

Protective Action Questions & Answers for Radiological and Nuclear Emergencies:

A companion document to the
U.S. Environmental Protection Agency
Protective Action Guide (PAG) Manual



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This the second update to the September 2017 publication. The 2022 update replaces non-specific language about the health effects of radiation with messages on the risks of cancer and Acute Radiation Syndrome that can be used when dose estimates become available. This 2023 update reflects advances in radiation protection science and communication.



Foreword

One of the most critical factors in the success of a radiological response is the effectiveness of public communication. “The timely and effective flow of information between agencies and the public is vital for facilitating and encouraging appropriate protective actions, reducing rumors and fear, maintaining public trust and confidence, and reducing morbidity and mortality.”¹

Pre-scripted radiation emergency public safety messages will both improve timeliness and increase consistency of the information communicated, which will enhance emergency planners’ ability to effectively communicate with the largest number of people. Social media and the 24-hour news cycle have created an expectation for answers and information on an accelerated schedule; both the media and the public want access to updated information on crises on various information platforms throughout the day. These answers will help your department or organization to meet and exceed that expectation.

This document is intended to help emergency planners prepare public communications prior to and during a radiological emergency; it is designed to be worked into emergency response plans and standard operating procedures. Each radiological emergency is unique; the messages contained in this book need to be adapted for the specific emergency at hand.

Based on the safety measures in the U.S. Environmental Protection Agency (EPA) *Protective Action Guide (PAG) Manual*, this document is applicable to all types of radiological emergencies that may necessitate the implementation of a protective action. It complements the planning considerations presented in the *PAG Manual* and Federal Emergency Management Agency’s incident-specific messaging documents *Improvised Nuclear Device Response and Recovery: Communicating in the Immediate Aftermath and Communicating During and After a Nuclear Power Plant Incident*.

The questions and answers in this document represent the best of the work produced through other government emergency radiological communications efforts. This document includes new messages addressing potassium iodide administration and populations that require special consideration, including pregnant and breastfeeding women, children, and individuals with disabilities.

Ideally, these messages never will be needed; nevertheless, we have a responsibility to be prepared to empower the public by effectively communicating how people can protect themselves and their families in the event of a radiological or nuclear emergency.

¹Becker, S. 2004. “Emergency communication and information issues in terrorist events involving radioactive materials.” *Biosecurity and Bioterrorism: Biodefense Strategy, Practices, and Science* 2 (3): 195–207.

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Protective Action Guidance

1. What is a protective action?

A protective action is an urgent step that people can take to protect their health and the health of their loved ones from radiation in a nuclear or radiation emergency.

The main protective actions that the public might be asked to take are evacuation or sheltering (staying inside).

2. How do people know which steps to take?

Health and emergency management officials will tell the public if protective actions are needed and which steps, whether evacuation or staying inside, will be most effective for avoiding radiation.

Officials make these decisions about how to protect public health by using information about local conditions and by following the recommendations in the *Protective Action Guide (PAG) Manual*.

Be aware that as conditions change, the guidance also may change. Stay tuned for updates.

3. What are the PAGs?

PAGs, or Protective Action Guides, are radiation dose guidelines that would trigger public safety measures, such as evacuation or staying inside, to safeguard public health during a radiation emergency. The U.S. Environmental Protection Agency developed the PAGs to help responders plan for and respond to radiation emergencies.

Every emergency is different, and the best action or set of actions in one situation may not be appropriate at another time or in another situation.

Officials use the PAGs, combined with their existing local knowledge, to help them make the very important decisions about which emergency steps are warranted and when those steps should be enacted.

4. Who uses the PAGs?

State, local and tribal governments have the main responsibility for taking measures to protect life and health.

In a radiation emergency, state, local and tribal emergency response agencies use the Protective Action Guides to decide when special actions are needed to avoid radiation exposure and protect people's health.

5. What kinds of steps are included in the *PAG Manual*?

The *Protective Action Guide (PAG) Manual* includes actions that both government agencies and members of the public can take to protect people's health in a radiation emergency.

In the beginning of a radiation emergency, the public might be asked to take one of two main protective actions to avoid exposure to radiation: evacuation or sheltering (staying inside). The PAGs also provide guidance on food safety and administration of potassium iodide.

6. What is evacuation? What is sheltering? What is the difference?

Evacuation involves urgently moving people away from a specific area to avoid or minimize health and safety risk.

Sheltering, on the other hand, involves having people stay inside their homes, offices, schools or other buildings to reduce exposure to an outdoor hazard.

7. What other steps might officials ask people to take?

Depending on the situation, evacuation or sheltering may be supplemented by other measures.

Limited Access—One possible step is to keep people out of the affected area by limiting access to it.

Decontamination—Another step involves decontamination, which means removing radioactive particles that may have fallen onto a person's clothes, skin or hair. Decontamination is done by having people wash or shower and change clothes.

Food—Sometimes officials may take steps to stop people and animals from consuming certain foods if those foods may be contaminated. Authorities also may act to prevent livestock from grazing in potentially contaminated areas and instead have the animals drink water and eat feed that has been previously stored.

Water—If alternative drinking water is needed, officials can provide bottled water, change the water source (such as switching to ground water), reroute water from an unaffected water system or choose a combination of these actions.

Potassium Iodide—Potassium iodide (KI) is a nonradioactive form of iodine. KI can be useful in situations where radioactive iodine has been released into the environment. KI works by filling a person’s thyroid gland with stable iodine so that harmful radioactive iodine is not absorbed, reducing the risk of thyroid cancer in the future. KI is not an “anti-radiation” drug. Never take KI or give it to others unless you have been specifically advised to do so by public health officials, emergency management officials or your doctor.

8. How do officials know when to carry out protective actions?

When a radiation emergency occurs, officials will use available information and computer models to quickly predict how much radiation people could *potentially* receive from the incident.

Officials then use the Protective Action Guides to determine what actions to take to *avoid or minimize* that potential exposure.

Expect recommended actions to be updated as the response evolves. Stay tuned to television, radio and government emergency management websites for updates.

9. Wouldn’t it make more sense to carry out all of the protective actions right away, as soon as a radiation emergency occurs?

No. Different safety measures are used for different situations.

Taking all of the safety measures at once is not possible: For example, people should not be told to stay inside and evacuate at the same time. Also, evacuating people when it is unnecessary increases the chance of accidents and injuries.

Officials need to identify the threat the emergency poses to people so they can provide the best advice on how to protect health. Actions will be determined based on available information, with the immediate and most severe safety threats being addressed first.

10. Why don’t officials just automatically advise everyone to evacuate when a radiation emergency occurs?

In some situations, sheltering may be a better choice for preventing or reducing radiation exposure. For example, if a cloud containing radioactive particles is expected to pass over an area soon and then leave quickly, evacuation could actually expose people to more radiation than staying inside.

This is because evacuation takes time, and many people might be caught outside or in their cars when the cloud passed over. People staying inside while the cloud passes by would be more protected than those caught outside trying to evacuate.

Also, in some situations, evacuation may not be practical. For example, blocked highways, power outages or severe weather could make evacuation difficult.

Officials using the Protective Action Guides and information about local conditions will tell the public what steps are needed in a radiation emergency. Follow the instructions so that you do what is needed to protect yourself and your loved ones.

11. Are there controls on food?

Officials might advise against eating vegetables from home gardens.

In some situations, officials also might determine that it is necessary to take actions to prevent radioactive material from entering the food supply.

Steps might involve preventing livestock from grazing in potentially contaminated pastures or fields and ensuring that animals eat and drink only feed and water that had been previously stored.

When necessary, officials also might act to stop certain foods from coming to market or limit consumption of certain foods that might be contaminated.

12. Are there controls on drinking water?

If alternative drinking water is needed, officials can provide bottled water, change the water source (such as switching to ground water), reroute water from an unaffected water system or choose a combination of these actions.

13. When should I take potassium iodide?

Never take potassium iodide (KI) or give it to others unless you have been specifically advised to do so by public health officials, emergency management officials or your doctor.

KI is a nonradioactive form of iodine that can be useful in situations where radioactive iodine has been released into the environment. It works by filling a person's thyroid gland with stable iodine so that harmful radioactive iodine is not absorbed, reducing the risk of thyroid cancer in the future.

KI is not an "anti-radiation" drug. KI is issued *only* in situations involving radioactive iodine, and it protects *only* the thyroid gland; it does not help in situations involving other types of radioactive releases, nor does it help protect other parts of the body.

14. Do the PAGs continue to play a role in protecting people after the immediate emergency is over?

Yes, it is possible that protective actions, including food safety measures, will stay in place to protect people until the area has been cleaned up.

One such cleanup measure is decontamination of land and property, which involves cleaning radioactive contamination from an area so that people can return to their homes and businesses. When this is not possible, another measure—relocation—may be required. Relocation involves moving people out of an area permanently. An additional protective action may involve continuing to place controls on food and water.

15. What is the basis for the PAGs?

The Protective Action Guides (PAGs) are radiation dose guidelines, or “trigger levels,” designed to prevent immediate harmful health effects from radiation while balancing the risks of developing cancer against the risks of protective actions, such as accidents from evacuation.

Balancing the risks between radiation exposure and protective actions is important. For example, evacuations present additional health and safety risks from traffic accidents and stress-related illnesses. The *PAG Manual* provides updated planning considerations based on the lessons learned from the 2011 evacuations related to the nuclear power plant release in Fukushima, Japan.

16. Where can I find out more about protective actions?

We are strongly committed to keeping the public informed and to answering people's questions. If you want to learn more about the Protective Action Guides (PAGs), please go to www.epa.gov/radiation/protective-action-guides-pags.

For information about [INSERT NAME OF RESPONSE HERE] protective actions, please contact us on the web at [INSERT AGENCY WEBSITE HERE] or by telephone at [INSERT AGENCY CONTACT NUMBER HERE].

Affected Community: Immediate Actions

17. If I am outside, what steps should I take to protect myself and my loved ones?

Doctors, scientists and health experts recommend a few simple steps that will help protect you and your loved ones.

If you are outside—

Cover your nose and mouth. Covering your nose and mouth with a cloth can reduce the risk of breathing in or swallowing radioactive material. You also may use a disposable mask, such as a dust mask, if one is immediately available.

Don't touch objects or debris related to the release—they could be contaminated with radioactive material.

Go inside and stay inside. Quickly go into a building where the walls and windows have not been broken. Close all doors and windows. Go to the basement or middle of the building. This will help shield you from any radiation that might be outside.

Remove your outer clothes. Once you are inside, carefully take off your outer layer of clothing. Do this in case any radioactive material fell onto your clothes while you were outside.

Put the clothing in a plastic bag and tie it shut, if possible. Be sure to keep the plastic bag away from people and animals.

Shower or wash off. If possible, take a warm shower with lots of soap. Don't scald or scratch your skin. Wash your hair. When washing, try to keep the suds and water from entering your mouth, and don't swallow the water. Parents or other adult caregivers should give children a shower or wash them following these directions.

If you cannot shower, use a wet wipe or clean wet cloth to wipe any skin that was not covered by clothing (such as your hands and face).

Gently blow your nose and gently wipe your eyelids, eyelashes and ears with a clean wet cloth.

Put on clean clothes. Clothing stored in a closet or away from radioactive material is clean. If you do not have clean clothes, carefully brush off your outer layer of clothing and get dressed again. Rewash your hands, face and exposed skin at a sink or faucet.

Tune in. Stay tuned to television, radio and government emergency management websites for updates.

18. If I am inside a building, what steps should I take to protect myself and my loved ones?

Doctors, scientists and health experts recommend a few simple steps that will help protect you and your loved ones.

If you are in a building—

Stay inside. If the walls and windows of the building are not broken, stay in the building and don't leave.

If the walls and windows of the building are broken, go to an inside room and don't leave. If the building has been heavily damaged, quickly go into another building where the walls and windows have not been broken.

Close doors and windows. To keep radioactive material from getting inside, shut all windows, outside doors and fireplace dampers. It is not necessary to put duct tape or plastic sheets around doors or windows.

If weather conditions permit, close the windows and turn off the fan, air conditioner or heater. Otherwise, set the fan, air conditioner or heater on recirculate. In-room fans (for example, ceiling fans) that only recirculate indoor air are okay to use. Air-conditioning systems in large buildings can be used if they are set on recirculate.

If you must go outside, follow the “if you are outside” instructions in question 17.

19. If I am in a car or truck, what steps should I take to protect myself and my loved ones?

Cars and trucks provide little protection from radiation.

If you are in a car or truck—

Shut the windows and vents. Close the windows and turn off the fan, air conditioner or heater if weather conditions permit. Otherwise, set the fan, air conditioner or heater on recirculate.

Cover your nose and mouth. Covering your nose and mouth with a cloth can reduce the risk of breathing in or swallowing radioactive material. You also may use a disposable mask, such as a dust mask, if one is immediately available.

Go inside and stay inside. If you are near your home, office or a public building where the walls and windows have not been broken, go there immediately and go inside quickly. Close all doors and windows. Go to the basement or middle of the building. This will help shield you from any radiation that might be outside.

If you cannot get to your home or another building safely, pull over to the side of the road and stop in the safest place possible. Turn off the engine and stay in the car until you are told it is safe to get back on the road. Cars offer more protection than being outside.

If it is a hot or sunny day, try to stop under a bridge or in a shady spot so you and your passengers don't overheat.

Tune in. Listen to the car radio or check government emergency management websites for more instructions.

20. If I am in a potentially affected community, what steps should I take to protect myself and my loved ones?

If you are in a potentially affected community—

Go inside and stay inside. If you are near your home, office or a public building where the walls and windows have not been broken, go there immediately and go inside quickly. Close all doors and windows. Go to the basement or middle of the building. This will help shield you from any radiation that might be outside.

The wind can sometimes carry radioactive material from the site of the release. As a precaution, people should stay inside for their personal safety until authorities say it is okay to leave.

Tune in. Stay tuned to television, radio and government emergency management websites for updates.

21. What should people do if they are on a boat near the affected area?

Like cars, boats do not provide adequate protection from radioactive material. Tune in to the radio for more information about the location of the radioactive material.

If you are in a boat, you have two choices:

- Return to a marina or boat landing, find a building and immediately go inside, **OR**
- Get information about the location of the radioactive material and navigate to a distance far enough away from the incident.

22. What should people do if they're told to evacuate?

If you are told to evacuate, leave the area immediately.

When the public evacuates, they are moved to safer areas depending on levels of radiation and radioactive material to keep exposures as low as possible.

If you are told to evacuate—

- Pay close attention to what officials are telling you.
- Take the designated routes to the location where you will be registered and checked for contamination. A list of these locations can be found at [\[INSERT AGENCY WEBSITE HERE\]](#).
- If easily accessible, bring identification cards and medications with you.
- Follow the instructions from law enforcement personnel.

Transportation will be provided to those who need it, including accessible transportation for people with disabilities.

Limit phone calls to emergencies only, so those who need immediate help can be answered quickly. Text messaging may work better during high-volume periods because it does not require as much bandwidth as a phone call.

23. Are care shelters available for people who are evacuating?

Yes, designated shelters have been opened.

You should first go to a designated location to be checked for contamination. Then you can go to a shelter, or you can stay at a hotel or with family or friends.

24. There is a protective action on the next street but not on mine. How do I know I am safe?

Protective actions include buffer areas for safety. If you have not been issued a safety precaution, it is because you are outside the affected and buffer areas. Safety precautions may be updated as more information becomes available. Stay tuned to television, radio and government emergency management websites for updates.

25. A radiological release occurred. Why haven't I been issued safety precautions?

Safety precautions are not needed. The release was [TOO SMALL, TOO FAR AWAY, CONTAINED PARTICLES THAT WERE TOO HEAVY TO TRAVEL VERY FAR, ETC.] to necessitate safety precautions.

Even if radiation from the event is detected at your location, the levels will be so low that taking a safety precaution may do more harm than good. Balancing the risks between radiation exposure and protective actions is important. For example, evacuations present additional health and safety risks from traffic accidents and stress-related illnesses.

26. Why are the recommended actions changing, and which one should I follow?

The recommended actions are being updated because the authorities have access to better, more recent information about the event. The recommended actions are designed to minimize risk to the affected population. You always should follow the most recent recommended actions for your group/area.

Potassium Iodide (KI): Important Information

27. What is potassium iodide? How does it work?

Potassium iodide (KI) is a nonradioactive form of iodine.

KI is issued only in situations where radioactive iodine has been released into the environment, and it protects only the thyroid gland.

KI works by filling a person's thyroid gland with stable iodine so that the harmful radioactive iodine from the release is not absorbed, reducing the risk of thyroid cancer in the future.

You should take KI *only* if you have been specifically advised to do so by local public health officials, emergency management officials or your doctor. It is not an “anti-radiation” drug.

28. Should my family take potassium iodide?

Never take potassium iodide (KI) or give it to others unless you have been specifically advised to do so by the health department, emergency management officials or your doctor.

KI reduces risk from radioactive iodine only if taken very close to the time of exposure. It is not an “anti-radiation” drug.

29. What types of incidents release radioactive iodine?

Radioactive iodine *might* be released during a nuclear power plant incident or a nuclear detonation. In the case of a nuclear power plant release, the plant operators will know if radioactive iodine has been released into the environment and will inform local officials so that decisions on distributing potassium iodide can be made quickly.

30. Will potassium iodide protect me from radiation?

Potassium iodide (KI) protects only the thyroid gland from radioactive iodine. It does not provide protection from any other kind of radiation exposure.

KI pills are not “radiation antidotes.” KI should be taken *only* if there is a specific public health recommendation to do so.

31. Are over-the-counter medicines that contain iodine, such as disinfectants or throat sprays, a good substitute for potassium iodide?

No. Over-the-counter medicines will not protect your thyroid, and some could be dangerous to your health. It is true that many over-the-counter medicines contain some form of iodine, such as iodine liquid for cuts and sores, disinfectants, and throat sprays. These should never be taken as a substitute for potassium iodide (KI). The amount of iodine contained in most of these products is small and would have no protective effect against radioactive iodine.

Over-the-counter medicines always should be used as directed. Some topical medicines might contain ingredients that can be harmful if ingested.

Never take KI or give it to others unless you have been specifically advised to do so by the health department, emergency management officials or your doctor.

32. What about taking household disinfectants or antiseptics that contain iodine? Are these a good substitute for potassium iodide?

No. Household cleaners will not protect your thyroid. Drinking or consuming them could poison you.

33. Is taking large amounts of iodized salt a good substitute for potassium iodide?

No. Iodized salt will not protect your thyroid. It is true that iodized salt contains small quantities of iodine, but the amount is too low to prevent radioactive iodine from being absorbed by the thyroid.

Furthermore, although most people don't realize this, it could even be dangerous. The main ingredient in salt—sodium chloride—can make people very ill if taken in large amounts. Even tablespoons of salt taken repeatedly over a short period of time can cause poisoning. Eating large amounts of salt also can cause high blood pressure and other medical problems.

34. Are herbs or herbal products a good substitute for potassium iodide?

No. Herbs will not protect your thyroid and could even be dangerous to your health. It is true that some herbs and herbal products may contain iodine. But the amount of iodine is not regulated, so it is not possible to know how much iodine you will be getting.

Taking large amounts of herbs or herbal products could endanger your health.

35. Are there other medications or supplements I can take to minimize my risk?

Other medications and radiation countermeasures can be used in rare cases, but take those medications only when directed by the authorities or your doctor.

36. Do people need a prescription to obtain potassium iodide?

No. If public health and emergency management officials determine that taking potassium iodide is appropriate, the pills will be provided to people at no cost.

Additional Information: Situation Specifics

37. Where should I go for information about the situation?

Stay tuned to television, radio and government emergency management websites for updates.

Public health and emergency management officials will provide regular updates. You also can go to the following website or toll-free hotline for information:

- [\[INSERT AGENCY WEBSITE HERE\]](#)
- [\[INSERT AGENCY PHONE NUMBER HERE\]](#)

38. I am seeing a lot of information and instructions on Internet blogs about what to do. Should I follow that advice?

Check official sources first. You can find the latest information at [\[INSERT WEBSITE HERE\]](#).

Blogs, social media and the Internet in general can provide useful information, but only if the source is known and trustworthy.

Unfortunately, we know from past disasters and emergencies that small numbers of individuals may take the opportunity to distribute false information. Even well-intentioned individuals can sometimes pass on incorrect information or rumors.

Therefore, double-check what you are reading with the information and instructions being provided by the official website listed above, the official toll-free hotline, or local radio and television broadcasts.

In an emergency, get information from reliable sources so that you can protect your health and the health of loved ones.

39. I received a text message giving me instructions on what to do. How do I tell if it is an official message or a fake?

If the government has issued an emergency text message, it will be clearly identified as coming from [\[INSERT INFORMATION\]](#). That is, the sender will read [\[INSERT INFORMATION\]](#).

Unfortunately, we know from past disasters and emergencies that small numbers of individuals may use the situation to send out official-looking false information. Even well-intentioned individuals can pass on incorrect information or rumors.

If you are unsure about a message, cross-check what you are reading with the information and instructions being provided by the official website or the official toll-free hotline.

- [\[INSERT AGENCY WEBSITE HERE\]](#)
- [\[INSERT AGENCY PHONE NUMBER HERE\]](#)

40. How many people have been injured or killed?

At this time, we do not yet know the specific number of casualties. An update will be provided as soon as reliable information becomes available.

Right now, we are focused on getting help to people in the affected area as quickly and safely as possible.

41. Where is the radioactive material located?

Radiation and environmental health experts are checking air, water and ground conditions in and around the release site to locate the areas with radioactive contamination. Stay tuned to radio or television, or visit [\[INSERT AGENCY WEBSITE HERE\]](#) for the latest information.

42. What is a plume?

A plume is the cloud of radioactive material moving away from the incident site. A radioactive plume is not likely to be visible, but can be detected with radiation detection instruments.

43. Where is the radioactive plume going?

According to current weather predictions, the areas [\[DIRECTION\]](#) of [\[CITY\]](#) could be in the path of the radioactive plume.

Until advised otherwise, people in neighborhoods and communities that could be in this path should stay inside.

44. What should I do if I come across an object that might be radioactive?

Don't approach, pick up or touch debris or other objects that may be contaminated with radioactive material. These objects could be dangerous, especially in the immediate vicinity of the incident.

45. What are emergency responders doing now?

Emergency responders, radiation experts, scientists and representatives from all levels of government are working together to protect the public and save lives.

If terrorism is suspected: Law enforcement is working to identify and apprehend those responsible.

46. How can people learn about the safety of their family members?

Use text messages instead of phone calls to try to reach your family and loved ones.

If phone lines or other types of communication infrastructure are damaged, or if the lines are clogged, you may not be able to complete a phone call.

If you have access to a computer or a Web-enabled device, use e-mail, social media websites like Facebook and Twitter, or online registries such as the Red Cross Safe and Well website.

Emergency responders are gathering and organizing all vital information available. If you are separated from your family or loved ones, search online for registries where people can identify themselves and their location.

Bear in mind that it may take time for registries to put in the latest information. You can seek additional information and counseling services at [\[LIST ORGANIZATIONS OR LOCATIONS\]](#).

47. What will happen to people in the affected neighborhoods?

As appropriate: Lives have been lost, people have been injured, and homes and businesses have been destroyed.

All levels of government are coordinating their efforts to do everything possible to help the people affected by this emergency.

As lifesaving activities continue, follow the instructions from emergency responders. These instructions are for your safety and the well-being of your loved ones. The instructions are based on the best information we have right now; the instructions will be updated as more information becomes available.

48. How can the public help?

Your help is vital in this situation.

Here are six important steps you can take to help:

1. **Don't abandon your car on the road.** Instead, park your car where it won't block traffic. This will allow responders to reach people who need help.
2. **Don't go near the release site.** It could put you in danger and prevent emergency responders from doing their jobs.
3. **Use text messaging.** Phone lines might overload; use text messaging to communicate with your friends and family. Text messages might be more likely to go through.
4. **Don't go to the hospital, police stations or fire stations unless you have a medical emergency.** These facilities will be busy responding to the incident and need to be available to those who are seriously injured or have another medical emergency requiring immediate treatment.
5. **Stay alert.** If you see anything suspicious, contact your local police or the FBI right away.
6. **Stay tuned.** We will continue to update you through television, radio and emergency management websites.

49. When will it be safe for people to return to their homes and businesses?

Federal, state and local partners are collecting information about the hazards in the affected areas. Until this is done, we cannot predict when people can begin returning to the area.

If you have been evacuated, **do not return until you are told it is safe** to do so by authorities. Please don't put yourself or your family in danger by attempting to return early. Returning early could interfere with responders' efforts to help those who need immediate assistance.

50. Will this affect air travel?

Until we have more information, expect air travel in and near the affected area to be restricted.

Limiting air travel keeps airline crews and passengers safe and keeps the airspace free for response and recovery efforts.

51. Will this affect travel on waterways, both at home and abroad?

Until we have more information, expect the use of navigable waterways in the affected area to be restricted.

Limiting waterway traffic keeps boaters, ship crews and passengers safe and keeps the waterways free for response and recovery efforts.

Radiation Health Effects

52. What is radiation?

Radiation is energy. It travels in the form of energy waves or energized particles.

Radiation can pose a health risk by damaging the tissues and cells of your body, but these risks can be limited by your distance from the source, the time exposed to the source, and the barriers between you and the source.

During a radiological emergency, we try to keep exposure to radiation as low as possible.

53. What is radioactive material?

Radioactive material is a substance that gives off radiation in the form of energy waves or energized particles. Radioactive materials released by a radiological incident could include dust, powder, debris, liquids, and gasses. The types of radioactive materials released depends on the specific nature of the incident.

54. Is there any way for me to tell if radioactive materials are present or if I am being exposed to radiation?

Your natural senses are unable to detect radiation or radioactive material. The only way to determine presence of, or exposure to, radiation or radioactive materials is with special instruments or tests designed for that purpose. Emergency response authorities are using these instruments to find radiation in the affected areas and will notify the public.

55. What are millirem (mrem) and millisieverts (mSv)?

These units measure radiation dose. Dose is defined as the amount of radiation or energy absorbed by a person's body. In the United States, dose is measured in units called millirem (mrem). The international unit is millisievert (mSv).

The risk of health effects from radiation depends on the dose received. Safety recommendations are designed to keep your dose as low as possible. The lower the dose, the lower the risk.

[PUT IN CONTEXT OF RADIATION INCIDENT RADIOACTIVITY FINDINGS]

56. What is a curie (Ci) or a becquerel (Bq)?

These units measure the amount of radioactive material in a sample, such as in a sample of water, soil or air. This is sometimes referred to as the sample's radioactivity (or simply its activity). In the United States, we measure this amount of radioactive material in curies (Ci), and the international community uses becquerels (Bq). Typically, results will be in picocuries (pCi), which is one trillionth of a curie.

[PUT IN CONTEXT OF RADIATION INCIDENT RADIOACTIVITY FINDINGS]

57. Will people who have been exposed to the radiation get cancer?

Use this statement if projected/actual dose is known —

The risk of cancer from radiation depends on the dose received.

The dose from the incident {was/is} estimated to be [INSERT DOSE]. To put this in perspective, about 99 percent of a population would not get cancer if their whole body got a dose of 100 millisieverts (10,000 millirem).

- Follow all safety instructions. They are intended to keep your radiation dose as low as possible.
- The lower the dose, the lower the risk.

Use this statement if projected/actual dose is not known —

The risk of cancer from radiation depends on the dose received.

Scientists and health experts are working now to gather information on the radiation risks posed by this incident.

- Official updates will be provided via radio, television, and the Internet.

Follow all safety instructions provided by responders and local government. They are intended to keep your dose as low as possible.

- The lower the dose, the lower the risk.

58. Is radiation contagious?

No. Radiation is not like a cold. You cannot catch it from someone.

It is true, however, that people who have radioactive material on their clothes or their bodies can leave some of that contamination on objects or people they come into contact with.

But there is a simple solution: They should clean up or decontaminate themselves. People who might have radioactive material on them can take the following steps:

Remove your outer clothes. Once you are inside, carefully take off your outer layer of clothing. Do this in case any radioactive material fell onto your clothes while you were outside.

Put the clothing in a plastic bag, and tie it shut, if possible. Be sure to keep the plastic bag away from people and animals.

Shower or wash off. If possible, take a warm shower with lots of soap. Don't scald or scratch your skin. Wash your hair. When washing, try to keep the suds and water from entering your mouth, and don't swallow the water. Parents or other adult caregivers should give children a shower or wash them following these directions.

If you cannot shower, use a wet wipe or clean wet cloth to wipe any skin that was not covered by clothing (such as your hands and face).

Gently blow your nose and gently wipe your eyelids, eyelashes and ears with a clean wet cloth.

Change clothes. Change into clothes stored inside an intact building. If you cannot change clothes, carefully brush off your outer layer of clothing. After brushing off, wash your hands, face and exposed skin at a sink or faucet.

59. Are people at risk for radiation poisoning or sickness?

SELECT MESSAGE DEPENDING ON WHETHER ANSWER IS YES OR NO FOR THE SPECIFIC LOCATION.

If yes, radiation experts say the release may have been large enough to cause immediate health effects for some people —

For people in [SPECIFY LOCATIONS]:

- If you have skin burns, nausea, or if you began vomiting shortly after radiation exposure, seek medical attention as soon as it is safe to leave your building or place of shelter. These may be symptoms of acute radiation syndrome (ARS) or radiation sickness, which is caused by exposure to large amounts of radiation over a short period of time. Symptoms can appear within minutes to several days after you were exposed to large amounts of radiation.
- If you are not experiencing these symptoms or do not have another life-threatening condition, stay away from hospitals. Hospitals need to care for those most critically injured.
- Follow all safety instructions to keep your radiation dose as low as possible.

If no, the dose from the release is too low to cause Acute Radiation Syndrome in the specific location —

- The release of radiation in [SPECIFY LOCATIONS] was not large enough to cause radiation sickness. Radiation sickness is an illness from short-term exposure to a large amount of radiation.
- The highest amount of radiation we expect from this incident is far below the amount that could cause radiation sickness.

If possible, get a comparison from radiation experts—

- o The amount of radiation is [INSERT COMPARISON: HUNDREDS, THOUSANDS, TEN THOUSAND, ETC.] times lower than the amount that could cause radiation sickness.
- We still want to keep radiation dose as low as possible, so please follow all safety instructions.

Food, Water and Air Safety

60. Is the food safe to eat?

You may consume food and drinks that were inside a building. Check food in a refrigerator or freezer to make sure it hasn't spoiled.

You may eat food in sealed containers that were outside or in a damaged building as long as you wipe off the container with a damp towel or cloth. Put these towels or cleaning cloths in a plastic bag and tie it shut, if possible. Be sure to keep the bag away from people and pets.

Unsealed foods that were outside may be contaminated with radioactive material. Do not consume food from your garden, or food or liquids that were outdoors and uncovered, until authorities tell you it is safe.

61. Can people eat food from their gardens or locally caught fish and game?

People in [AREA] are instructed not to eat [FOOD FROM THEIR GARDENS, LOCAL FISH, LOCAL WILDLIFE].

Responders will be monitoring the area around the release and will notify you when it is safe to eat local fish, game and food from your garden.

If you are concerned and suspect that radioactive material has settled on your garden, make sure to wash, or simply don't eat, the food.

Listen for instructions from state and local officials and responders regarding food safety.

62. Is the water safe to use?

Bottled water and sealed juice or soda containers will be free of radioactive contamination. If the containers were outside or in a damaged building, wipe off the container with a damp towel or cloth. Put these towels or cleaning cloths in a plastic bag and tie it shut, if possible. Be sure to keep the bag away from people and pets.

Water from the tap is probably safe. But until we have drinking water test results, only bottled water is certain to be free of contamination.

Tap or well water can be used for cleaning yourself and your food.

If alternative drinking water is needed, officials can provide bottled water, change the water source (such as switching to ground water), reroute water from an unaffected water system or choose a combination of these actions.

Boiling tap water does not get rid of radioactive material.

63. What should farmers do with their crops?

If you are being asked to stay inside (shelter-in-place) or evacuate, follow the instructions of state and local officials. These instructions are for your safety.

We are asking farmers in [AREA] not to tend, harvest, eat or distribute their crops until radiation monitoring and sampling results are analyzed, unless otherwise directed.

We recognize that your crops are your livelihood. State and local officials will keep you informed as radiation monitoring and sampling results come in.

64. What should farmers and ranch owners do with livestock?

If you are being asked to stay inside (shelter-in-place) or evacuate, follow the instructions of state and local officials. These instructions are for your safety.

We are asking farmers and ranchers in [AREA] not to transport their livestock and to not consume or distribute milk from dairy animals until radiation monitoring and sampling results are analyzed, unless otherwise directed. If you have milk-producing animals, contact state and local officials for guidance.

Take these simple steps to protect your livestock from eating feed or drinking water contaminated with radioactive material:

- **Move your livestock inside**, away from more highly contaminated areas outside.
- **Use only stored feed and covered water.** If possible, avoid using hay or alfalfa kept outside.

65. Is the air safe to breathe?

Federal, state and local partners are monitoring [AREA] to determine the location and levels of radioactive material on the ground and in the air.

If radioactive particles are in the air, you can take these simple steps to reduce your exposure:

- **Covering your mouth and nose** with a cloth can reduce the risk of breathing-in or swallowing radioactive materials. You may also use a disposable mask, such as a dust mask, if one is immediately available.

- **If you have been instructed to stay inside, remain inside.** The roof and walls provide protection from the radioactive material outside.
- **If weather conditions permit, close doors and windows.** To keep radioactive materials from getting inside, shut all windows, outside doors and fireplace dampers. It is not necessary to put duct tape or plastic sheets around doors or windows.
- **If weather conditions permit, turn off the fan, air conditioner or heater.** Otherwise, set the fan, air conditioner or heater on recirculate. In-room fans (for example, ceiling fans) that only recirculate indoor air are okay to use. Air-conditioning systems in large buildings can be used if they are set on recirculate.

We are tracking the radiation levels, and authorities will instruct you to leave the area if it is in your best interest to do so.

Decontamination

66. If people are told by health and emergency management officials to self-decontaminate, what does this mean?

It means that people are being told to take several easy steps to remove any radioactive material that might have fallen onto clothes, skin or hair.

Take the following steps to self-decontaminate:

Remove your outer clothes. Once you are inside, carefully take off your outer layer of clothing. Do this in case any radioactive material fell onto your clothes while you were outside.

Put the clothing in a plastic bag, if available. Store the plastic bag away from people and animals.

Shower and wash off. If possible, take a warm shower with lots of soap. Don't scald or scratch your skin. Wash your hair. When washing, try to keep the suds and water from entering your mouth, and don't swallow the water. Parents or other adult caregivers should give children a shower or wash them following these directions.

If you cannot shower, use a wet wipe or clean wet cloth to wipe any skin that was not covered by clothing (such as your hands and face).

Gently blow your nose and gently wipe your eyelids, eyelashes and ears with a clean wet cloth.

Change clothes. Change into clothes stored inside an intact building. If you cannot change clothes, carefully brush off your outer layer of clothing. After brushing off, wash your hands, face and exposed skin at a sink or faucet.

Tune in. Stay tuned to television, radio and government emergency management websites for updates.

67. How quickly does an exposed person have to remove contamination from their body?

There is no set time. People should remove contamination as soon as possible to reduce their radiation dose by following the steps listed above.

68. I am injured, and I think my wound is contaminated. What should I do?

Flush the wound with lots of fresh water or saline, if possible. Otherwise, keep it covered and seek medical attention.

69. Is it safe for me to let someone who might have been affected by the radiological incident into my home?

If someone has radioactive material on their clothes or body, a few simple steps can clean up or decontaminate the person so that he or she can safely visit your home.

First, ask your visitors to remove their outer layer of clothing, put it in a plastic bag, and tie it shut, if possible.

Second, have your visitors clean off using the following steps:

Remove their outer clothes. Once inside, your visitors should carefully take off their outer layer of clothing in case any radioactive material fell onto their clothes while they were outside.

Put the clothing in a plastic bag if available. Store the plastic bag away from people and animals.

Shower or wash off. If possible, your visitors should take a warm shower with lots of soap. They should wash their hair. They should not scald or scratch their skin. When washing, they should try to keep the suds and water from entering their mouth, and they shouldn't swallow the water. Parents or other adult caregivers should give children a shower or wash them following these directions.

If your visitors cannot shower, they should use a wet wipe or clean wet cloth to wipe any skin that was not covered by clothing (such as their hands and face).

They should gently blow their nose and gently wipe their eyelids, eyelashes and ears with a clean wet cloth.

Have them change clothes. Have your visitors change into clothes stored inside an intact building. If you do not have clothes for your visitors, they can carefully brush off their outer layer of clothing. After brushing off, they should wash their hands, face and exposed skin at a sink or faucet.

70. How should people decontaminate their homes and their possessions?

Don't decontaminate your home until you get information from emergency responders or local officials.

You may not need to decontaminate your home, or there may be special instructions for how to clean your home. For example, you may receive special instructions on wearing protective clothing, cleaning methods, and washing the outside of your home. You can find more information on steps you can take at [\[INSERT AGENCY WEBSITE HERE\]](#).

Exposure Versus Contamination

71. How do I know if I've been exposed to radiation or contaminated by radioactive materials?

People cannot see, smell, feel or taste radiation, so you may not know whether you have been exposed.

In addition, low levels of radiation exposure do not cause any symptoms.

People who were in areas of concern may be instructed to go to a screening center—sometimes called a community reception center. At this location, responders will quickly check for radiation by using special equipment to determine how much radiation is present and whether it poses any danger.

If you think you have been contaminated, simply removing the outer layer of your clothing and washing exposed skin will significantly reduce any contamination you may have on your body.

72. What is the difference between radiation exposure and radioactive contamination?

Exposure occurs when radiation interacts with the body. You can be exposed to radiation without having radioactive material on your body (contamination). For example, during a chest X-ray or computed tomography (CT) scan a person is exposed, but that person is not contaminated and not radioactive.

Contamination happens when radioactive material is physically on or inside of a person or object. If you are contaminated with radioactive material, you are being exposed to radiation. Contamination can occur two ways:

1. External contamination occurs when radioactive material settles outside, on the surface of an object, or on a person's body or clothing.
2. Internal contamination occurs when radioactive material enters the body. This can happen when radioactive material is swallowed, inhaled, embedded or absorbed through the skin or wounds.

Special Issues and Concerns: Pregnancy and Breastfeeding

73. I am pregnant. Is my baby in danger?

After any radiation incident, expectant mothers who have concerns should seek advice from their physicians, who should work in consultation with radiation professionals.

It is true that a fetus is extremely sensitive to radiation. According to the Centers for Disease Control and Prevention (CDC), and as history has shown, most radiation releases will not expose the fetus to levels high enough to cause harmful health effects or birth defects.

After some radiation accidents in other countries, pregnant women terminated their pregnancies because they feared that the radiation would harm the developing embryo or fetus, but these terminations turned out to be totally unnecessary.

However, before any potential health risk to the embryo or fetus can be assessed, health care professionals and radiation experts would determine what external or internal doses the expectant mother might have received because of being near the incident.

Once dose levels to the expectant mother and fetus have been determined, your physician can consult with other medical and radiation professionals to identify potential risks (if any) and provide appropriate counseling.

74. Is it safe to breastfeed?

In a radiation emergency it is important to keep your baby fed and hydrated, and breastfeeding should continue when possible.

If you were indoors since the time of the radiation emergency, continue breastfeeding.

If you were outside in the affected area during the incident, you may have breathed-in or swallowed radioactive contamination that could be passed through breast milk. Consider temporarily stopping breastfeeding and feed your baby with breast milk that was pumped and stored before the emergency or with infant formula. These options will reduce the potential risk of transmitting radioactive material to your baby through breast milk.

- **If you do NOT have previously expressed breast milk or infant formula, continue breastfeeding.** It is important to stay inside and make sure your baby is hydrated and fed.

- o **Do NOT leave your house** or other indoor sheltering location to go get infant formula. It is safer to stay inside and continue breastfeeding.
- o Wash your hands, nipples, and breasts thoroughly with soap and warm water before breastfeeding or expressing milk.

Using previously stored and pumped breast milk: When feeding your baby breast milk that was pumped and stored before the emergency:

- Use previously expressed breast milk to feed your child as it will not be contaminated. Closed containers of milk that were stored inside the refrigerator or freezer are safe to use.
- Wash your hands with soap and water before feeding.
- After each use, carefully clean all infant feeding supplies such as bottles and nipples with soap and water and dry with a clean cloth or paper towel.

Using Infant formula: When feeding your baby infant formula —

- Use ready-to-feed infant formula, if available at your current location. Ready-to-feed infant formula is a sterile liquid formula that does not need to be mixed with water.
- If you do not have ready-to-feed infant formula, use powdered infant formula.
- Prepare powdered infant formula with bottled water, if possible.
- Tap water may be used if local officials say it is safe. Water that has radioactive material in it will not be made safe by boiling or disinfection. However, boiling or disinfecting water can kill germs so it's important to follow all local water advisory instructions.
- Wash your hands with soap and water before feeding.
- After each use, carefully clean all infant feeding supplies, such as bottles and nipples, with soap and water and dry with a clean cloth or paper towel.

If you temporarily stop breastfeeding:

- Hand express or pump your breast milk regularly and discard it to maintain your milk supply and prevent a breast infection.
- Clean your pump kit parts after each use and dry them with a clean cloth or paper towel.
- If needed, connect with a lactation support provider in your community who offers phone consultations or telehealth appointments to help you manage your milk supply and create a temporary feeding plan for your baby.

Breastfeeding can resume when advised by local health officials or after evacuation and self-decontamination. For additional questions or concerns, contact your baby's doctor.

75. Can pregnant women take potassium iodide pills?

As with the rest of the population, pregnant women should take potassium iodide (KI) only when specifically advised to do so by public health officials.

KI will cross the placenta and protect the thyroid of the growing fetus, as well as the expectant mother, from radioactive iodine.

76. Can breastfeeding women take potassium iodide?

As with the rest of the population, breastfeeding women should take potassium iodide (KI) pills only when specifically advised by public health officials.

However, this will not be sufficient to fully protect the breastfed child. The child also will need KI in special doses adapted for newborns and infants. Don't administer extra doses of KI to newborns or infants unless directed by your doctor. If you are instructed to give your child KI, follow age-specific dosing instructions. All newborns and infants should be evaluated by a doctor as soon as possible after administration of KI.

Listen to your state or local public health officials for specific guidance on taking KI pills. For the latest information go to [\[INSERT AGENCY WEBSITE HERE\]](#).

77. I am trying to get pregnant. Should I worry that my future children will be affected?

There is no evidence that your future children will be at a greater risk for birth defects or other problems.

Over many years, doctors and scientists have conducted extensive studies of children born to atomic bomb survivors. They have found no indication of genetic effects in these children.

Special Issues and Concerns: Children

78. What should I do about my children and family? Should I leave to find my children?

If your children or family are with you, stay together.

If your children or family are in another home or building, they should stay there until you are told it is safe to travel. You also should stay where you are. You risk exposure to radiation if you go outside. You cannot help them if you are injured.

Schools have emergency plans and shelters. If your children are at school, they should stay there until it is safe to leave. Don't go to the school until public officials say it is safe to do so.

79. What is being done to protect children in school?

Schools have emergency plans in place to protect the children. These plans include keeping everyone inside and providing assistance for those with special needs.

Children in schools will be cared for by teachers and staff until it is safe for them to leave. Children will not be released to go outside until instructed to do so by health officials and emergency responders.

80. If some of the radioactive material got on my clothes or skin, will I contaminate my child? Is it safe for me to be around my child?

Radioactive material can be removed by taking off and bagging your outer layer of clothing, showering with soap and warm water, and putting on clean clothes.

People who have cleaned up pose no contamination risk to you, your property or the members of your household.

81. Is it okay for me to give my child a bath?

Yes. If you think your children have radioactive material on their bodies, the most important thing to do is get them clean. A quick bath is one way to do that.

If there is concern that the water contains radioactive material from the incident, you can still bathe your child. There is no additional risk from bathing your child; however, make sure that your child doesn't drink the bath water.

82. If people need to be decontaminated at a reception center or other location, will I be able to stay with my children while they are decontaminated?

Parents should be able to stay with their children during decontamination and other processes.

Children and their families (parents or caregivers) should not be separated unless critical medical issues need to be addressed.

83. Does my child need to have his/her thyroid scanned?

Thyroid scans are needed only when there is a possibility that radioactive iodine has entered the body.

Health experts are gathering information now and determining potential health threats. You will be notified if thyroid scans are needed.

84. What kind of emotional impact can a radiological incident have on children? What should I look out for?

Children are among the most vulnerable of those affected by a radiological emergency, because they lack the maturity, skills and experience to fully understand and process what is going on.

Family members and caregivers should gently try to find out what the child thinks and feels about the incident.

If children are scared because they have misunderstood what has happened, then simple explanations should be provided while avoiding alarming details.

Children who exhibit signs of stress—such as difficulty sleeping, loss of appetite or bed-wetting—should receive extra time and attention from family members and other caregivers. If signs of stress continue, seek advice from a pediatrician or licensed therapist.

It is important to remember that children also need a chance to play and relax. Encourage older children to be helpful and maintain regular routines.

85. Are children exposed to radiation at higher risk of harm?

Children exposed to radiation may be at greater risk of harmful health effects than adults.

Children have higher breathing rates, are growing and have closer physical proximity to the ground, where radiation may be more concentrated; all of this makes children more vulnerable.

Health experts are gathering information now to determine any potential health threats, and they are specifically looking at potential effects on children. Instructions issued by health officials are based on these findings.

86. Should my children take potassium iodide?

If public health officials say to take potassium iodide (KI) in the affected area, children should take potassium iodide unless they have known allergies to iodine.

However, the doses and procedures for giving KI to children are not the same as for an adult.

If KI is needed, public health officials will provide specific guidance on doses and procedures for giving KI to children.

Special Issues and Concerns: People With Disabilities or Special Medical Needs

87. If I go through decontamination at a reception center or other facility, will my eyeglasses or contact lenses be taken away?

Your glasses should not be taken away.

Eyeglasses may be washed in the shower.

You can continue to wear your contact lenses until you can safely get replacements.

88. I have a prosthetic limb. If I have to be decontaminated to remove radioactive dust, will my prosthetic limb have to be taken away?

There is no reason for a prosthetic limb to be taken away.

Most prosthetic limbs can get wet, so they can be removed, thoroughly cleaned along with the person, and put back on.

89. Is there a general list of the kinds of devices, adaptive equipment, prostheses and mobility aids that can be decontaminated?

Unfortunately, no single guide currently available covers all situations.

However, a general list was published in 2006 by the New York Center for Terrorism Planning and Preparedness in a document on hospital decontamination protocols.

The list identifies the following items that can be decontaminated: nonelectric wheelchairs, prosthetic limbs (without leather components), walkers, crutches (without foam cushions/parts), canes (without foam cushions/parts), eyeglasses and prosthetic eyes.

Items that cannot be decontaminated, or that pose special challenges, include mechanical ventilators, electric wheelchairs, hearing aids, contact lenses and any leather attachments/components of items.

For such items, discuss options with emergency responders and health officials.

90. What if my service animal is found to be contaminated?

If your service animal is known or suspected to be contaminated, it will be decontaminated.

In 2006, the Pets Evacuation and Transportation Standards (PETS) Act was created to ensure that state and local emergency management partners address the specific needs of individuals with service animals. The law includes provisions for decontaminating service animals.

91. How are service animals decontaminated?

Most animals can be decontaminated by simply using soap and water. For sensitive areas where traditional washing methods may be more difficult—around the animal's eyes, nose and mouth, and in its ears—damp towels or cleaning cloths may be used.

In some situations, emergency responders might place a muzzle on the animal to prevent it from licking or drinking contaminated water.

92. What should people do if they don't have access to their life-sustaining medications?

If you are in the affected area and your life is in danger because you are running out of **life-sustaining** medication, such as insulin or heart medicine, take the following steps to get medication:

- Call 911 if possible.
- Seek help from a neighbor.
- As a last resort, go to the closest medical facility.
- If you must go outside, remember to clean yourself thoroughly when you come back inside. Remove your outer layer of clothes, shower and wash with soap and warm water, and put on clean clothes.

93. I receive radiation treatments for medical reasons. Should I stop my treatments because I might have been exposed to radiation from the emergency?

As a general rule, a radiation incident should not cause people to stop or take a break from potentially lifesaving medical treatments. However, tell your doctor if you think you were exposed to radiation from the emergency. The doctor will decide how to handle your radiation treatments.

Special Issues and Concerns: Pets

94. If people have been told to stay inside and self-decontaminate during a radiation emergency, what should they do with their pets? How do I decontaminate my pet?

If you are instructed to stay inside, your pets should be inside too.

If your pet was outside at the time of the incident, the pet can be brought inside and decontaminated.

Start by putting on waterproof gloves and a dust mask (or other material to cover your mouth).

Also, keep cuts and scrapes (both yours and your pet's) covered to keep radioactive material out of any wounds.

Then wash your pet carefully in a shower or bath using shampoo or soap and water. Rinse the pet completely.

To make sure you have not picked up any contaminants, be sure to shower after you have washed the pet, especially washing your hands and face.

95. Is the water safe for my pet to drink?

Bottled water will be free of radioactive contamination. Wipe or rinse the outside of bottles or cans before opening them. Clean the bowl prior to filling.

Water from the tap is probably safe. But until we have drinking water test results, only bottled water is certain to be free of contamination.

96. Is pet food safe for my pet?

As with other foods, sealed pet food is safe for animals to consume.

As with other foods, rinse or wipe off any debris from a sealed can or package with tap water and put the cleaning cloth in a plastic bag away from people and animals.

97. What should I do if my pet needs to go outside to use the bathroom?

If possible, remain indoors. If your pet must go outside, minimize the time spent outside and repeat decontamination procedures upon reentering the building (see question 94).

Appendix—Radiation Communication Resources From Emergency Support Function 15: Annex N (July 2016)

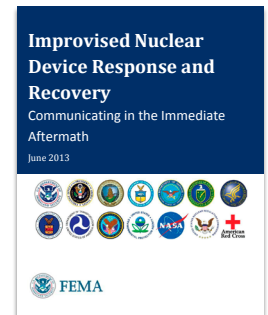
Improvised Nuclear Device Response and Recovery: Communicating in the Immediate Aftermath

Incident Type: Improvised Nuclear Device (many messages will be applicable to other radiological emergencies)

Content:

- Key messages for affected community and the nation
- Pre-approved answers to anticipated public and media questions
- Social media templates for immediate safety actions

URL: https://www.fema.gov/sites/default/files/documents/fema_improvised-nuclear-device_communicating-aftermath_june-2013.pdf



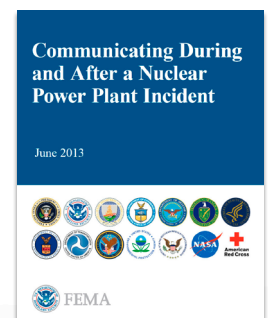
Communicating During and After a Nuclear Power Plant Incident

Incident Type: Nuclear Power Plant Incident

Content:

- Roles and responsibilities for communicating after a nuclear power plant incident
- Pre-approved answers to anticipated public and media questions

URL: https://www.fema.gov/sites/default/files/documents/fema_nuclear-power-plant-incident_communicating-during-after_june-2013.pdf



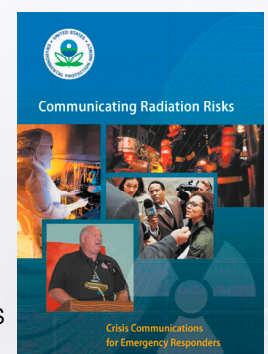
Communicating Radiation Risks: Crisis Communications for Emergency Responders

Incident Type: Radiological Emergency (transportation or dirty bomb)

Content:

- Guidelines for emergency message development
- Example questions and answers for transportation and dirty bomb scenarios

URL: <https://www.epa.gov/radiation/pag-public-communication-resources#communicating-radiation-risks>



CDC Radiation Resources

Radiation Emergency Tool Kits for Public Health Professionals

- Guidance, training and educational materials for professionals
- Fact sheets and other content that can be used for public information

URL: <https://www.cdc.gov/nceh/radiation/emergencies/toolkits.htm>

Radiation Basics Made Simple Videos

- Eight brief educational videos on protective actions, countermeasures and health effects, which can be used for public education or b-roll

URL: <https://www.cdc.gov/nceh/radiation/emergencies/protectiveactions.htm>

Radiation Communications Research Reports

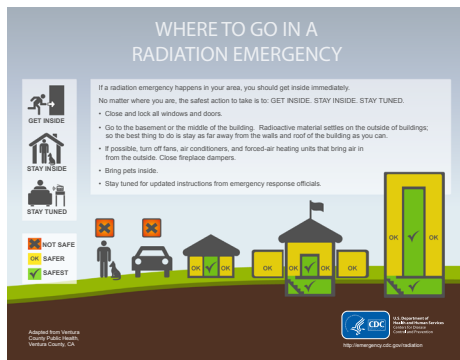
- Formative research reports on radiation-related message testing

URL: <https://www.cdc.gov/nceh/radiation/emergencies/audience.htm>

CDC Radiation Infographics

Note: URLs provided after infographic listing.

Where to Go in a Radiation Emergency



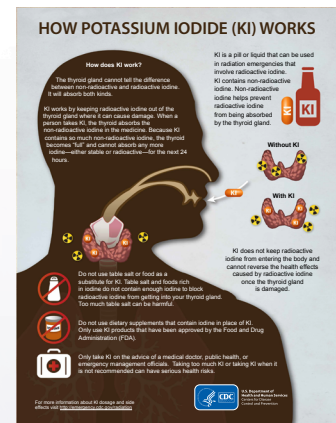
1

Decontamination



2

Potassium Iodide: KI



3

Prussian Blue

HOW PRUSSIAN BLUE WORKS

Prussian blue is a pill that may be used in a radiation emergency to help remove radioactive cesium (Cs) and thallium (Tl) from inside a person's body.

Prussian blue traps radioactive cesium and thallium in the intestines and keeps them from being redistributed by the body.

The radioactive materials then move through the intestines and are passed (excreted) in bowel movements.

Because Prussian blue reduces the time that radioactive cesium and thallium stay in the body, it helps limit the amount of time the body is exposed to radiation.

Prussian blue is available only by prescription. Public health and medical professionals will determine if Prussian blue is needed.

People **SHOULD NOT** take Prussian blue unless they are advised to treat themselves. This type of Prussian blue not designed to treat radioactive contamination and can be harmful.

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<http://www.emergency.cdc.gov/radiation>

4

Improved Nuclear Device

IMPROVED NUCLEAR DEVICE

An improved Nuclear Device (IND) is a type of nuclear weapon. When an IND explodes, it gives off four types of energy: a blast wave, intense light, heat, and radiation. The bomb dropped on Hiroshima, Japan, at the end of World War II is an example of an IND.

When an IND explodes, a large fireball is created. Everything inside of the fireball vaporizes and is carried upward. This creates a mushroom-shaped cloud. The material in the cloud cools and the particles and drop back to the earth as fallout. Fallout can be carried by the wind and can get as close to the site of the explosion. Fallout is radioactive and can contaminate anything it lands on.

FALLOUT

What are the main dangers of an improved Nuclear Device?

An IND would cause great destruction, death, and injury and have a wide area of impact. People close to the blast site could experience:

- Injury or death (from the blast wave)
- Moderate to severe burns (from heat and fire)
- Blindness (from the intense light)
- Radiation sickness, also known as acute radiation syndrome or ARS (caused by the radiation released)

People farther away from the blast, but in the path of fallout, could experience health effects from:

- Fallout on the outside of the body or clothes (external contamination) or on the inside of the body (internal contamination)
- Radiation sickness
- Contaminated food and water sources

What should I do to protect myself?

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<http://www.emergency.cdc.gov/radiation>

7

Radiological Exposure Device

RADIOLOGICAL EXPOSURE DEVICE

What is a Radiological Exposure Device?

Radiation material or an object containing radioactive material can expose people to radiation without their knowledge. Such objects are called Radiological Exposure Devices (REDs), or hidden sealed sources.

REDs may be hidden in public places (e.g., under a subway seat), in a food court, or in a busy hallway. People who sit near or pass close to the RED may be exposed to radiation.

What are the main dangers of a Radiological Exposure Device?

The dangers of a RED depend on three factors: 1) the type and amount of radioactive material used; 2) how long a person spends near the device; and 3) what parts of a person's body are exposed to radiation coming from the device.

People exposed to high levels of radiation can develop symptoms of Acute Radiation Syndrome (ARS). They can also develop radiation burns. Health effects may take hours, days, or weeks to appear. These effects can range from mild to severe (e.g., cancer or death). Some people may not experience any health effects.

What should I do to protect myself?

Report a suspected RED to law enforcement officials immediately. Stay as far away from the suspected object as possible.

If a RED is identified and you believe you have been exposed, listen for instructions from emergency officials and contact your doctor.

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<http://www.emergency.cdc.gov/radiation>

10

Contamination Versus Exposure

RADIATION CONTAMINATION VERSUS EXPOSURE

EXTERNAL CONTAMINATION

External contamination occurs when radioactive material comes into contact with a person's hair, skin, or clothing.

RADIOACTIVE MATERIAL

INTERNAL

INTERNAL CONTAMINATION

Internal contamination can occur when radioactive material is swallowed or breathed in.

Internal contamination can also occur when radioactive material enters the body through an open wound.

Different radioactive materials can accumulate in different body organs.

RADIATION EXPOSURE

Another word for radiation exposure is irradiation.

Radiation materials give off a form of energy that travels in waves or particles.

A person exposed to radiation is not necessarily contaminated with radioactive material.

For a person to be contaminated, radioactive material must be on or inside of the body.

When a person is exposed to certain types of radiation, the energy may penetrate the body.

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<http://www.emergency.cdc.gov/radiation>

5

Dirty Bomb

DIRTY BOMB OR RADIOLOGICAL DISPERSAL DEVICE

What is a dirty bomb?

A dirty bomb is a mix of explosives, such as dynamite, and radioactive powder or pellets. It is also known as a radiological dispersal device (RDD).

RADIOACTIVE MATERIAL

When the bomb explodes, the blast carries radioactive material into the surrounding area.

What are the dangers from a dirty bomb?

The main danger from a dirty bomb comes from the explosion, not the radiation. The explosion can cause serious injuries and property damage. People nearby could be injured by pieces of radioactive material that are blown into the air. People who are very close to the blast may be exposed to enough radiation to cause immediate serious illness. However, the radioactive dust and smoke can spread farther away and could be dangerous to health if people breathe it in. The dust, contaminated food, or drink contaminated water. People injured by radioactive powder or contaminated with radioactive dust will need medical attention.

What should I do to protect myself?

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<http://www.emergency.cdc.gov/radiation>

8

Transportation Accidents

TRANSPORTATION ACCIDENTS

How is radioactive material transported?

Radioactive material is transported by trucks, rail, and other shipping methods. Shipments involving significant amounts of radioactive material are required to have documentation, labels, and placards identifying the cargo as radioactive. Radioactive material must be packed in special protective containers that are designed and tested to withstand damage.

What are the main dangers of transportation accidents involving radiation?

The main danger of transportation accidents involving radiation are contact with and exposure to radioactive material, in the rare event that the shipping container is damaged. It is very unlikely that accidents involving transport of radioactive material will cause any radiation-related injuries or illnesses. Emergency officials have plans in place to safely respond to transportation accidents involving radioactive material.

What should I do to protect myself?

Report any transportation accidents involving radiation to emergency responders immediately. Stay as far away from the site of the accident as possible. Do not touch any cargo from the transport container.

If you believe you have been exposed, listen for instructions from emergency officials and contact your doctor.

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<http://www.emergency.cdc.gov/radiation>

11

Radiation Emergencies and Pregnancy

RADIATION EMERGENCIES AND PREGNANCY

After a radiation emergency, pregnant women should follow instructions from emergency officials and seek medical attention as soon as emergency officials say it is safe to do so.

Prenatal radiation exposure occurs when a pregnant woman's abdomen is exposed to radiation.

For most radiation exposures, the radiation dose to the fetus is lower than the dose to the woman. A pregnant woman's abdomen partially protects the fetus from radiation sources that are outside her body.

If a pregnant woman swallows or breathes in radioactive materials, these may be absorbed into her bloodstream. From the woman's blood, radioactive materials may pass through the umbilical cord to the fetus or concentrate in areas of the mother's body near the uterus and expose the fetus to radiation.

Health effects to the fetus from radiation exposure can be severe, even at radiation doses too low to make the mother sick. These health effects can include miscarriage, stunted growth, deformities, abnormal brain function, and cancer.

A fetus is most sensitive to radiation between weeks 2 and 18 of pregnancy. A fetus will become less sensitive to radiation during later stages of pregnancy.

In the rare event of a radiation emergency, radiation experts can answer questions from pregnant women and their healthcare providers about radiation exposure and pregnancy.

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<http://www.emergency.cdc.gov/radiation>

6

Nuclear Power Plant Accidents

NUCLEAR POWER PLANT ACCIDENTS

Nuclear power plants have safety and security procedures in place and are closely monitored by the Nuclear Regulatory Commission (NRC). An accident at a nuclear power plant could release dangerous levels of radiation over an area (sometimes called a plume).

What are the main dangers of nuclear power plant accidents?

Radioactive materials in the plume from the nuclear power plant can settle and contaminate people who are outdoors, buildings, food, water, and livestock.

PLUME

Radioactive materials can also get inside the body if people breathe it in, or eat or drink something that is contaminated.

People living close to the nuclear power plant who are exposed to radiation could experience long-term health effects such as cancer.

What should I do to protect myself during a nuclear power plant accident?

If you live near a nuclear power plant, you can get emergency information materials from the power company that operates your local nuclear power plant or your local emergency services office.

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<http://www.emergency.cdc.gov/radiation>

9

Workplace Incidents

WORKPLACE RADIATION INCIDENTS

Workplaces that have care facilities, research institutions, and industrial operations may use radiation sources. An incident can happen if:

- radiation sources are stored or used incorrectly
- safety controls malfunction
- safety procedures are not followed

The health effects from a workplace incident involving radiation sources could range from no health effects to very serious health effects based on several factors:

- the type and amount of radioactive material
- how long people were near the radioactive material or how long the radioactive material was in or on the body
- how close people were to the radioactive material
- what parts of the body were exposed

What should I do to protect myself?

If your workplace uses radiation sources, use required personal protective and monitoring equipment, be familiar with safety procedures and protocols, and complete required radiation safety trainings.

Report any incidents involving radiation to safety officials immediately. Stay as far away from the site of the incident as possible.

If you are involved in a workplace radiation incident, follow instructions from safety officials and contact your doctor.

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<http://www.emergency.cdc.gov/radiation>

12

1. emergency.cdc.gov/radiation/pdf/infographic_where_to_go.pdf
2. emergency.cdc.gov/radiation/pdf/infographic_decontamination.pdf
3. emergency.cdc.gov/radiation/pdf/infographic_ki.pdf
4. emergency.cdc.gov/radiation/pdf/infographic_prussian_blue.pdf
5. emergency.cdc.gov/radiation/pdf/infographic_contamination_versus_exposure.pdf
6. emergency.cdc.gov/radiation/pdf/infographic_radiation_and_pregnancy.pdf
7. emergency.cdc.gov/radiation/pdf/infographic_improvised_nuclear_device.pdf
8. emergency.cdc.gov/radiation/pdf/infographic_radiological_dispersal_device.pdf
9. emergency.cdc.gov/radiation/pdf/infographic_nuclear_power_plant.pdf
10. emergency.cdc.gov/radiation/pdf/infographic_radiological_exposure_device.pdf
11. emergency.cdc.gov/radiation/pdf/infographic_transportation_accidents.pdf
12. emergency.cdc.gov/radiation/pdf/infographic_workplace_radiation_incidents.pdf

Federal Agency Radiation Websites

Federal Emergency Management Agency: www.ready.gov

U.S. Department of Energy, National Nuclear Security Administration:
energy.gov/nnsa/counterterrorism-and-counterproliferation

U.S. Department of Health and Human Services (HHS), Centers for Disease Control and Prevention: cdc.gov/nceh/radiation/emergencies/index.htm

HHS, Radiation Emergency Medical Management: remm.hhs.gov/

HHS, Substance Abuse and Mental Health Services Administration, Disaster Distress Helpline: samhsa.gov/find-help/disaster-distress-helpline

U.S. Environmental Protection Agency: epa.gov/radiation

U.S. Nuclear Regulatory Commission: nrc.gov/about-nrc/emerg-preparedness.html

Additional Resources

Conference of Radiation Control Program Directors: crcpd.org

International Commission on Radiological Protection: icrp.org

National Alliance for Radiation Readiness: radiationready.org

National Council on Radiation Protection and Measurement: ncrponline.org

