable systems and equipment are necessary for personnel to understand their capabilities and limitations before an incident. In addition, the need for "hardened" laptops and/or personal digital assistants should be considered in the communications plan.

C. ORGANIZATION AND OPERATIONS

1. INCIDENT INFORMATION

During the course of an incident, information is vital to assist the IC, UC, and supporting agencies and organizations in making decisions. Much of the information is used for diverse functions within the Incident Command System. For example, the same piece of information may:

• Aid in the planning process to develop an Incident Action Plan (IAP).
• Be a key point in the release of public information.
• Assist the Finance/Administration Section in determining incident cost.
• Determine the need for additional involvement of NGO or private-sector resources.
• Identify a safety issue.
• Follow up on an information request.

The following are examples of information generated by an incident that can be used for decision making purposes.

a. Incident Notification, Situation, and Status Reports

Incident reporting and documentation procedures should be standardized to ensure that situational awareness is maintained and that emergency management/response personnel have easy access to critical information. Situation reports offer a snapshot of the past operational period and contain confirmed or verified information regarding the explicit details (who, what, when, where, and how) relating to the incident. Status reports, which may be contained in situation reports, relay information specifically related to the status of resources (e.g., availability or assignment of resources).

The information contained in incident notification, situation, and status reports must be standardized in order to facilitate its processing; however, the standardization must not prevent the collection or dissemination of information unique to a reporting organization.

Transmission of data in a common format enables the passing of pertinent information to appropriate jurisdictions and organizations and to a national system that can handle data queries and information/intelligence assessments and analysis.

b. Analytical Data

Data, such as information on public health and environmental monitoring, should be collected in a manner that observes standard data collection techniques and definitions. The data should then be transmitted using standardized analysis processes. During incidents that require public health and environmental sampling, multiple organizations at different levels of government often collect data, so standardization of data collection and analysis is critical. Additionally, standardization of sampling and data collection enables more reliable analysis and improves the quality of assessments provided to decision makers.

c. Geospatial Information

Geospatial information is defined as information pertaining to the geographic location and characteristics of natural or constructed features and boundaries. It is often used to integrate assessments, situation reports, and incident notification into a common operating picture and as a data fusion and analysis tool to synthesize many kinds and sources of data and imagery. The use of geospatial data (and the recognition of its intelligence capabilities) is increasingly important during incidents. Geospatial information capabilities (such as nationally consistent grid systems or global positioning systems based on lines of longitude and latitude) should be managed through preparedness efforts and integrated within the command, coordination, and support elements of an incident, including resource management and public information.

The use of geospatial data should be tied to consistent standards, as it has the potential to be misinterpreted, transposed incorrectly, or otherwise misapplied, causing inconspicuous yet serious errors. Standards covering geospatial information should also enable systems to be used in remote field locations or devastated areas where telecommunications may not be capable of handling large images or may be limited in terms of computing hardware.

2. COMMUNICATIONS STANDARDS AND FORMATS

Communications and data standards, related testing, and associated compliance mechanisms are necessary to enable diverse organizations to work together effectively. These include a standard set of organizational elements and functions, common "typing" of resources to reflect specific capabilities, and common identifiers for facilities and operational locations used to support incident operations.

a. Radio Usage Procedures

Common terminology, standards, and procedures should be established and detailed in plans and agreements, where possible. Jurisdictions may be required to comply with national interoperable communications standards, once developed. Standards appropriate for NIMS users will be designated by the National Integration Center (NIC) in partnership with recognized standards development organizations.

During incident response activities, radio traffic should be restricted to those messages necessary for the effective execution of emergency management/response personnel tasks.

Procedures and protocols for incident-specific communications and other critical incident information should be set forth in agreements or plans prior to an incident, where possible. These procedures and protocols form the foundation for the development of the communications plan during an incident. The receiving center should be required to acknowledge receipt of the emergency information. Additionally, each agency/organization should be responsible for disseminating this information to its respective personnel.

All emergency management/response personnel participating in emergency management and incident response activities should follow recognized procedures and protocols for establishing interoperability, coordination, and command and control.

b. Common Terminology, Plain Language (Clear Text), Compatibility

The ability of emergency management/response personnel from different disciplines, jurisdictions, organizations, and agencies to work together depends greatly on their ability to communicate with each other. Common terminology enables emergency management/response personnel to communicate clearly with one another and effectively coordinate activities, no matter the size, scope, location, or complexity of the incident.

The use of plain language (clear text) in emergency management and incident response is a matter of public safety, especially the safety of emergency management/response personnel and those affected by the incident. It is critical that all those involved with an incident know and use commonly established operational structures, terminology, policies, and procedures. This will facilitate interoperability across agencies/organizations, jurisdictions, and disciplines.

All communications between organizational elements during an incident, whether oral or written, should be in plain language; this ensures that information dissemination is timely, clear,

acknowledged, and understood by all intended recipients. Codes should not be used, and all communications should be confined to essential messages. The use of acronyms should be avoided during incidents requiring the participation of multiple agencies or organizations. Policies and procedures that foster compatibility should be defined to allow information sharing among all emergency management/response personnel and their affiliated organizations to the greatest extent possible.

c. Encryption or Tactical Language

When necessary, emergency management/response personnel and their affiliated organizations need to have a methodology and the systems in place to encrypt information so that security can be maintained. Although plain language may be appropriate during response to most incidents, tactical language is occasionally warranted due to the nature of the incident (e.g., during an ongoing terrorist event). The use of specialized encryption and tactical language should be incorporated into any comprehensive IAP or incident management communications plan.

d. Joint Information System and Joint Information Center

The Joint Information System (JIS) and the Joint Information Center (JIC) are designed to foster the use of common information formats. The JIC provides a structure for developing and delivering incident-related coordinated messages. It develops, recommends, and executes public information plans and strategies; advises the IC, UC, and supporting agencies or organizations concerning public affairs issues that could affect a response effort; and controls rumors and inaccurate information that could undermine public confidence in the emergency response effort. It is the central point of contact for all news media at the scene of an incident. Public information officials from all participating agencies/organizations should co-locate at the JIC.

The JIS integrates incident information and public affairs into a cohesive organization designed to provide consistent, coordinated, accurate, accessible, and timely information during crisis or incident operations.

e. Internet/Web Procedures

The Internet and other Web-based tools can be used, as appropriate, during incidents to help with situational awareness and crisis information management.

The Internet and other Web-based tools can be resources for emergency management/response personnel and their affiliated organizations. For example, these tools can be used prior to and during incidents as a mechanism to offer situational awareness to organizations/agencies involved in the incident or to the public, when appropriate.

Procedures for use of these tools during an incident should be established to leverage them as valuable communications system resources. Information posted or shared during an incident through these applications should follow planned and standardized methods and generally conform with the overall standards, procedures, and protocols.

f. Information Security

Procedures and protocols must be established to ensure information security. Inadequate information security can result in the untimely, inappropriate, and piecemeal release of information, which increases the likelihood of misunderstanding and can compound already complicated public safety issues. The release of inappropriate classified or sensitive public health or law enforcement information can jeopardize national security, ongoing investigations, or public health. Misinformation can place persons in danger, cause public panic, and disrupt the critical flow of proper information. Correcting misinformation wastes the valuable time and effort of incident response personnel.

Individuals and organizations that have access to incident information and, in particular, contribute information to the system (e.g., situation reports) must be properly authenticated and certified for security purposes. This requires a national authentication and security certification standard that is flexible and robust enough to ensure that information can be properly authenticated and protected. Although the NIC is responsible for facilitating the development of these standards, all levels of government, NGOs, and the private sector should collaborate on the authentication process.

Appendix C

Risk Communication References (Selected)

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APPENDIX E

Strategies and Tools for Developing Effective Risk Communication Messages

Risk communicators use a variety of specific tools to develop effective messages. These include:

- Collecting and evaluating empirical information (e.g., through surveys, focus groups, or interviews) about stakeholder judgments of each risk perception factor. (Note: To develop effective risk communication messages, it is necessary to develop a shared understanding of perceptions and expectations.)
- Exchanging information with stakeholders on a regular basis about identified areas of concern.
- Recognizing that people who receive emergency information typically go through a sequential process that shapes their perceptions and subsequent actions and/or behavior. The sequence is: (1) hearing and perceiving the risk information; (2) understanding the risk information; (3) believing the risk information; (4) personalizing the risk information; (5) deciding about alternative protective actions in response to the perceived risk; and (6) performing the protective actions.
- Developing only a limited number of key messages (ideally no more than three or five messages or one key message with no more than three to five parts) that address underlying concerns or specific questions.
- Developing key messages that serve individually or collectively as a media sound bite – the quote in a media story attributed to a spokesperson. Sound bites are an essential element in effective media communication as short, quotable messages often played repeatedly by the media. They often will also be quoted by other sources of information. Speaking in sound bites helps to ensure that prepared key messages are carried in news stories. Reporters and editors almost always cut interview material into sound bites. The average length of a media sound bite is 27 words for print media and 9 seconds for broadcast media.
- Developing messages that are clearly understandable by the target audience (typically at or below their average reading grade level).
- Adhering to the "primacy/recency" or "first/last" principle in developing information materials. This principle states that the most important messages should occupy the first and last position in lists. In high-stress and emotionally charged situations, listeners tend to focus most on (and remember) information that they hear first and last. Messages that are in the middle of a list are often not heard.
- Citing sources of information that would be perceived as credible by the receiving audience. The greater the extent to which messages are supported and corroborated by credible third party sources, the less likely it is other information will interfere with the ability to comprehend messages. Since people often have different views about who is credible and who is not, messages that come from a mix of credible sources tend to be more believable than messages that come from only one source.
- Providing information that indicates genuine empathy, active listening, caring and compassion – crucial factors in establishing trust in high-concern and emotionally charged situations. When people are upset, they typically want to know that you care before they care what you know. The greater the extent to which individuals and organizations are perceived to be empathetic, caring, listening and compassionate, the less likely it is that mental noise will interfere with message comprehension.

- Using graphics, visual aids, analogies and narratives (such as personal stories) to increase an individual's ability to hear, understand and recall a message.
- Constructing messages that recognize the dominant role of negative thinking in high-concern and emotionally charged situations. People tend to focus more on the negative than on the positive in emotionally charged situations, with resulting high levels of anxiety and exaggerated fears. Risk communication strategies related to this principle include:
  - avoiding unnecessary, indefensible or non-productive uses of absolutes, and of the words "no", "not", "never", "nothing" and "none"
  - balancing or countering a negative key message with positive, constructive or solution-oriented key messages
  - providing three or more positive points to counter a single negative point or bad news (It is important to note in this regard that a trust-building message is a positive response in and of itself and can count as one or more of the positives. It is also important to recognize that organizations have very limited control over what messages the media will emphasize beyond the first live communication. The media control which messages will be cited, what visibility they will be given, and how often they will be repeated. As a result, many positive messages may fall by the wayside. This is especially likely to be the case if the positives are hypothetical or predictive and the negatives are matters of fact.)
- Presenting the full message using the repetitive structure found in the "Tell me, Tell me more, Tell me again model" (the "Triple T Model") namely:
  - Tell people the information in summary form (i.e., the key messages;
  - Tell them more (i.e., the supporting information)
  - Tell people again what was told in summary form (i.e., repeat the key messages). (The greater the extent to which messages are repeated and heard through various channels, the less likely it is that mental noise will interfere with the ability to comprehend them.)
- Repeating messages to reinforce risk perceptions and responses. Frequently repeated messages help to reduce the potential for misperceptions by focusing people on key messages and addressing rumors, and increasing public confidence. However, in protracted emergencies, repetition of key messages may become counterproductive.
- Developing key messages and supporting information that address risk perception, outrage and fear factors such as trust, benefits, control, voluntariness, dread, fairness, reversibility, catastrophic potential, effects on children, morality, origin and familiarity. Research indicates that the greater the extent to which these factors are addressed in messaging, the less likely it is that mental noise will interfere with the ability to comprehend messages.
- Providing people with understandable, concise, accurate, reliable information at the outset so their first impressions are correct.
- Layering information according to individual needs. One recommendation for information materials is providing multiple levels of information that can be targeted to various audiences. Most importantly, information materials cannot replace the dialogue between stakeholders.
- Motivating people to understand risk information. When people are sufficiently motivated, they can learn even very complex material.
- Using spokespersons who can relate to the target audience, can project caring and empathy, and have knowledge of the issues.

- Recognizing that during crises, people typically judge the messenger before the message, and they typically base their judgment in terms of trust, forming their impressions within the first 9 to 30 seconds. Trust is judged primarily through actions, body language, and verbal communication. In Western culture, non-verbal cues that communicate when a speaker is attentive and empathetic include maintaining eye contact, keeping hands above the waist and visible, and maintaining body posture that signals that the speaker is listening such as standing straight or leaning slightly toward the audience while sitting. Other non-verbal factors that have an influence include dress, appearance, and voice inflection.
- Presenting and using risk comparisons effectively. The goal of risk comparisons is to make a risk number more meaningful by comparing it to other numbers. For example, small probabilities are often difficult to conceptualize (just how small is "1 in 10 million" or "a probability of 0.00015"?). Although risk comparisons can provide a yardstick and are useful for putting numbers in perspective, they can also create their own problems. For example, it is often tempting to make the following type of argument:

  > "The risk of "a" (illness or death caused by exposure to radiation) is lower than the risk of "b" (injury or death caused by an automobile accident). Since you (the target audience) find "b" acceptable, you are obliged to find "a" acceptable."
  >
  > This argument has a basic flaw in its logic. Trying to use it can severely damage trust and credibility. Some receivers of the comparison will analyze the argument this way:
  >
  > "I do not have to accept the (small) added risk caused by exposure to radiation) because I accept the (perhaps larger, but voluntary and personally beneficial) risk of driving my car. In deciding about the acceptability of risks, I consider many factors, only one of them being the size of the risk; and I prefer to do my own evaluation."

  Many variables affect the success of using risk comparisons, including context and the trustworthiness of the source of the comparison. The most effective comparisons appear to be:

  - comparisons of the same risk at two different times;
  - comparisons with a regulatory standard;
  - comparisons with different estimates of the same risk;
  - comparisons of the risk of doing something versus not doing it;
  - comparisons of alternative solutions to the same problem; and
  - comparisons with the same risk as experienced in other places.

  The most difficult comparisons to communicate effectively are those that disregard the risk perception factors people consider important in evaluating risk

- Probabilities are only one of many kinds of information upon which people base decisions about risk acceptability. Risk numbers cannot pre-empt those decisions. Explanations of risk numbers are unlikely to be successful if the explanation appears to be trying to settle the question of whether a risk is acceptable.

APPENDIX F

Risk Communication Channels

Achieving successful risk communication with stakeholders depends on selecting channels of communication that will most effectively reach them. Risk communication channels include:

Fact sheets
News/media releases
Media advisories
Video news releases
Videos
News/press conferences
Community meetings
Open houses
Teacher packets
Media packets
Radio and TV talk shows
Satellite media tours
Fliers
Direct mailings
E-mail Listserves
Broadcast fax
Personal visits
Brochures
Pamphlets
Billboards
Mailing inserts
Telephone hotlines
Telephone information centers
Telephone calls
Teleconferences
Webcasts
Blogs
Podcasts
RSS feeds
Text messaging
Wikis
Twitter feeds
Feeds to social networking and social media sites such as Facebook and Youtube

APPENDIX G

Sample Radiological Emergency News Release

Date

Contact

Time

News Release #

General Emergency Declared at (*Name of organization or facility*)

(City, State) — Officials at (*name of organization or facility*) declared a General Emergency at the (*name of facility*) nuclear power plant at approximately *(time)* today. In accordance with federal regulations and emergency plant procedures, the U.S. Nuclear Regulatory Commission, state, county and local officials were notified.

A General Emergency is the most serious of the four Nuclear Regulatory Commission emergency classification levels. A General Emergency could involve serious damage to the plant's safety systems or protective barriers. The damage may result in the release of radioactive materials to an area beyond the plant's boundaries.

(*Name of facility*) was operating at *(percent)* power when a malfunction occurred with the automatic shutdown system for the reactor. Instruments in the control room indicate that the reactor is not properly cooled. Initial emergency operating actions were ineffective in re-establishing sufficient cooling to the reactor.

There (*is/has been*) no release of radiation to the environment due to this event. All onsite personnel are accounted for. No injuries are reported.

Plant personnel (*used/are using)* Emergency Operating Procedures to inject a solution of boron into the reactor, which is an alternative shutdown procedure. The boron solution stops the nuclear reaction in the reactor and brings it to a condition where it is no longer producing heat. (*Name of organization or facility)* anticipates the reactor to be in a safe and stable condition by *(approximate time).*

The *(organization or facility)* Web site address is *(Web site address for the organization or facility)*

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This document provides guidance for nuclear power plant licensees and local response organizations on message development for radiological emergencies. Message development skills are critical to successful radiological risk communication to the public, the media, and other stakeholders. Message development skills are particularly critical to successful emergency communications with those living in close proximity to a nuclear power plant. This document contains principles, strategies, and tools for producing messages before, during, and after a radiological emergency that are understandable, timely, accurate, consistent, and credible. The document contains nearly 400 questions the public and media may ask during a radiological emergency.

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