PUBLIC HEALTH PLANNING DVD TRANSCRIPTS:

>> On behalf of the Centers for Disease Control and Prevention, welcome to this presentation of "Public Health Planning for Radiological and Nuclear Terrorism." I'm Dr. Charles Miller, Chief of the Radiation Studies Branch in the National Center for Environmental Health at the CDC. We are pleased to offer this new program because it will help public health officials and emergency planners better prepare for a radiological or nuclear incident. Our branch's first public health satellite broadcast, on February 3, 2005, was "The Role of Public Health in a Nuclear or Radiological Terrorist Incident." It provided introductory material about radiation principles, potential incident scenarios, and protective action guides. Then, on March 9, 2006, we made our second satellite broadcast. This program, called "Preparing for Radiological Monitoring and Decontamination," provided initial information about preparing for radiological monitoring of people following a terrorism incident. Audience feedback from these two broadcasts asked for more specific guidance about planning or responses to radiological terrorism incidents. This new program was created in response to those requests. Using the information in this program, state, local, and tribal public health officials and planners can adapt and supplement existing disaster response plans to better prepare for and respond to radiological and nuclear incidents. I highly recommend that you view the first two broadcasts, "The Role of Public Health in a Nuclear or Radiological Terrorist Incident" and "Preparing for Radiological Monitoring and Decontamination," as background for this program. Reviewing the introductory information in the first two programs will prepare you for the more advanced information in this new program. The first two programs can be found on our web site at www.bt.cdc.gov/radiation. This program will provide you with information about -- local government's roles and responsibilities for planning and emergency response to a radiological or nuclear event; planning for effective radiological monitoring of people, including addressing initial and long-term monitoring concerns; pharmaceutical countermeasures that may be used following a radiological or nuclear mass casualty incident, and developing a communications plan tailored to an incident involving potential mass exposure to radiation. Our speakers are: first, Dr. James

Smith, former Associate Director of Radiation, Division of Environmental Hazards and Health Effects in the National Center for Environmental Health at the CDC; second, Dr. Jeffrey Nemhauser, Medical Officer in the Radiation Studies Branch in the National Center for Environmental Health at the CDC; and last, Dr. Marsha Vanderford, Director of the Emergency Communications Branch in the National Center for Health Marketing at the CDC. We sincerely hope that the additional information in this latest program will help you adapt your planning processes to accommodate the unique aspects of responding to radiological and nuclear terrorism. Your feedback on this program is most welcome. You may send your comments or questions to me at rsb@cdc.gov. Please continue to check our website at www.bt.cdc.gov/radiation for new information. We greatly appreciate your interest in CDC's program for responding to radiation and nuclear emergencies.

>> An emergency is an unforeseen situation that is an imminent and substantial threat to public health or safety and that calls for immediate action. When we speak of radiological or nuclear emergencies, we mean unplanned incidents requiring an urgent response, that involve at least the potential for significant exposures to radiation. All emergencies are local. If a radiological or nuclear emergency occurs, local public health officials will need to determine if they require the assistance of the state or tribal public health organizations. In turn, these agencies must decide whether the assistance of federal public health response organizations is required. In a previous satellite broadcast in this series, we provided detailed information on federal and state government roles in planning for and responding to radiation incidents. Given the key role played by local authorities in any emergency, we emphasize, in this presentation, the roles and responsibilities of the local public health officials. Without doubt, many agencies other than public health will be involved in any such emergency, but the overarching goal of all emergency response activities is to keep people safe and to protect their health. As a reminder -- you may view and download the federal government's National Response Plan from the Department of Homeland Security's website at www.dhs.gov. This plan includes not only the basic plan, but also the emergency support functions, incident annexes, and appendices. It also identifies and

explains the concept of operations, roles and responsibilities, implementation guidance, authorities, and provides references. The Plan's incident annexes describe roles and responsibilities for specific contingencies, such as terrorism, radiological response, and catastrophic incidents. The Department of Homeland Security coordinates the federal response to incidents of national significance, such as terrorist incidents involving radioactive materials. The Department of Health and Human Services, or HHS, coordinates public health aspects of the federal response to any incident of national significance involving nuclear or radiological material. Again, while all emergencies are local, if you decide you need help, remember that CDC assistance is available. Health and Human Services has tasked the CDC to coordinate with state health agencies in issues related to: health surveillance, public health information, disease vector control, worker health and safety, as well as public health and medical consultation, technical assistance, and support. CDC can also assist in the management of long-term public monitoring and support of the affected population. If requested, this assistance includes collecting and processing blood samples and body fluids and advising on medical assessment and triage of victims. Federal guidance is also available from the EPA as a Manual of Protective Action Guides and Protective Actions for Nuclear Incidents. This is EPA document number 400. The EPA's Radiation Protection website offers recommendations for protecting people and the environment. And the Nuclear Regulatory Commission offers radiation protection and regulatory guidelines at its website. If so requested by state, local, or tribal governments, CDC can offer advice and can assist in developing these recommendations. Nevertheless, in the event of a nuclear or radiological terrorist attack, you should be prepared, within your communities, to give immediate protective action recommendations. The emergency response planning for a radiological terrorist incident should be as consistent as possible with the planning that already exists for other disasters, such as fires, floods, and HAZMAT incidents. One of the first and most important considerations local governments will face for any community is determining how much planning is both necessary and reasonable. Most of the major response roles, and certainly, the responsibility for them, will fall to local public health professionals. In these cases, it is paramount that the decision-makers ensure that no more risk is imposed on responders and the public than is absolutely necessary. In that regard, keep in mind that certain actions that have been encouraged or permitted at other disasters may not apply to a radiation incident. One example is the application of time, distance, and shielding principles, which were discussed in depth in other presentations in this series. Local public health officials can and should do as much as possible in preparing for a radiation incident. Of course, to some degree, all local communities have planned for emergencies and disasters. It is not our purpose here to discuss emergency or disaster planning in the broadest sense, rather, we will review those aspects of planning that pertain specifically to a radiation incident. Most local agencies and communities have not included this type of scenario in their plans. With this in mind, here are some specific planning pointers. Determine public health roles that include radiation protection within the emergency response structure and identify who will fill those roles. Identify all equipment, supplies, communications, and facilities needed to support emergency response tasks. Establish training requirements for emergency responders that include radiological principles and practices. Assure the existence of safe shelters for food and water supplies. Evaluate what type of radiation monitoring support and resources are required wherever shelters are to be established. Establish plans for cold, warm, and hot zones for all emergency operations. Determine a protocol for requesting, when necessary, deployment from the CDC's Strategic National Stockpile. A link to more information on the stockpile can be found at the website listed here. Prepare a plan for coordinating sampling and laboratory analyses of biological and environmental samples for radioactive contamination. Establish public, private, and volunteer teams who, following a disaster, will conduct a needs-based assessment of the affected population. Identify and train those local agencies designated to conduct preliminary damage and contamination assessment surveys. These surveys are designed to recognize the extent of damage and contamination to structures and critical facilities. Assure that procedures are established to analyze, compile, and report the results of these assessments. Finally, we would emphasize two important points. Identify who is responsible for health and medical activities, which include: safety of water supplies, proper sanitation, protection of food supplies, medical and mortuary services, preventing or controlling of epidemics, and crisis counseling. Know the name and contact information for your state radiation control program director. In both planning for and responding to a radiation incident, this person is vital. Planning for the Emergency Operations Center is critical. You must establish procedures for activation of the EOC and assure activation can be accomplished quickly and effectively. Ensure the ability to request needed resources -- for example, equipment, personnel, radiological expertise. And also, track missions that include weather conditions and that target population radiological monitoring. Establish procedures for possible EOC relocation. This need may arise not only because of damage from an incident, but also because of contamination, or the EOC's original placement in the path of a contaminated plume. Provide an organizational chart defining the day-to-day operations, emergency operations, each agency's roles and responsibilities, and coordination among state, local, and tribal agencies. Make certain that those agencies with radiological responsibilities are properly included. Communicate with agencies and stakeholders from inside and outside the public health community. Develop communication messages specifically for radiological scenarios. Develop criteria for entry and operations within the incident site, and set exposure standards and limits. For example, when is it safe to re-enter an area or facility. The EPA provides recommendations that may be adopted in the immediate aftermath of an incident. These can be found in the EPA 400 Document referred to earlier. Determine who is responsible for what actions in your area and how to contact them. Make certain that the list includes those specifically responsible for radiological or nuclear emergencies. Develop a list of resources available within your community, including radiation expertise. Include websites, such as the CDC Radiation Emergencies website, and contact information for groups, such as the local fire departments, EPA regional office, the HAZMAT teams. And identify in advance local professional radiation experts, such as health and medical physicists, radiation safety officers, nuclear medicine staff, and those staff at facilities with radioactive material licenses from the Nuclear Regulatory Commission. All have radiation detectors and all have people familiar with radiation and how to handle radioactive materials. Rapid medical response to nuclear or radiological terrorism is crucial. Without special preparation at the state, local, and tribal levels, a large-scale attack involving radiation could overwhelm the local and perhaps even the national public health infrastructure. Large numbers of patients, including both the injured and those concerned about potential exposure would seek medical attention. They would have a corresponding need for supplies, diagnostic tests, hospital beds, as well as information and reassurance. In addition, if provider facilities, equipment, and personnel become significantly contaminated, the medical services delivery system might become quickly disabled. First responders, hospitals, and the emergency medical system are generally responsible for ensuring that the contaminated, the injured, and those concerned about potential exposure are treated in an efficient manner. But given the widespread fear of such an unknown agent such as radiation, the potential is enormous for alarm and for major disruption of everyday life. Preparedness for radiological terrorism is an essential component of the U.S. public health and surveillance and response system. Hospitals and public health agencies should prepare for radiological terrorism's unique features, such as -- mass casualties with blast injuries combined with burns, radioactive contamination, and Acute Radiation Syndrome. The key to a hospital's capacity to serve the critically ill is to recognize that a hospital is part of a community. It is important that hospitals work with their communities -- in particular, that hospitals work with local and state health and radiation protection departments on developing plans for notifying and communicating. As mandated by the Nuclear Regulatory Commission requirements, most states have already established such plans for communities with operating nuclear power plants. Even in those communities, however, the various states need to plan more broadly than for a nuclear power plan incident alone. Other scenarios involving radiation are possible, including incidents discussed in other parts of this series. When developing community response plans, remember that local hospitals are an integral part of the community-wide system for emergency response. CDC has prepared Interim Guidelines for Hospital Response to Mass Casualties from a Radiation Incident. This can be found at the CDC Radiation Emergencies website, listed here. CDC's recommendations are based on the following six focus areas -- notification and communication, triage, patient management, healthcare provider protection and resources, surveillance, and community planning. We would encourage you to access these Guidelines as you prepare for hospital and medical response to a radiation incident. Also of note, pharmaceuticals and other medical countermeasures are a major issue. Dr. Jeffrey Nemhauser will address this important topic as a separate lecture in this program. Discussion of the transport and treatment of contaminated patients, of hospital education and training, and a number of other issues related to medical response during and following a radiation incident are covered in additional programs available at the CDC Radiation Emergencies website. One of the top priorities following a radiation incident is that of screening people for exposure and contamination, therefore we are dedicating a separate presentation to that topic alone in the series. The National Council of Radiation Protection and Measurements has recommendations for the general public on ensuring safe sheltering. Sheltering is an effective countermeasure with little negative impact on the affected community. In general, sheltering will significantly reduce exposure to external radiation and to internal contamination. When escaping through a radioactive contaminated area, a reduction of internal contamination by up to a factor of 10 may be afforded by advising people to use ad hoc respiratory protection. For example, breathing through handkerchiefs or towels. Following passage of the plume, internal contamination may be minimized by providing prompt notification so that people might open windows and restart ventilation systems to flush out any radioactive material that may have migrated into the structures. With regard to worker health and safety, all workers should be screened for contamination at the end of their duty shift, after decontamination or after time in the hot zone. Responders younger than 18 or with declared pregnancy must only be allowed to work within the cold zone. Health and safety officers for each agency will be responsible for maintaining records and recording radiation doses of their agency workers. Some of the many types of necessary records are shown in Table 1. The recovery and re-occupancy phase in the aftermath of an incident deals with the restoration of a contaminated area, including property and possessions. Here are some important considerations. In the wake of a major radiation incident, the decision to re-occupy premises should be made on a case-by-case basis only after a risk-benefit analysis, taking public health and welfare into consideration. Over the course of the clean-up and recovery, state, local, and tribal public health agencies will collaborate with federal agencies -- such as Homeland

Security, EPA, and the FDA -- to apply protective action guides for food and water. If an incident of national significance occurs, a previously established federal interagency effort will be operating, namely the Federal Advisory Team for Environment, Food, and Health. These agencies will develop long-term recommendations for decontamination, re-entry into contaminated areas, and for final recovery of the incident site and the surrounding areas. In collaboration with the state, local, and tribal governments, the federal agencies will also conduct long-term surveillance and epidemiological studies. These studies would include assisting in the establishment of registries to monitor health effects from the incident and providing information to the public and responders on what is known about long-term health effects associated with radiation exposure. Of significant importance is that public health agencies establish a registry of affected individuals as soon as possible following the incident. For information on radiation protection, you can visit the CDC radiation emergencies website, where fact sheets on radiation, information on medications to treat internal contamination, various radioisotopes, and evacuation and sheltering are available. CDC and Health and Human Services will also assist states and tribes in tracking victims' treatments and long-term health effects. They will also provide assessment and treatment teams for those exposed to radiation or contaminated with radioactive materials. CDC will respond if and when you determine the agency is needed. CDC will not come to your local area and take over from the people who know the area and the residents best. Therefore it becomes especially important for local public health professionals to understand their roles in response to a radiation incident. The decision to allow reoccupancy of an area in the wake of a radiological release, whether on a restricted or unrestricted basis, should be based on codified limits for re-occupancy, taking into consideration factors such as cost, technical feasibility, and a risk-benefit analysis of performing decontamination down to a specified level. Risk will often include potential harm to workers or other areas where contaminated material may be relocated. Environmental decontamination projects can vary widely in size, scope, nature of contaminants, and extent of contamination. Desired final outcome upon completion, measured by allowable uses of land and structures, as well as any remaining restrictions on site access, is typically established in the planning stages of the project. The decision to perform environmental decontamination should be based primarily on public health and safety issues. A secondary consideration may be a cost-benefit analysis. Remember that planning assistance is available from the CDC and from other federal agencies. But keep in mind -- even when CDC and other agencies arrive, they will provide assistance and recommendations only. Talk to and involve the director of your state radiation control program. Finally, remember that planning is a dynamic process. Continually reassess plans to ensure they are up to date and consistent with new policies, lessons learned from exercises and drills, changes that have been made with other forms of emergency response operations, or with regard to new information from federal, state, or tribal authorities. Thank you for viewing.

>> This program on Population Monitoring is designed to inform the public health workforce and emergency preparedness and response personnel about radiological monitoring. Population monitoring is the process of identifying, screening, and monitoring people fro exposure to radiation or contamination from radioactive materials. Our program will discuss initial and long-term monitoring issues, logistics, and sites used for monitoring. Note that the program emphasizes radiological monitoring of people following a mass casualty incident. It is not intended to address environmental monitoring. Population monitoring, also known as public monitoring, is an essential element often overlooked in emergency response planning. Many critical actions should occur in the first few hours after a radiation incident, prior to the arrival of federal resources that may assist in response efforts. After a radiation incident, the primary elements that must be evaluated are the following -- immediate need for medical treatment, presence of radioactive contamination on the body or clothing, intake of radioactive materials into the body, removal of external or internal contamination, radiation dose received and the resulting health risk from the exposure, and long-term health effects. With the exception of the last of these, public health personnel and emergency responders should assess these elements as rapidly as possible after the incident. The last element, long-term health effects, is usually accomplished through epidemiologic studies that may span many years. To conduct population monitoring, public health personnel use specialized instruments to detect radioactive

contamination on the body. This is referred to as "external contamination monitoring." However, laboratory tests may be needed for internal contamination monitoring to determine if radioactive material is inside the body. In addition, if an incident involves large amounts of radiation or radioactive materials, other assessments may be needed to determine if those exposed have or may receive a lethal or near-lethal radiation dose. To assist those who are considering these issues when planning for a radiation emergency response, the CDC has developed a guide entitled Population Monitoring in Radiation Emergencies: A Guide for State and Local Public Health Planners. This Population Monitoring Guide is available at the CDC Radiation Emergencies website, listed here. State, local, and tribal emergency response and public health authorities can use the guide to evaluate their emergency response plans and determine if population monitoring is adequately addressed; to identify staffing needs, training requirements and priorities, and necessary material assets; develop mutual assistance programs with other states by identifying the available resources each state has to meet population monitoring needs; and to allocate personnel and resources more efficiently during a response. In addition, during the planning process, public health personnel should consider the size of their communities, the population demographics, and all available local resources. For examples, facilities should be assessed that could serve as a community reception center for monitoring people and decontaminating them when necessary. Public health personnel should take note of resources made available through agreements with adjoining jurisdictions. They should also consider the assistance needed from federal responders to conduct population monitoring. The information provided in the CDC "Population Monitoring" guide is consistent with sound radiation protection and with public health policies and practices, but keep in mind that the guide makes two assumptions. First, a potential incident does *not* involve biological or chemical agents. In that case, radiological issues are likely to be overshadowed by more immediate health concerns. And second, the local response infrastructure remains relatively intact. The United States has 31 states with operating nuclear power plants. Public health planners in these states should already have local response plans for a nuclear power plant incident. These plans probably include population monitoring. However, effective response to a radiological or nuclear terrorism incident requires broader planning and a different response than current plans likely include. Terrorism incidents may be sudden, affect a much larger urban population, and involve unknown radioactive material. Nevertheless, the nuclear incident response plans already developed by states can assist them when preparing for a mass casualty nuclear terrorism incident. Health personnel should use these key principles when planning for population monitoring following a radiation emergency. The first priority is to save lives. Respond to and treat the injured first. Treatment of life- or limb-threatening medical conditions should take precedence over decontamination. Standard precautions are generally adequate to provide protection for first responders, emergency medical personnel, and clinicians. Contamination from radioactive material is *not* immediately life-threatening. This guidance differs from that for chemical agent contamination, which may be life-threatening. Removing clothing and washing the body thoroughly with soap and water will eliminate most external radioactive contamination. Initial population monitoring should focus on detecting and preventing acute radiation health effects. Cross-contamination -- that is, spreading contamination among people and places -- is a secondary concern, especially when the contaminated area or affected population is large. Scalability and flexibility are important components in the planning process. Screening criteria used for initial monitoring may need to be adjusted to accommodate for the magnitude of an incident and the availability of resources. Fear of radiation is high, perhaps higher than with other agents of terrorism. Most people are unfamiliar with radiation including some medical and public health professionals. They often fear radiation more than they fear most chemical and biological agents. Information and clear communication prior to and during an incident will help to reduce public fear and allow people to make appropriate response decisions. A key resource for implementing this Population Monitoring Guide is a state's lead agency for radiation control. Community radiation specialists can provide additional expertise and resources to plan for and respond to a radiation incident. Local emergency response plans should identify experts such as health physicists or radiation safety officers in area health departments, environmental health agencies, hospitals, and universities. Relationships with these experts should be established in the planning stages. The final guiding principle is that first responders and local officials may not be aware initially that a radiation incident has occurred. Public health and emergency personnel's initial response to an incident may be an all-hazards approach, however, once it is determined that radiation or radioactive material is involved, personnel must begin addressing the issues related to this type of incident. Planning for a radiation emergency, especially for a large-scale terrorism incident, involves complex issues and processes. Public health and emergency preparedness personnel must understand the objectives of population monitoring, know how to identify the affected population, and recognize those community members with special needs. The major objectives are -- to identify people whose health is in danger and who need immediate care or medical attention, whether their condition is radiation-related or not; identify people who may need medical treatment for contamination or exposure, further evaluation, or short-term health monitoring; recommend and facilitate practical steps to minimize the risk of radiation exposure; and register people for long-term health monitoring. After a terrorist attack, many people may request assessment or treatment from hospitals, clinics, and private physicians. Others not exposed or contaminated may want to be checked to confirm that they are okay, however, local hospitals must not become burdened with those who do not need immediate medical attention. People with life-threatening injuries or in need of urgent medical care are always the highest priority. These injuries or conditions, such as heart attacks; or pre-existing critical conditions; may be or may not be related to the radiation incident. To ensure that the highest-priority cases are treated first, effective communication is important. In a mass casualty incident, those who are not injured can be encouraged to go home with instructions for self-decontamination. They may then return for monitoring at designated locations. During their planning, local and state officials should ensure that the following capabilities are available within the first 24 to 48 hours after an incident -- determining radiation exposure or dose projections to affected or potentially affected populations; assessing the risk of exposure by time and location; identifying those within range, location, and proximity to the incident; identifying potential acute symptoms, such as nausea and vomiting; providing radiation survey equipment to detect external contamination and following up with decontamination; and performing blood tests for direct-exposure assessment if large, whole-body radiation doses are suspected. These tests include a complete blood count with differential white cell count. The ranking scheme to identify people for monitoring can be based on three basic assessments -- radiation exposure or dose projections, if available; specific times and locations that may put people at a higher probability for exposure or contamination; and presentation of clinical symptoms consistent with Acute Radiation Syndrome. Planners should identify and give particular attention to special populations with exceptional needs in the community. These may include children, the elderly, pregnant women, and those whose immune system is compromised. A special note -- families should remain together. Be aware of minor children without custodial adults present. In addition, consider that cultural or religious factors in communities could affect population monitoring. For example, communication materials should be provided in all appropriate languages for the community and should be sensitive to local cultural practices. Planners must consider many factors when preparing for population monitoring in the initial hours following a radiation incident. In large metropolitan areas, population density is highest during daytime business hours, when tens, even hundreds, of thousands of people may be in the immediate vicinity of an incident. First responders may be inclined to cordon off the area and detain those believed to be affected until the situation is assessed, however, in general, this response is not effective. The longer the public is kept waiting, the higher their anxiety, as well as their potential radiation exposure and likelihood of ingesting or inhaling radioactive material. CDC does not recommend setting fixed screening criteria in advance to be applied to all people for all incidents under all circumstances. Instead, CDC recommends that planners and decision-makers work with their state radiation control authorities to consider a range of possible circumstances, keeping the following in mind -- the population monitoring objectives, as described in CDC's Population Monitoring Guide, readings from radiation survey instrumentation that responders will be using; staffing resources and the size of the population to be processed; the facility and resources for offering on-the-scene monitoring and decontamination; and the availability of other resources that could increase available options. This planning for a range of circumstances should be done in advance and allow for flexibility. However, emergency responders after a radiation incident occurs will need clear instructions to follow, based on evaluation of the situation by the public health authorities. To assist in the planning process, CDC has included, in Appendix C of the Population Monitoring Guide, key considerations in selecting screening criteria and descriptions of several benchmarks. In addition, if requested after an incident, the Federal Advisory Team for Environment, Food, and Health can assist in establishing practical screening criteria based on specific local circumstances. In routine occupational settings, a head-to-toe radiation survey, followed by full documentation of findings, is a standard radiation protection practice. However, this survey methodology is not recommended in the first few hours after a mass casualty incident. Unnecessary delays, including those caused by lengthy surveying, can potentially increase an affected population's radiation dose. If a large population must be surveyed, a screening only of the head, face, shoulders, and hands should be performed. These are the locations most likely to become contaminated. The Population Monitoring Guide recommends planning for the distribution of large caches of clothing to replace the contaminated garments people may be wearing. Having people remove and bag contaminated outer clothing before going home or to a shelter helps to significantly reduce cross-contamination with others. If possible, communities should include clothing retailers in their local emergency response plans, and they should negotiate emergency clothing purchase agreements in advance. Public health personnel should plan to provide transportation in the initial hours after an incident for those who have a place to go but no transportation. Cross-contamination of the buses or other vehicles is a secondary issue. These vehicles do not need to be decontaminated between loads of passengers. That can be done prior to return to normal service. Facilities for complete washing should be established at or near community shelters and reception centers. Many communities also have plans for deploying portable decontamination facilities in the initial hours after a radiation incident, however, in mass casualty incidents, quickly processing a large number of people through such portable facilities may not be practical. Instead, public health personnel can provide other services to reduce the affected population's radiation exposure and the likelihood of internal contamination. For example, responders could give instructions and basic supplies for self-decontamination, using plastic bags to contain outer garments, and moist towels or wet wipes for cleaning faces and hands. In the first few hours after an incident, the most heavily contaminated people may need assistance with washing facilities. The goal at this stage is to remove contaminated clothing immediately and to remove radioactive material from the body as soon as possible. If showering is to occur, replacement clothing must be nearby. People who are able to shower by themselves should use soap and warm water. Cold water or hydrant water should not be used. Structures such as sports arenas and high school gyms may provide suitable showering facilities. If such places are difficult to locate in the vicinity of an incident, consider transporting people to those facilities or using a nearby hotel, especially if outdoor weather conditions are not favorable. Anyone who showers should be remonitored and asked to take a second shower, if necessary. If this simple decontamination procedure fails, those people should be designated for further assessment of possible internal contamination. A critical function that should begin as early as possible after an incident is registering affected or potentially affected people. Initially, basic details, such as name, address, phone number, and contact information should be collected as people are processed. This information can be used to contact people for follow-up monitoring, if needed. If time permits, other information, such as a person's location at the time of an incident and his or her radiation readings, can be recorded, however, this is not essential information and should not become a bottleneck for processing people. Typically, local, state, or tribal responders may not be able to collect bioassay samples in the first few hours following an incident, however, urine samples provide a strong diagnostic tool for assessment of internal contamination. Also, blood samples allow for detection of Acute Radiation Syndrome when relatively high radiation doses may have occurred. Although federal resources can assist in the collection and analysis of urine bioassays, these resources may not be available in the first few hours after an incident. Local and state laboratories should be prepared to analyze blood samples as described in the CDC Population Monitoring Guide. Responders will likely be screening people for radioactive contamination in the immediate hours after the incident, at or near the scene, at hospital entrances, or elsewhere. Remember, it is the site safety officer who determines what protective equipment responders should wear, and that includes respiratory protection.

Subsequent population monitoring should take place at locations that are not contaminated and that do not have any known airborne or respiratory hazards. An example would be community reception centers, where most screening for exposure or contamination takes place. I'll discuss those in more detail shortly. At these uncontaminated locations, it is highly recommended that local responders be provided with and wear, on a voluntary basis, filtering face-piece respirators. Preferably, these should be designated as N95. Also, these respirators should be certified by CDC's National Institute for Occupational Safety and Health. This equipment may prevent inhalation of radioactive or other hazardous particles or fibers that become airborne when workers remove contaminated clothing or perform similar actions. To improve communication, filters with exhalation valves are recommended. However, it is important to note that the lack of immediate availability of these respirators should not prevent or hinder population monitoring. The voluntary use of respiratory protection is permitted by OSHA. And in addition, frequent changes of vinyl examination gloves are also recommended for responders who physically assist people in removing clothing that may be contaminated. During the days after a radiation incident, only limited federal assistance may have arrived on-site. As federal personnel arrive, many services described in this section can be augmented, however, initially, local, state, and tribal responders must set up and conduct these operations. A mass casualty radiation incident will require establishing one or more community reception centers for population monitoring and decontamination. These centers are used to assess people for exposure and contamination, and their need for decontamination or other medical follow-up. Also, when possible, community reception centers should be established at or near shelters operated by the American Red Cross. Public health personnel should assess facilities or sites that could serve as reception centers in their communities. Potential sites should have adequate restrooms and shower or decontamination facilities. Chosen locations should also have well-defined entries and exits for crowd control and security purposes. All-weather facilities, such as nearby covered sports arenas or convention centers, are ideal, and agreements should be established in advance with facility owners or operators. When planning for these reception centers, it should be considered that community emergency response plans may already include similar facilities for other public health incidents. Many community plans incorporate a concept similar to the Modular Medical Emergency System, or MEMS. This system provides surge capacity for alternate care centers to give assistance or limited medical care in a public health emergency. In some communities, these facilities are referred to as Neighborhood Emergency Help Centers and are usually well-known locations, such as area high schools. Many communities also plan to use these facilities as points of dispensing, or PODs, for medical supplies from the Strategic National Stockpile in case of biological threats, such as pandemic flu. As members of the public are released from reception centers, each should be given a discharge instruction sheet written in clear, easy-to-understand language. It should tell people that the CDC or their state, local, or tribal health department may need to contact them to conduct further monitoring or additional medical evaluation. The instruction sheets should also provide the following -- basic information about radiation and its effects on human health; recommended actions to be taken by the public to safeguard their health; and points of contact for news and information. Since these contacts may change, we recommend reviewing this information from time to time to ensure its accuracy. Those discharged should be tracked in a database common to all service centers, and it is recommended that it be computerized. Such a database will help preclude duplication of tracking efforts for anyone who may visit more than one reception center. It should also be used to notify local physicians about their patients, who may have been irradiated or contaminated. At the same time, local health care providers should receive appropriate training about managing victims of radiation exposure and contamination. In addition, public health personnel should plan to augment pre-existing psychosocial services. The need for such services will be in demand both by people acutely affected by the radiation incident as well as by members of the public with chronic, long-term, mental health needs. The need for such services will be exacerbated following a radiation mass casualty incident. The CDC Population Monitoring Guide provides more detail on establishing and operating community reception centers, including monitoring for contamination and assessing the need for decontamination. Psychosocial issues may present significant challenges to public health and medical practitioners, both during and after a radiation incident. People seeking assessment and care could overwhelm healthcare systems, therefore public health personnel should ensure that their health departments have a psychological assistance officer on staff for each community reception center. They should also establish a list of credentialed people who could provide psychosocial assistance during a public health emergency. For more information about population monitoring, the CDC Population Monitoring Guide, or the public health role in radiation emergency preparedness, please contact CDC's Radiation Studies Branch by email or by calling 404-498-1800. In a public health emergency, contact the CDC Director's Emergency Operations Center 24 hours a day, 7 days a week at 770-488-7100. Thank you for viewing.

>> The diagnosis and treatment of radiation illness or injury may be unfamiliar to healthcare providers, especially as compared to illnesses or injuries caused by biological or chemical agents. Very few healthcare providers have ever seen a victim of acute radiation injury, much less cared for one. And although new materials are being developed, training and educational resources specifically designed to teach healthcare providers how to manage a radiation incident have been limited in number and generally written for specific audiences. To better assist the medical community in a radiation emergency event, public health officials must have a basic understanding of the medical and public health needs involved in responding to such an event. Having this knowledge will help public health officials make early and appropriate realtime decisions about the delivery of pharmaceutical countermeasures to healthcare providers. This core understanding is essential, since not every radiation emergency will require the distribution of pharmaceutical countermeasures. In fact, in some cases, the use of countermeasures may even be contraindicated. With the proper information, then, public health officials can play a vital role in making sure that health care providers receive the medical supplies they need to best care for victims of a radiation incident. This lecture therefore is designed to provide you with that information. That is, to provide you with an overview of what we believe public health officials should know if it becomes necessary to use, or think about using, radiation pharmaceutical countermeasures. I've divided this lecture into four main parts. In part one, I will discuss how public health officials can, by asking appropriate questions, determine

whether pharmaceutical countermeasures need to be deployed. In part two, I will provide details about each of the four radiation countermeasures, including information about their use and their limitations. Part three will highlight the importance of knowing how to request Stockpile assets. And part four will emphasize why it is necessary to develop, in advance, prevention initiatives as primary public health countermeasures. I'd like to start this lecture, before I speak about the drugs themselves, by providing a context for their appropriate use. In other words, regardless of the type of radiation incident, intentional or otherwise, public health officials will need to decide whether deployment of pharmaceutical countermeasures is necessary and appropriate. To help make this decision, public health officials should use an easy-to-remember tool. I suggest that, in the immediate aftermath of a radiation incident, you seek answers to two key questions. First, is there any evidence that victims of the radiation incident have become internally contaminated? And second, what radioisotopes were released? Let's look at how the answers to these two questions will enable you to make informed decisions about requesting pharmaceutical countermeasures and managing their distribution. Question 1: Is there evidence that members of the public are internally contaminated? This question may not be so simple to answer. We say that internal contamination has occurred when a person ingests or inhales radioactive material. This material may then take up long-term residence in the body. By contrast, as you may recall, external contamination means that radioactive material has been deposited on a person's clothing, skin, or hair. Now, in most cases, identifying and removing external contamination is significantly easier than diagnosing and managing internal contamination. In a mass casualty incident, however, where resources may be scarce and demand for medical services high, you will need to assume that some subset of the population with *external* contamination is also *internally* contaminated. In truth, diagnosing whether an individual has been internally contaminated and to what level can require sophisticated testing. But for screening purposes, public health officials and healthcare providers will be justified in assuming that internal contamination has occurred, at least in some individuals with external contamination. Healthcare providers will then need to identify, as rapidly and as accurately as possible, who among the externally contaminated is also internally contaminated. This is because individuals with internal contamination, depending on the levels, may require acute medical intervention using one or more of the pharmaceutical countermeasures currently available in the Strategic National Stockpile. A timely and accurate diagnosis of external and internal contamination will require the efforts of two different groups -- radiation control professionals, experts who will play a crucial role in the response to a radiation incident; and healthcare providers. If these experts can establish that people have been or are likely to have been internally contaminated, it then becomes imperative to identify the radioisotope or isotopes involved. And to do so, public health officials will need to call upon radiation control professionals to help answer the second key question. What radioisotopes were released? The answer to this question is highly important, for several reasons. First, while a radiation incident -- for example, the detonation of a dirty bomb -- may involve just a single isotope, this should not be considered a foregone conclusion. More than one radioisotope may have been used. Second, in a nuclear incident, multiple radioisotopes are expected to be produced and released. And third, the effectiveness of pharmaceutical countermeasures decreases over time. Optimal treatment of internal contamination depends on isotope identification precisely because each pharmaceutical countermeasure interferes with the incorporation of or enhances the elimination of specific radioisotopes. Knowing that multiple isotopes have been found in the environment after a radiation incident can alert healthcare providers of the possible need to treat victims with a combination of pharmaceutical countermeasures. Radiation experts, including health physicists, have the equipment and the knowledge necessary to make an accurate determination of the specific radioisotope or isotopes released in a radiation incident. Based on the information provided by radiation experts, then, public health officials should be able to request the appropriate countermeasure or countermeasures shortly thereafter. Now, in cases where radioisotopes have been identified, but a diagnosis of internal contamination has not yet been made, healthcare providers may choose to treat people with countermeasures until it can be determined that internal contamination has not occurred. Delays in diagnosing internal contamination should not lead healthcare providers or public health officials to withhold treatment, however, the sooner the contaminating radioisotopes are identified, the sooner the proper drug or drugs can be administered. So by quickly establishing that people have been internally contaminated and with what, the public health community, together with radiation control professionals, will be serving a critically important public health function. Now that I have provided you with a context for the use of pharmaceutical countermeasures, I'd like to discuss the four drugs in the Strategic National Stockpile specifically designated for use in a radiation emergency. The first three drugs, potassium iodide, DTPA, and Prussian blue, may be used to treat internal contamination. Each countermeasure is specific, not only in the way it works, but also for the radioisotopes it is used to treat. Knowing what countermeasures do and their limitations can help direct your response and the response of healthcare providers in a radiation incident. The fourth drug, Neupogen, also known as Filgrastim, may be used to treat the Acute Radiation Syndrome, or ARS, caused by exposure to high levels of radiation. I'll be discussing Neupogen separately at the end of this section. The first drug, potassium iodide, commonly referred to as "KI," is a radioisotope-blocking agent. It is used to treat people internally contaminated with radioisotopes of iodine. Radioactive iodine may enter the body in a couple of different ways. First, it may be breathed in through the lungs, where it is absorbed into the body by way of the pulmonary blood vessels. Alternatively, radioiodine may enter the body through the digestive tract, as a contaminant of food or drink. In the aftermath of the Chernobyl incident in Russia, for example, ingestion of radioactive iodine was a major route for internal contamination. Ultimately, whether it is absorbed through the lungs or the digestive tract, radioiodine is carried throughout the body and to the thyroid gland. The thyroid gland avidly takes up iodine, which is converted into thyroid hormone. Once taken up by the thyroid, however, radioactive iodine can injure the cells of the gland, resulting in cancer. KI works as a countermeasure to radioiodine by temporarily saturating the thyroid gland with non-radioactive -- also known as "stable" -- iodine. Once it becomes saturated, the thyroid can no longer take in any additional iodine, either stable or radioactive, for the next 24 hours. In this way, KI protects the thyroid gland during the period of time that radioactive iodine is being excreted from the body. Because children have the highest risk of developing thyroid cancer from radioactive iodine, the need to protect the thyroid gland is greatest for young people up through age

18. As a means of protecting the fetus, pregnant women should also receive KI. KI comes in both tablet and liquid forms, and both have been approved by the U.S. Food and Drug Administration for use in protecting the thyroid gland following a radiation incident. When given and taken correctly, KI is highly effective at protecting the thyroid, however, public health officials and the medical community should understand that KI is not a panacea treatment for radioisotope contamination. For example, KI cannot prevent adverse health effects caused by any radioactive elements other than radioisotopes of iodine. Stated another way, if radioactive iodine is not present, taking KI will not be protective, therefore the potential use of KI will be limited to scenarios in which there is a high likelihood of a radioiodine release. These include the detonation of a nuclear weapon or an improvised nuclear device, or in response to a nuclear power plant disaster. Another limitation of KI is that it cannot prevent any radioisotopes, including radioactive iodine, from entering the body. If radioactive iodine is present and enters the body, KI can only act to prevent the radioisotope from entering the thyroid gland. Once radioactive iodine has entered the thyroid, KI cannot remove it, nor can it reverse the health effects caused by radioactive iodine that has already entered the gland. The use of KI is also limited in that it has a fairly narrow time window of effectiveness. If taken more than 4 to 6 hours after internal contamination with radioactive iodine has occurred, radioiodine will have already saturated the thyroid gland, and stable iodine, in the form of KI, will be ineffective as a countermeasure. Because of this narrow time window, and for the other reasons I have described, public health officials should consider KI to be a supplementary public health measure. On the other hand, primary prevention measures -- for example, issuing orders to shelter-in-place in a protected area -- should play an important part in your public health planning and response to a radioiodine release. The next pharmaceutical countermeasure I'd like to discuss is DTPA. Like KI, DTPA has been approved by the U.S. Food and Drug Administration for use as a pharmaceutical countermeasure following a radiation incident. DTPA is available in two forms, calcium and zinc, and both are held in the Strategic National Stockpile. Calcium and zinc DTPA are used to treat internal contamination by chelating, or binding to, three radioisotopes -- plutonium, americium, and curium. Calcium and zinc DTPA bind to these three

radioisotopes in the bloodstream and help to more rapidly eliminate them from the body. Depending on a person's level of internal contamination, one or more doses of DTPA may be required. Typically, DTPA is given intravenously once per day, and neither form, calcium or zinc, is currently available as an oral medication. Now, providing multiple doses of intravenous medication to large numbers of contaminated, or presumptively contaminated, people may be difficult to achieve in the immediate aftermath of a radiation incident, especially in a resource-depleted environment, however, planners must consider that chelating agents like DTPA work best when given shortly after radioactive materials have entered the body. After 24 hours, chelation of radioisotopes becomes more difficult as these elements begin to take up residence in the bones, the liver, or other organs. Nevertheless, DTPA can still work, and should be given as soon as it becomes available -- several days, weeks, whenever -- to remove plutonium, americium, and curium from the body. Just because more than 24 hours have passed since the time of the initial contamination, DTPA should not be withheld. Details about which form of DTPA should be used, calcium or zinc, and when, may be found on the Supplementary Resources CD-ROM included with this set of materials. The binding agent Prussian blue is the third drug in the Strategic National Stockpile approved by the Food and Drug Administration as a pharmaceutical countermeasure for treating internal contamination. Taken orally three times a day, Prussian blue remains within the digestive tract, where it binds to radioactive cesium and both radioactive and non-radioactive thallium and speeds their passage out of the body. Bound to Prussian blue in the gastrointestinal tract, cesium and thallium are prevented from being absorbed and incorporated into the organs of the body. Prussian blue should be given following a diagnosis of internal contamination with cesium or thallium as soon as it becomes available. Now, as you can see, each of the three countermeasures I've just described is specific in how it works, and no one drug can adequately treat internal contamination from all radioisotopes. In radiation mass casualty incidents involving dispersal of radioactive material, where public health officials must assume that some people have been internally contaminated, treatment may involve use of a blocking agent, a chelating agent, and/or a binding agent, such as Prussian blue. Use of one or more pharmaceutical countermeasures may be required to treat victims of radiation mass casualty incidents. But public health planners and healthcare providers need to keep in mind that these countermeasures are not perfect antidotes. As a reminder, each of the pharmaceutical countermeasures used to treat internal contamination share three important limitations -- none of the drugs described can prevent radioisotopes from entering the body, each drug's action is specific for certain radioisotopes, and none of the drugs can be used to treat or reverse the adverse health effects initiated by radioisotopes that have already entered the body. It is also important to remember that none of the countermeasures I've discussed so far -- not KI not DTPA nor Prussian blue -- can treat the effects of high-dose whole-body radiation exposure. Victims of high-dose whole-body radiation exposure are almost certain to develop the Acute Radiation Syndrome, or ARS. Adverse health affects associated with ARS become more severe as the dose of radiation exposure increases. One of the serious adverse health effects of ARS is bone marrow suppression. The bone marrow is the source of the different blood cell populations, including white blood cells, red blood cells, and platelets. Radiation in sufficiently high doses will wipe out these cells in the bone marrow, starting with the white blood cells. Without a healthy source of white blood cells, victims of high-dose radiation exposure are very susceptible to infection. Neupogen, the fourth countermeasure in the Strategic National Stockpile, can be used to improve a victim's chances for survival by stimulating certain types of cells that remain in the bone marrow to produce mature granulocytes -- white blood cells critical to fighting infection. Neupogen belongs to a class of drugs known as "colony stimulating factors," or CSFs. Public health officials and healthcare providers should be aware that, although it has been stockpiled for this purpose, Neupogen has not been approved by the Food and Drug Administration for the treatment of bone marrow suppression following acute radiation exposure. Instead, Neupogen would be administered to victims of Acute Radiation Syndrome, either as an Investigational New Drug, or under an Emergency Use Authorization from the Food and Drug Administration. CDC currently holds both the Investigational New Drug and Emergency Use Authorization applications for the use of Neupogen in patients after a radiation incident. As with the other radiation countermeasures, the use of Neupogen will be limited to specific populations after a radiation incident. To begin, providers and planners should recognize that not all people with radiation exposure will necessarily benefit from receiving Neupogen. For example, victims with lower levels of radiation exposure may have incomplete bone marrow suppression. Appropriate care for this patient category will require more familiar forms of medical interventions -- antibiotics, antifungals, antivirals, nutritional and fluid support, and pain control -- until white blood cell counts slowly return on their own to a more normal range. On the other hand, victims exposed to very high doses of radiation who then present to medical care with signs and symptoms consistent with more severe disease -- these individuals are expected to have a poor prognosis. Furthermore, victims of combined injury, defined as conventional trauma or burns superimposed on radiation exposure, also have an overall worse prognosis. People falling into the diagnosis categories I've just described are unlikely to benefit from medically induced bone marrow stimulation. Depending, then, on the magnitude of the incident, healthcare providers and public health officials may be faced with making triage decisions about who will receive Neupogen in relation to available resources. Withholding Neupogen from victims of combined injury or very high-dose radiation exposure in favor of children and adults with atraumatic or lower-dose radiation exposure may be warranted. Victims with non-survivable Acute Radiation Syndrome or combined injury will, however, still require varying degrees of intervention. In addition to pain medication and basic first aid; counseling, pastoral, and psychiatric care will be needed for these victims and their families. Ultimately, the use of Neupogen, as well as other pharmaceutical countermeasures, will be determined by the epidemiology of the radiation incident. For example, in an incident involving either an explosive or a nonexplosive dispersal of radiation, commonly called an RDD, radiation doses to victims are expected to be comparatively low. As a result, we expect that relatively few people will require treatment with Neupogen following an RDD event. Current models suggest that an RDD terrorist attack, as compared to a nuclear attack, would be less devastating in terms of total numbers of individuals affected, total numbers of victims with acute traumatic injury, and destruction of infrastructure. By comparison, many more victims of larger-scale incidents -- such as the detonation of an improvised nuclear device or a nuclear weapon -- will need treatment with a colony stimulating factor to improve their chances for survival. However, because of the technical sophistication necessary to engineer a nuclear explosion, a terrorist attack involving an IND, or a nuclear weapon, is generally regarded to be less likely to occur. The expected need for Neupogen, therefore, will be based on how many people have been exposed to high doses of radiation, which, in turn, will be based on the type of radiation incident. To estimate how many people have had radiation exposures in a range likely to result in treatable Acute Radiation Syndrome, public health officials will need to collaborate with state and local radiation control program officers. Using exposure levels provided by radiation experts, public health officials can, by working together with healthcare providers, determine which victims are most likely to benefit from receiving Neupogen. Undoubtedly, identifying victims of radiation contamination and exposure who are most in need of treatment with pharmaceutical countermeasures will be of paramount focus and concern after a radiation incident. It is therefore important, at this juncture, to restate and reemphasize a point we have made elsewhere. Treatment of life- and limb-threatening injuries always takes precedence over treatment of radiation contamination, radiation illness, and radiation-induced injury. And although this caveat is highly relevant to healthcare providers giving direct care to victims, public health officials should also know that management of radiation -- and this includes patient decontamination and treatment of radiation-induced injury -- is of secondary importance in patients who have other critical injuries. As I just mentioned, the epidemiology of radiation incidents will play an important role in deciding when to deploy pharmaceutical countermeasures. In planning for potential radiation incidents, then, remember that not all of them will begin with a bang. Covertly placed radiological exposure devices or nonexplosive radiological dispersal devices may go undetected as sources of ionizing radiation, at least until the adverse health effects of radiation exposure are identified in the population. In the case of a silent radiation source, public health surveillance systems, or an alert primary care or emergency medicine healthcare provider, may be the first to identify an outbreak of radiation-induced illness. But whether the source of radiation is from an explosion, resulting in significant damage to a city's infrastructure, or is covert, you must be prepared to respond to and have contingency plans in place for, a variety of scenarios. For this reason, the planning process must involve knowing in advance how to request, receive, distribute, and dispense assets from the Strategic National Stockpile. If you are a local, regional, or tribal planner, CDC recommends contacting the Strategic National Stockpile coordinator in your state to learn more about the logistics of obtaining and delivering pharmaceutical countermeasures. Your state coordinator will be the most knowledgeable person concerning the stockpile plan. Your state coordinator will also have experience in working with supporting agencies, as well as tribal, local, and regional planners and responders. More information about this process is included in the CD-ROM entitled "Supplementary Resources" that is provided to you as part of this program. I've now spent the bulk of this lecture describing the salient properties of the four pharmaceutical countermeasures stored in the Strategic National Stockpile, and I started out by providing a context for their use. Knowing how and when to request countermeasures is a vital public health function, however, for members of the public not immediately contaminated with or directly exposed to ionizing radiation, preventing their exposure or contamination will be most important. In fact, preventing exposure or contamination will have a much larger public health impact for people who are unexposed than will timely delivery of pharmaceutical countermeasures should exposure or contamination occur. In other words, don't make delivery of pharmaceutical countermeasures a priority at the expense of prevention. I would strongly encourage you to develop protective action recommendations and guidelines designed to minimize public exposure to ionizing radiation and to lower the risk of radioisotopes entering the body. In some cases, these recommendations may involve advising individuals to remain at home, in school, or at a place of work -- as I mentioned before, a protective measure known as "shelter-in-place." In other instances, recommendations for evacuating people living downwind of a slower-moving plume of radioactive material may be appropriate. Guidance may also include advice on avoiding certain foods and beverages, at least until a safe supply can be brought in from outside the affected area. For some members of the public, then, where prevention of exposure or contamination is possible, the use of pharmaceutical countermeasures can potentially be avoided. To provide maximum benefit to victims of a radiation incident, the appropriate drugs need to be delivered to the right place within an appropriate amount of time and in the appropriate quantities. Remember that neither the size nor the scope of the incident will dictate which pharmaceutical countermeasures are needed, but rather, this will be based on the answers to two key questions. Is there evidence that victims have become internally contaminated? And what radioisotopes were released? Gathering the answers to these questions will be the responsibility of public health officials who will need to rely upon radiation control professionals who have the skills and tools necessary to identify radioisotopes. In this way, the integrated processes of identifying needed assets and then requesting, receiving, distributing, and dispensing pharmaceutical countermeasures will represent a collaborative effort of federal, tribal, regional, state, and local officials. By now, if you haven't already, you should recognize the importance of meeting with your state or local radiation control program officials. If you have neglected to include them in your radiation incident planning or training exercises, you have overlooked an important and valuable resource. In addition, beyond their own expertise, your state and local radiation control professionals can serve as points of contact for radiation experts from around the country and within the federal government -- professionals whose assistance may be critical to your response effort. CDC therefore encourages local, state, regional, and tribal public health officials to -- plan ahead to meet and partner with radiation control program officials, pre-establish channels for emergency communication of protective action recommendations or guidelines, and formalize and become familiar with the procedures for requesting pharmaceutical countermeasures. In summary, advanced planning; coordination with federal, tribal, state, and local partners; and, should an incident occur, immediately asking the right questions and delivering the right pharmaceutical countermeasures are the keys to effectively handling a radiation mass casualty incident.

>> This portion of our program deals with the critical role of communication during a radiological or nuclear incident and how you can begin planning this aspect of your emergency response. Communication will play a key role in successfully managing an event. People's understanding of what is happening and what they need to do will determine whether they are able to make appropriate decisions and work collaboratively with public health and emergency officials during the response and

recovery efforts. The task of effectively communicating information about radiation exposure and related emergency issues is extremely challenging and requires considerable skill and preparation. Whether you are participating in a joint information center, or a JIC, established under the National Incident Management System; or providing information directly to the public and response personnel immediately after an event, you need to have a solid communication plan. Effectively communicated health messages can influence individuals, healthcare providers, and other professionals, and policy makers at all levels, in making decisions regarding health protection issues. This can have a direct and a highly significant effect on the health and safety of large segments of the population. Communicating effectively will help your organization to execute response and recovery efforts, to decrease illness, injury, and death. Also, to avoid misallocation of limited resources and to reduce rumors surrounding recovery efforts. Communication research has found that, in a crisis situation, people take in information differently than they would in a routine situation. People who are upset have difficulty hearing and processing information. This stress can reduce their ability to process information by as much as 80%, therefore crafting public messages for the public requires planning and skill. As a basis for developing your communication plan, it is helpful to have some understanding of your audience's current perceptions and attitudes about a radiological or nuclear emergency. During the past several years, research sponsored by CDC and by other public health organizations indicates that people have much greater fear and many more misperceptions about radiation exposure than about other public health issues. Specifically, this audience research has found that people have sporadic and varied knowledge about precautions such as sheltering-in-place; they rely on local electronic media and the Cable News Network, or CNN, during a crisis situation; they desire multiple information channels in a crisis, and they would trust television meteorologists as an information channel during a radiological or nuclear terrorist attack; they want to be presented with positive action steps for themselves and for their families; they have questions about how to know when they should seek medical care; and they will want information about the nature of the threat, including its geographic location and transmission methods. We have also found, from the research, that the public resists reassuring messages; they prefer expert sources over elected-official sources; the public needs more material, in accessible formats, about radiological and nuclear preparedness and response; the public does not generally understand what a "dirty bomb" is or what a radiological dispersal device is, and how it differs from a nuclear weapon; and people are generally not able to understand information about doses, unless there is some context provided. For example, comparison to more familiar exposures, such as X-rays. While this is somewhat contrary to some risk communication recommendations, it seems to be essential to the public's understanding of relative risk. Keeping these concerns in mind, you and your communication specialists will need to plan for communicating effective messages using sound crisis and risk communication principles. We will not try to give you a thorough presentation of risk communication in this training, however, a brief review of these basics can help you to better participate in the communication planning process. In general, emergency risk communication calls for -- being the first source of information, expressing empathy and caring, exhibiting competence and expertise, remaining honest and open, committing to remaining dedicated to response and recovery efforts, and developing appropriate messages for your audiences. Your communication objective will vary somewhat according to the phase of the crisis. For example, in the pre-crisis phase, you will need to focus on being prepared, fostering alliances, developing consensus recommendations, and developing and testing messages. During the initial phase of an incident, you will need to be able to -- acknowledge the incident with empathy; explain and inform the public about the risk in the simplest terms; establish organizational and spokesperson credibility; provide emergency courses of action, including how and where to get more information; and commit to stakeholders and the public to continued communication. Simplicity, credibility, verifiability, consistency, and speed all count when communicating during the initial phases of an emergency. As you enter the crisis management stage, your objectives will be to -- help people more accurately understand their own risks, provide background and encompassing information to those who need it -- this will answer questions such as how could this happen, has this happened before, how can I prevent this from happening again, will I be all right in the long term, will I recover? Gain understanding and support for response and recovery plans, listen to stakeholder and audience feedback and correct misinformation, and explain emergency recommendations. Finally, in the resolution or recovery phase, you will need to determine how you can improve public response in future incidents, you will need to honestly examine problems and reinforce what worked, you will need to persuade the public to support public policy and resource allocation decisions, and you will need to promote activities and capabilities of your organization. Of course, your ability to successfully communicate at each of these stages depends upon the trust that you build with your stakeholders and the public. If people trust that you have planned for this type of emergency and are providing credible and timely messages, they will be much more likely to take appropriate action. For example, in a radiation emergency, the key behaviors that you will be trying to effect are -- to remove contamination and control its spread. This will help prevent internal contamination and the need to use Stockpile pharmaceuticals. Another key behavior will be to minimize medically unnecessary self-referrals to hospitals and other critical facilities. Effective communication in these areas can make a significant difference in your ability to manage and recover from the incident. We have just discussed the key principles for planning and conducting your communication. It is also important to point out several communication practices that can actually create problems, including -- mixed messages from multiple experts, which is confusing to individuals and lessens the credibility of spokespersons; releasing information late, which allows rumors and misinformation to fill in the void or create more stress; paternalistic attitudes, which increases the feeling that the government just doesn't care about what is happening to us; not countering rumors and myths in real time, which can cause people to take inappropriate actions and create negative perceptions, which then are much more difficult to turn around; and public power struggles and confusion, which, as we saw during the Hurricane Katrina crisis, increased the feeling that nobody is in charge and therefore factual information and remedy is not forthcoming. As we mentioned previously, message development and delivery are central to effective communication during an emergency. They enable officials to provide clear, concise, and consistent information to help people understand their risks and to take appropriate protective and response actions. We recommend developing and using message maps, which is a risk communication tool used to help organize complex information and make it easier to express current knowledge. The message map development process distills information into easily understood messages written at a sixth-grade reading level. Messages are presented in three short sentences that convey three key messages. Each message is 27 words or less in length. Each primary message has three supporting messages that can be used when and where appropriate to provide context for the issue being mapped. The approach is based on surveys showing that lead or front-page news media stories usually convey only three key messages, each in usually less than 9 seconds for broadcast media or 27 words for print. Although many questions that are raised during an incident will be incident-specific, there are many others that will be brought up regardless of the specific situation. These are the questions that can be addressed in preplanned message maps. For example, during our research, the first and most critical question members of the public, as well as responders, clinicians, and public health officials asked was "How can I protect myself and my family?" A message map to respond to this question might be -- Listen to local authorities for specific instructions. Shelter-in-place until you receive information about what to do. Local officials will provide information about evacuation if necessary. And don't forget pets in emergency plans. If you think you are contaminated, there are simple steps you can take to remove the contamination. Remove clothes before entering your home or shelter. Wash skin and hair with soap and lukewarm water. And minimize touching other people or things to control contamination spread. If you are pregnant or a nursing mother, special precautions may be needed. Protecting pregnant women will protect their unborn babies. Nursing mothers should listen for guidance on breastfeeding. And formula may be preferable to breast milk for infant feeding. There will be other related questions that map back to these same basic messages, and perhaps slightly different supporting messages. In addition, there are other core messages that will respond to key questions that a person is certain to ask during a radiological or nuclear emergency. Again, they will have additional questions that will map back to them. To help this process for ourselves as well as for you, CDC has begun drafting message maps such as the one just described for broad use by public health and other officials during a radiological or nuclear emergency. CDC communications staff and health physics staff work together on these messages to ensure technical accuracy as well as adherence to risk communication principles. We are now testing these messages with target audiences. We plan to make these messages available on our Radiation Emergency website at www.bt.cdc.gov/radiation. They will be there for your use when they are in final form. We already have numerous other resources on this site. In addition, CDC's main Emergency Preparedness and Response website, at www.bt.cdc.gov, includes valuable resources, such as B-roll and interview segments. At www.bt.cdc.gov/ firsthours/dirtybomb, you will find risk communication training materials as well. In addition, the National Public Health Information Coalition, which has representatives in each state health department, is also a valuable resource for helping to develop the communication component of your radiological or nuclear emergency plans. In summary, planning for communication can make all the difference in your ability to manage the crisis and recovery stages of a radiological or nuclear terrorist incident. As Abraham Lincoln once said, "Give me six hours to chop down a tree, and I will spend the first four sharpening the ax."