VIDEO TRANSCRIPT/

[Armin:] Hello, and welcome to the panel discussion on the use of environmental monitoring data to support public health decision making in radiation emergencies. I'm Armin Ansari, a health physicist with the Centers for Disease Control and Prevention. Joining me are Dan Blumenthal, manager of the Department of Energy National Nuclear Security Administration Consequence Management Program, and Frieda Fisher-Tyler, Director of the Radiation Control Program for the state of Delaware Division of Public Health. The purpose of this panel discussion is to: identify federal resources available to respond to radiation emergencies, discuss the response timeline, and describe the types of information and data products that will be available to responders and decision makers. Frieda, Dan, thank you for making yourselves available for this discussion.

[Frieda:] It's a pleasure.

[Dan:] Happy to be here.

[Armin:] Dan, typically when we use the term "radiation emergencies" we're referring to a range of incidents. Could you provide us with a little more detail about the types of radiation emergencies that could lead to the activation of federal resources?

[Dan:] What we're talking about are incidents that result in widespread radioactive contamination of the environment. Whether the incident involves a release of radioactive material from a nuclear power plant, a terrorist attack using a radiological dispersal device, or the detonation of an improvised nuclear device, emergency response officials will need detailed information regarding the location and quantity of radioactive contamination in the environment.

[Armin:] And who's involved in the collection and analysis of this information?

[Frieda:] Well, Armin, most states are "home rule states," meaning that local government officials are in charge of responses within their jurisdictions. But effective response will involve a partnership between local, state, and federal agencies. At the local level, the first responders - like law enforcement, fire and emergency medical personnel - will be first on scene. Local emergency management and health agencies, and the local executive - such as the mayor, city manager, or county commissioners - will be leading the response. And for incidents that result in large amounts of radioactive contamination, local agricultural representatives will also need to be involved.

[Armin:] And how about at the state level?

[Frieda:] Each state also has a radiation control program, and in a radiation emergency their knowledge and insight will be essential for an effective response. The state emergency management, health, agricultural, and environmental protection agencies will also be valuable partners. In a large incident, the state Governor will be the lead executive. Early in a response, a Governor's emergency declaration can unlock vital state resources necessary for an effective response.

[Armin:] Okay, so we have the state and local emergency management, radiation control, public health, agriculture and environmental protection agencies, as well as the first responders. And on top of those assets, we have resources available from several federal agencies, including: The Department of Energy, The Department of Homeland Security, The Department of Health and Human Services, including the Centers for Disease Control and Prevention and the Food and Drug Administration, The Environmental Protection Agency, The Department of Agriculture, The Department of Defense, The Federal Bureau of Investigation in incidents that likely involve criminal action, and the Nuclear Regulatory Commission in incidents that involve a commercial nuclear power plant. Did I capture everything?

[Dan:] I believe so. Keep in mind there are other agencies with roles as in any other major disaster.

[Armin:] But it's the Department of Energy that provides most of the environmental monitoring assistance and modeling capabilities, right?

[Dan:] You could say that. The Department of Energy manages several radiation emergency response assets that will provide vital assistance and information during the response. These assets include: The National Atmospheric Release Advisory Center, The Radiological Assistance Program, The Aerial Measuring System, The Federal Radiological Monitoring and Assessment Center, and the Radiation Emergency Assistance Center & Training Site.

[Armin:] Can you please walk us through each one of these assets?

[Dan:] Certainly; It's a long list. I like to group the assets as: modeling, monitoring and medical. Even before assets arrive on the scene, The National Atmospheric Release Advisory Center, known as "NARAC," develops plume models and predictive maps of the affected areas based on estimates of what is released and the meteorological conditions. In the early hours following an incident, these models can be used to determine appropriate protective actions. NARAC continues to refine the models as radiation monitoring teams collect field data. This work is done in support

of the Interagency Modeling and Atmospheric Assessment Center, known as "IMAAC," an interagency group managed by the Federal Emergency Management Agency. The Radiological Assistance Program consists of specialized radiation monitoring teams stationed throughout the country. These teams, known as "RAP Teams," are usually the first federal radiation monitoring personnel available to assist state and local officials. Depending on the location of the incident, the first RAP teams can arrive on-scene within a few hours of a request for assistance. The Aerial Measuring System uses airplanes and helicopters equipped with radiation detection instruments to collect radiation readings as the aircraft flies over the affected area. These data are used to refine NARAC models and make rapid assessments of the overall impact based on what is really on the ground versus being just a prediction.

[Armin:] And how is all this monitoring coordinated?

[Dan:] The Federal Radiological Monitoring and Assessment Center, known as the "FRMAC," coordinates federal environmental radiation monitoring activities with those of state and local agencies. The FRMAC is composed of professionals from various federal, state, and local agencies, and may consist of as few as 60 people or as many as 500, depending on the size of the incident. The FRMAC can be located near the incident command post and can integrate into the planning section of the incident command structure. The Consequence Management Home Team is a component of the FRMAC. It supports analysis, map production, and planning for the deployed FRMAC personnel as well as any other State and local responders in need of such assistance.

[Armin:] You told us about modeling and monitoring, how about the medical component?

[Dan:] The Radiation Emergency Assistance Center/Training Site, known as "REAC/TS," is a medical asset that can provide consultation to medical professionals caring for patients injured by radiation exposure or radioactive contamination. REAC/TS also trains medical personnel and first responders either before an emergency as part of their continuing education or after an emergency has occurred. This just in time training provides basic skills for medical personnel and helps reduce their fear of radiation.

[Frieda:] You know, Dan, another federal asset that can provide guidance to state and local officials is the Advisory Team for Environment, Food and Health. The Advisory Team is composed of radiation professionals from the Centers for Disease Control and Prevention, the Environmental Protection Agency, The Food and Drug Administration, and the Department of Agriculture. In a radiation emergency, there will be a lot of information generated by field monitoring teams, and officials that

aren't familiar with radiation measurements can find it very confusing. The Advisory Team can help interpret the information and provide federal recommendations to officials who may need to issue protective action recommendations as part of the response. It's also worth noting that the Department of Energy assets and the Advisory Team are available to support state and local officials upon request, with or without a Presidential emergency or disaster declaration.

[Armin:] So far we haven't discussed FEMA's response. What is FEMA's role in a radiation emergency?

[Dan:] As in other incidents, FEMA will work alongside state and local emergency management agencies to coordinate the response and access necessary resources. In large incidents, FEMA will work with these agencies to obtain a Presidential emergency or disaster declaration, unlocking additional federal assets and funding.

[Armin:] Okay, now that we have identified the players, let's discuss the response timeline. Frieda, what types of information do state and local officials need, and when do they need them?

[Frieda:] Well, there are several key pieces of information that are needed to effectively respond to a radiation emergency. Officials leading the response will need to know: what radioactive material is involved, how much radioactive material there is, which areas are affected, and what actions should be taken to protect citizens and response personnel. Additionally, officials will need to know how far the radioactive material has traveled, and how long the radioactive material will be there. The extent of information available to answer these questions will vary greatly during the response.

[Armin:] Tell us how.

[Frieda:] Unless it's a very unusual situation, radiation emergencies will occur with little or no warning. Response personnel could be at their normal work locations or off-duty, depending on the time of day and normal work schedules. Within the first few hours of the response, information available will be in the form of preliminary radiation measurements performed by first response personnel and predictive information developed by state and federal responders.

[Armin:] And by predictive information, you mean results from computer modeling?

[Frieda:] Yes, exactly.

[Armin:] Okay. Now, Frieda, are there state assets that can be deployed early in the response?

[Frieda:] Yes. There are state radiological response teams as well as civil support teams from the national guard.

[Armin:] And, Dan, again early in the response, are there federal resources that can be deployed to assist local and state responders?

[Dan:] A couple of Federal assets are or will be available in very short order. The first of these is the IMAAC, which can provide predictive maps based on the size and nature of the event and the local weather conditions, such as wind speed, wind direction, and atmospheric stability, precipitation. IMAAC has the ability to produce a variety of maps of the affected area.

[Armin:] These maps start out as predictions?

[Dan:] Yes, they are based on information available at the time of the incident. After radiation response assets are mobilized, RAP teams and AMS will gather environmental measurements and send that field data back to the FRMAC for analysis. IMAAC then uses that field data to refine the predictive maps. As the response progresses, the maps become less predictive and more representative of the actual conditions on the ground.

[Frieda:] Another resource that is available is the RadResponder network, which allows response personnel nationwide to upload and share the results of radiation measurements. Response personnel from various agencies can access the RadResponder network and upload their field measurements.

[Admin:] How are these data used?

[Frieda:] Data entered into the RadResponder network are available to federal IMAAC and FRMAC personnel and can be incorporated into their modeling and data products, making the RadResponder network an effective way to use large numbers of field measurements early in the response.

[Armin:] Are the information needs any different for a nuclear incident than they are for a radiological incident?

[Frieda:] Yes. In the event of an Improvised Nuclear Device, or IND, the initial priority will be identifying areas where issuing prompt protective actions and deploying a targeted response can save the most lives.

[Dan:] That's right. IMAAC can provide two kinds of maps to support an IND response - one that shows blast effects on people and buildings, and one that shows estimated radiation effects on people, both from the explosion itself and from the ensuing radioactive fallout. These maps will help direct response efforts to areas where it is likely to find survivors and where responders can provide the most beneficial assistance.

[Armin:] How do the maps delineate these areas?

[Dan:] The maps that show blast effects identify three damage zones - severe, moderate, and light. They also show the area where the combined effects of the blast, heat and radiation from the IND are so severe that people in that area are unlikely to survive the incident. The area of near 0% survivability is roughly comparable to the severe damage zone from blast effects. The largest potential for live-saving is in the moderate damage zone, but responders in this area must exercise extreme caution due the potential presence of dangerous radioactive fallout. In addition to blast damage, an IND will result in lethal radiation levels close to the detonation site and downwind in areas of fallout; however, radiation levels associated with fallout from nuclear weapons will decrease rapidly. IMAAC produces predictive maps showing dangerous fallout at six default time intervals - 3 hours, 6 hours, 12 hours, 24 hours, 36 hours, and 48 hours post-detonation.

[Armin:] Okay, for people located in the dangerous fallout zone, the safest course of action is to stay inside?

[Frieda:] That's right. And depending on the location, people may be advised to shelter in place for 24 to 48 hours, until radiation levels have decreased to the point that they no longer pose a risk to people as they evacuate the area. Secondary to life-saving concerns, IMAAC and FRMAC will produce maps showing areas where relocation of people may be necessary due to elevated radiation levels.

[Armin:] And people from these areas may eventually be allowed to return to their homes, farms, and businesses after radiation levels decrease?

[Frieda:] Possibly. The decision to re-enter or reoccupy an area will be based on a safety assessment that considers radiation monitoring data as well as other environmental considerations. One important thing to note is the IMAAC modeling products and FRMAC data products are interpretations of federal radiation guidance. They don't constitute federal recommendations to state and local officials. Recommendations will come from the state and, depending on the jurisdiction, local radiation protection officials and the federal Advisory Team.

[Armin:] It sounds like there will be a number of assets activated in the first 24-48 hours. What kind of federal footprint are we talking about?

[Frieda:] Well, the FRMAC alone may have 300-500 personnel, including field monitoring teams, assessment scientists, and management and logistics personnel. "Mobile laboratories from state and federal agencies may also arrive on scene to process environmental samples. In addition, Aerial Measuring Systems will be available to provide rapid assessments of radioactive contamination on the ground.

[Armin:] And how does the response evolve from this point?

[Frieda:] Once it has been determined that life-saving activities are no longer necessary, the primary focus will turn to protection of workers and the public from long-term health effects of radiation. FRMAC will produce data products tailored to worker protection and maps indicating areas from which people may still need to be relocated.

[Armin:] What will be the basis for those decisions?

[Frieda:] Relocation decisions are based on long-term cancer risk, and involve calculations of the radiation dose to be received in the first year post-incident and each year after that. These maps may also be used to determine areas where it may be safe to allow people to return to their homes, farms and businesses.

[Armin:] How do we address agriculture?

[Frieda:] FRMAC will produce maps indicating areas where restrictions on the distribution or consumption of agricultural products may be warranted. Early protective action guidance from the Food and Drug Administration is very conservative and may indicate broader restrictions than thorough sampling and analysis will lead to.

[Armin:] Most of what we talked about today happens early in the response. Let's move down the timeline; and tell us what happens next.

[Dan:] Well, the focus of environmental monitoring shifts from an initial evaluation of the affected areas to a more detailed characterization that supports long-term recovery decisions. Once federal, state and local officials agree that the radiological consequences of the incident have been adequately assessed, FRMAC will transition from Department of Energy leadership to Environmental Protection Agency leadership. While many of the resources required during the initial response will be allowed to return to their normal work locations, a large workforce will still be needed

to support ongoing environmental monitoring and long-term public health decision making.

[Armin:] So, in other words, the new priority will be to determine how residents in the affected areas can return to some semblance of normal life.

[Dan:] That's right.

[Armin:] Well, Frieda, Dan, thank you both for your time today. You've shared a lot of valuable information with us.

[Armin, turning to camera:] In addition to this panel discussion, we'll post links to additional resources and examples of the maps we've discussed on our website. Thank you for joining us.