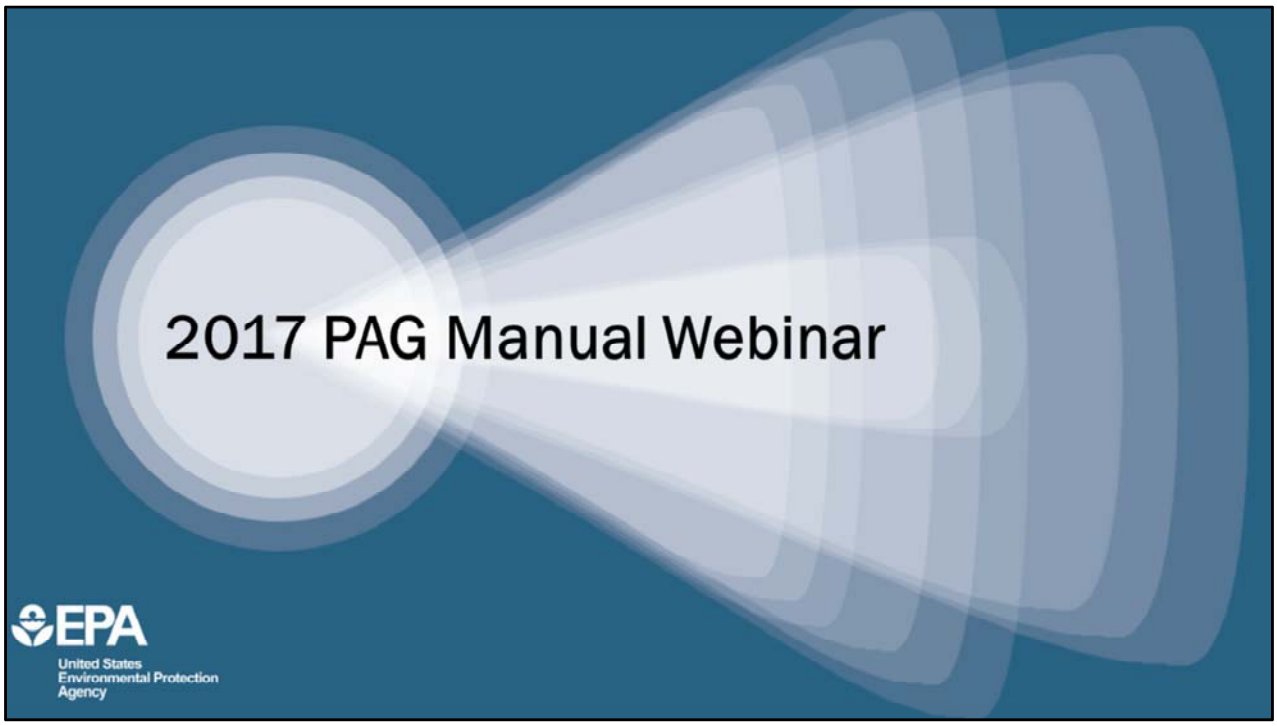
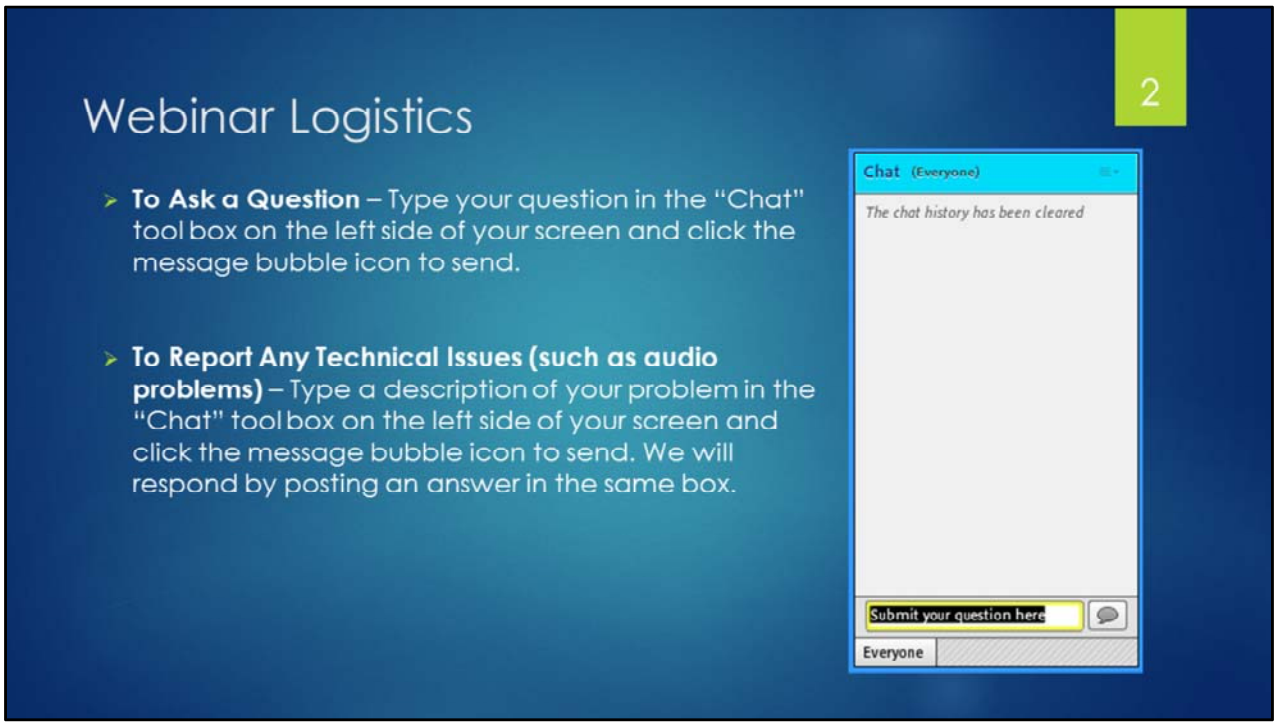


Hello and welcome to today's webinar. This webinar is part of a series offered by EPA's Office of Indoor Air and Radiation.

I hope you're all prepared and excited to learn more about EPA's updated, 2017 Protective Action Guide Manual – or as we often shorten it, the PAG Manual. This manual updates and supersedes the guidelines presented in the 1992 and interim 2013 PAG manuals.

Before we get started I'd like to extend a very big welcome to any participants who are tuning in to their very first PAG webinar. Thank you for joining us today.

I'd also like to welcome back any folks listening today who may have tuned in to our sister webinar in this series, the Drinking Water PAG webinar. It truly is great to have everyone here today.



Let's get started by going over a few housekeeping items.

Today we are using EPA's Adobe Connect service. If you are joining us today on a non-mobile device, you should be able to see the presentation on your screen now. Unfortunately mobile devices are not currently supported. Chat us in the chat box if you would like or need a copy of today's slides.

We ask that all participants who choose to call into the phone line also mute their computer speakers to avoid an echo.

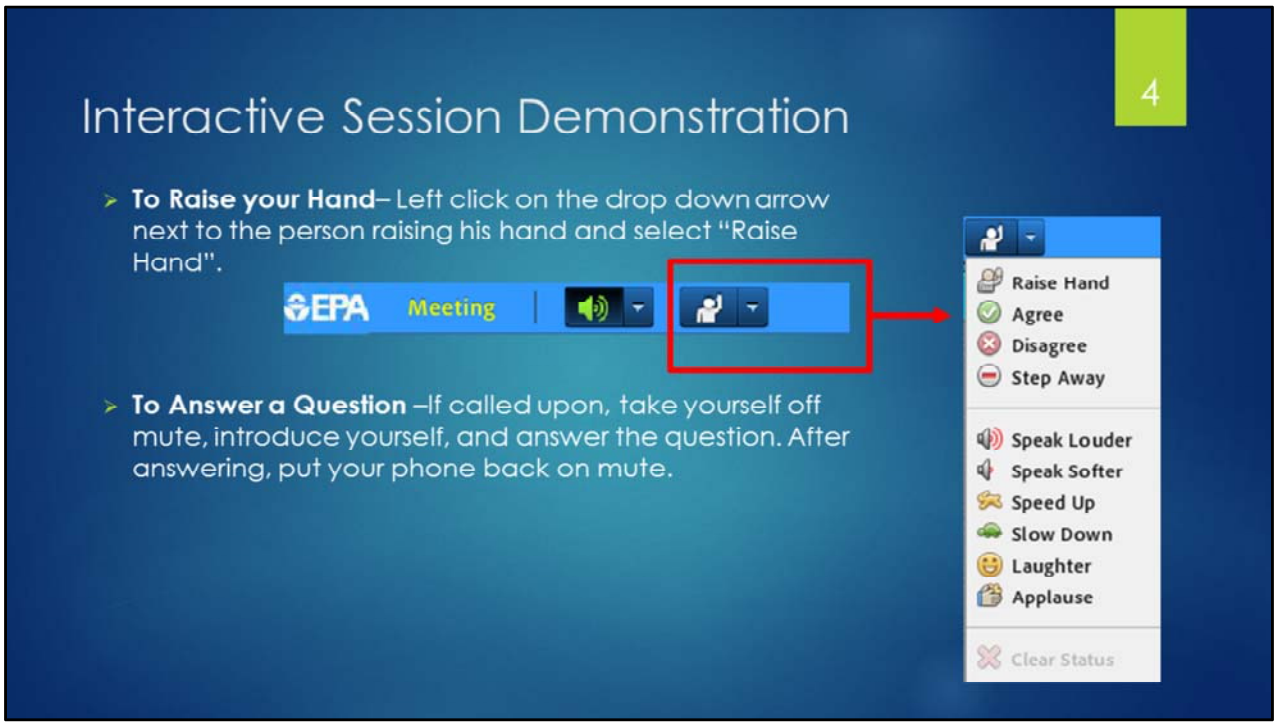
Today we will be taking questions throughout the webinar. If you have a question please type your question in the chat box on the left hand side of your screen. We hope you have plenty of questions and encourage you to submit your questions early. All questions from today's webinar will be collected and answered. If we are unable to respond to your question during the live webinar, we will compile your question - as well as others received - and respond to all questions as part of and FAQ.

If you experience any technical difficulties during this webinar, you may also type a description of your problem in the same "chat" box. If you chat us, please make sure to click on the chat icon to submit your note. We will respond to all question in the same

“chat” box.

Now that we've covered the logistics - I want to take a second to introduce myself. That is a picture of me on the right hand side of your screen. My name is Stefanie Gera Bacon – but the Bacon part is pretty new, so hang in there with me throughout this transition period - as you might see me referred to in several ways!

I'm based out of the EPA HQ office, and I am a Public Affairs Specialist in the Office of Radiation and Indoor Air's Radiation Protection Division. I have a background in research science, and prior to joining EPA in January, I spent the past 7 years as a contractor to EPA Water.



But let's not focus to much on me.

The information we are covering today will be very important during an emergency, so I want to make sure you are paying attention and understanding what I am telling you.

Let's start by demonstrating a few of the features we'll be using today to make the presentation more exciting AND interactive.

Across the top of your screen you will see a raise hand button, as part of the header bar - a screenshot of the header bar is shown on your slide now if you need to orient yourself. In the header bar, left click on the dropdown arrow next to the raise hand icon. Several options appear – including a raised hand icon, and symbols for agree and disagree. We will be using some of the features in this dropdown list throughout today's webinar.

If you see the raise hand button, **EVERYONE** please go ahead and raise your virtual hand **NOW.**

Let me take a minute to see if there is anyone who couldn't find the raise hand button**<<Address anyone who does not have their hand raised>>.**

<<clear responses>>

Now that we are all experts, I'd like you to demonstrate your new Adobe Connect skills by selecting the agree or disagree button depending on your response to my next two questions. Your responses will help me gauge our audience familiarity with today's topic!

1. Question1, please agree or disagree, I have heard of the term protective action guide or PAG before today's webinar

Great, it seems like we have a good mix of folks who have heard of the term protective action guides before, and maybe a few who are less familiar.

<<clear responses>>

Let me clear out the responses, and let's try another question:

2. Question 2, please agree or disagree, I know of at least one instance where a protective action guide would be used

Again, fantastic! Thanks to everyone who participated.

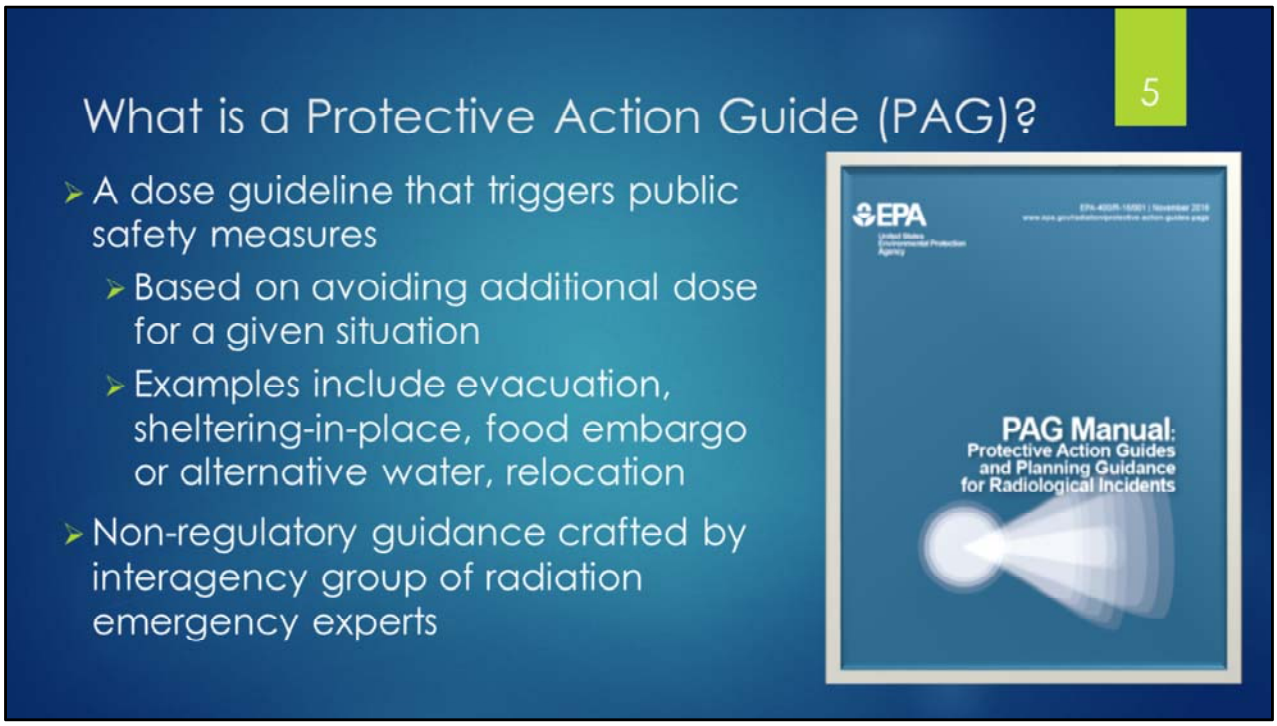
<<clear responses>>

You may have already guessed this, but just so there are no surprises, today's webinar will feature several opportunities for audience interaction. I will be calling on people and asking for volunteers to answer questions throughout the presentation. If I call on you, please take yourself off mute, introduce yourself by name and organization and remember to mute yourself when you are done answering. You may also use the chat box in the lower left hand corner of your screen to reply to any questions if you'd prefer not to talk over the phoneline.

Please use the agree or disagree button to signal that you understand.

<<clear responses>>

Ok let's get started!



We are all here today to learn about EPA's revised, 2017, protective action guide Manual – or PAG Manual for short. For frame of reference, the report cover on the right hand side of your screen is the cover of the new PAG Manual. But let's pause for a second because we have a wide audience participating today and I want make sure we have a chance to talk about what exactly a protective action guide is.

The Protective Action Guide Manual contains dose guidelines under several different scenarios that would trigger public safety measures to minimize or prevent radiation exposure during an emergency. Each Protective Action Guide in the manual serves as "health-based tipping point" to assists officials in deciding when it is necessary for people to evacuate, stay inside, issue a food or water advisory, or take other immediate steps to safeguard health during a radiological emergency.

The PAG manual features non-regulatory guidance for state, local and tribal governments responding to a radiological emergency.

I am looking for my first volunteer: Who wants to take a guess at what I mean when we say that the protective action guide manual is non-regulatory guidance? If you'd like to volunteer, you can take yourself off of mute or write in the chat box now

<<Pause>>

Let me repeat the question - what does it mean when we say that the protective action guide manual is non-regulatory guidance?

<<Call on a volunteer if needed>>

Thank you for that answer! You're <<**right/mostly right>>.** All of the guidance in the Protective Action Guide Manual is exactly that… guidance for state, local and tribal governments as well as utilities for use during emergency situations only.

PAGs are not legally binding regulation, they are not radiation limits, and do not supersede any environmental laws or regulations. PAGs also do not establish an acceptable level of risk for normal, non-emergency conditions, nor do they represent the boundary between safe and unsafe conditions.

PAGs are also not meant to be applied as strict numeric criteria, but rather as guidelines to be considered in the context of incident-specific factors.

PAGs are used by several different parties

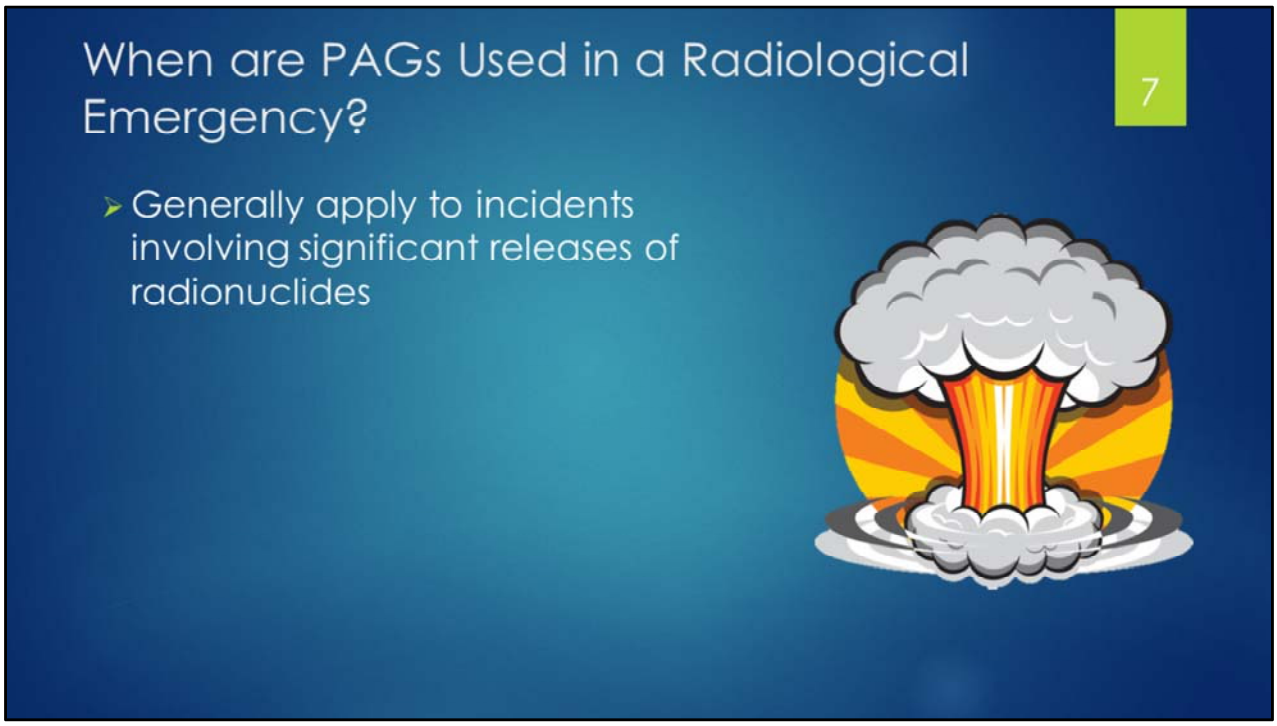
They are developed by federal agencies based on the best scientific information available.

In terms of implementation, state, local and tribal governments have the main responsibility for taking measures to protect life and health – this includes the decision to implement protective actions when needed. The good news is that PAGs have already been worked in to all state and many tribal and local emergency plans in some form or another

PAGs are also in place around certain types of industrial facilities. For example, around all nuclear power plants, and in most radioactive material use facilities, plans are in place to implement the PAGs if needed.

But state, local and tribal governments don't have to go at it alone. When it comes to implementing the guidance during an emergency, there is a federal group of radiation experts that can support state and local governments… This group is the Advisory Team for Environment, Food and Health (sometimes referred to as the A-Team)! Their mission is to provide radiation safety recommendations to decision-makers at all levels of government, following a radioactive release. The Advisory Team is comprised of expert radiation representatives from the Environmental Protection Agency, the Centers for Disease Control

and Prevention, the Food and Drug Administration, the U.S. Department of Agriculture.



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. In situations where the public has the potential to be exposed to significant amounts of radionuclides, officials then use the Protective Action Guides to determine what actions to take to *avoid or minimize* that potential exposure to the public.

I'd like pause here and ask for a volunteer – or volunteers – to list some examples of situations that could cause a significant release of radionuclides in the environment. In the chat box, please type examples of radiation emergencies that that could potentially cause a significate release of radionuclides.

Let's give everyone a chance to think about the question, and type in some responses.

<<If no responses are coming in>> To repeat the question – please type examples of radiation emergencies that that could potentially cause a significate release of radionuclides in the chat box.

Let me remind everyone that I am happy to call on someone randomly to answer the question if we do not get any volunteers. So please type away!

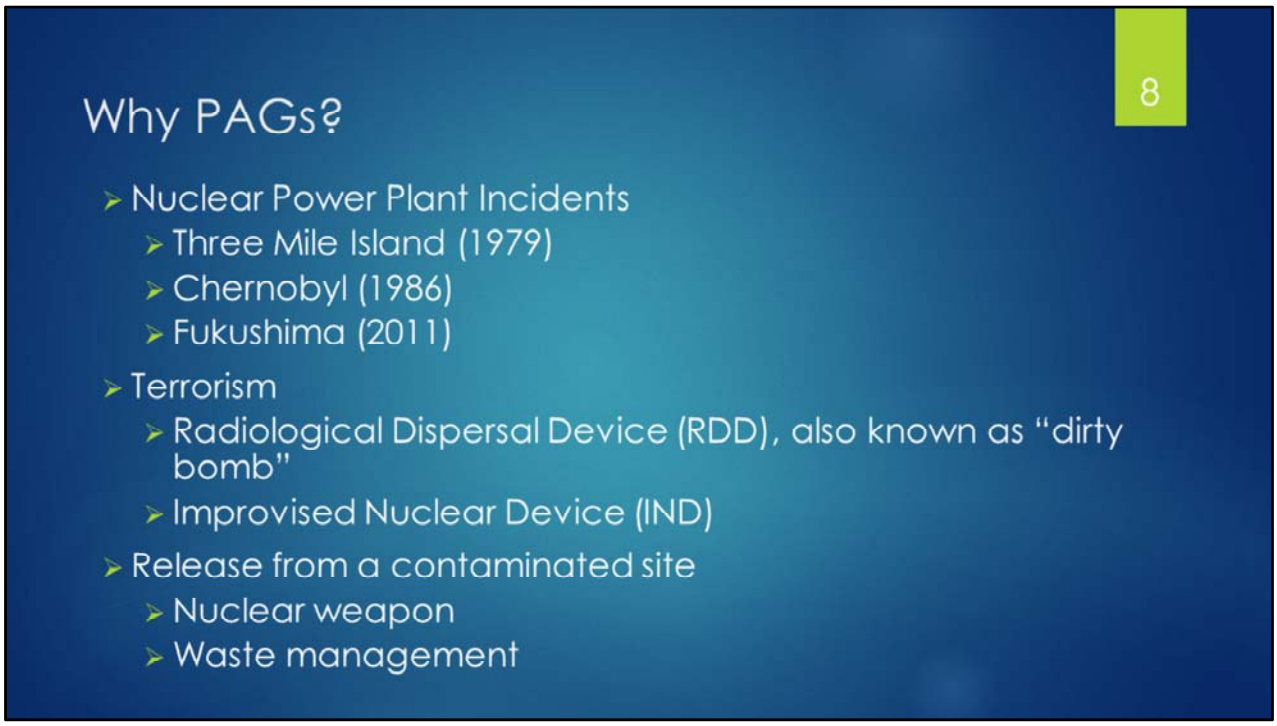
Looks like we have received some answers **<<READ ANSWERS IN THE CHAT BOX AND EXPAND WITH POSSIBLE ANSWERS TO INCLUDE fire in a major facility such as a nuclear weapons plant; an accident at a federal nuclear weapons complex; an accident at a commercial nuclear power plant; a transportation accident involving radioactive material; terrorist act involving the detonation of an improvised or radiological dispersal device (IND/RDD)>>**

Of course, every situation will be different. In the event of a radiological release at a nuclear power plant for instance, emergency action levels can trigger protective actions before any dose might be projected, based on the plant conditions. Decision-makers must compare estimates of projected doses with the appropriate PAG to determine which actions are necessary to take, if any.

I think it's important to make real world connections where we can. Fortunately, we don't have many example of radiological emergencies, especially recent ones. So let me leave you with this thought. We are all very much aware of some of the terrible destruction and historic flooding that has occurred recently in Houston. For this storm, experts have been talking a lot about flood levels, flood lines, and 100-year vs. 500- year storms. In a recent Washington Post article, a scientist was quoted as saying

"Decision-makers have to be able to pick a number and say this is the number we need to be prepared for…. If we debate and belabor the accuracy of these estimates, the community will not have a value to plan for".

I want you to think about this quote in relation to the PAGs as we continue our conversation today. The PAG manual is used by decision makers to prepare for a radiological emergency in very much the same way that flood lines are prepared for at risk communities. These values are based on the best scientific information available, and help immensely to prepare, but we never will know the scope, size, or severity of the next catastrophic emergency until it happens. Let’s do the best we can now to prepare for what could come next.



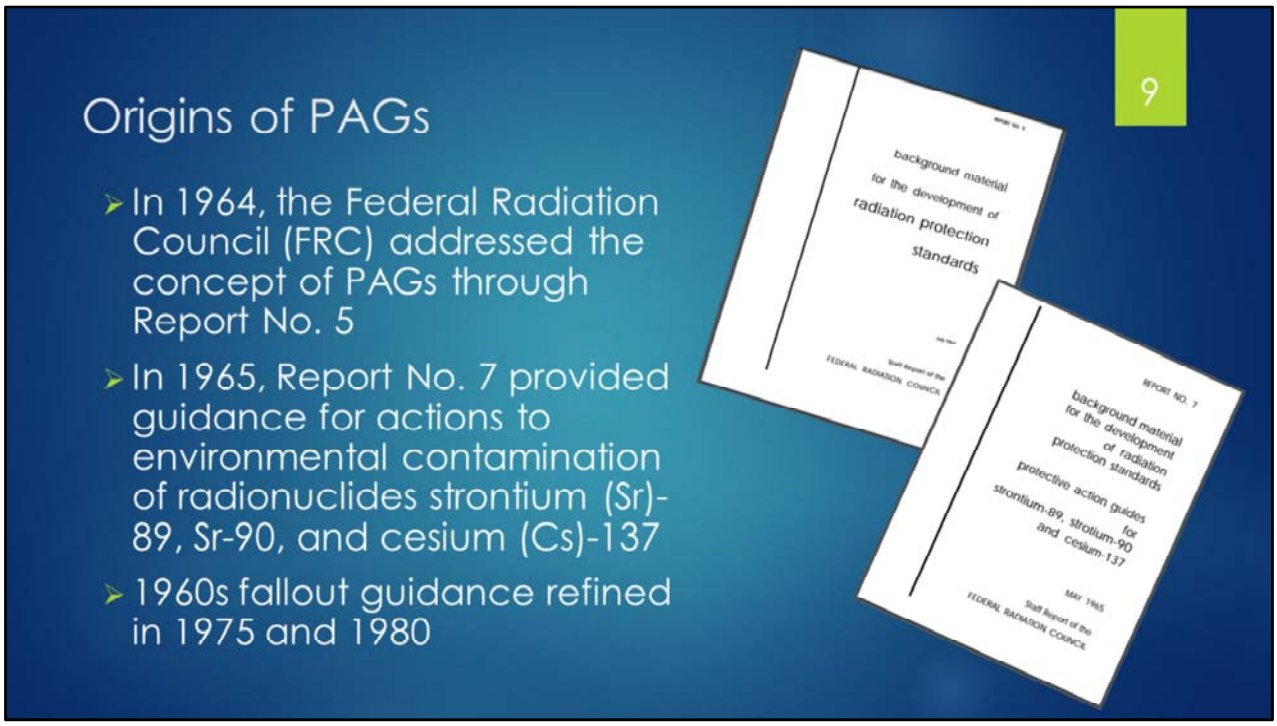
The PAG manual was developed to help emergency planners make timely and effective decisions for dose avoidance.

Emergency planners should be prepared to apply PAGs to a wide scope of facilities and circumstances; and to project doses that may trigger the need for protective actions from a release of radioactive material.

Historical radiological incidents like Three Mile Island, Chernobyl, and Fukushima all demonstrated the need for guidance. These events were important turning points for improvements in preparing and responding to radiological emergencies. There are also other events, such as an RDD, IND, or nuclear weapon detonation, that we have a responsibility to plan and prepare for, should an event happen in the future.

All of these events require some type of protective action or actions be put in place immediately following the release of radiological materials to best protect the public.

Past history, paired with unpredictable, and still theoretical future events make advanced planning critical, but also challenging. The PAGs are an important tool that can help emergency responders put in place scientifically defensible, protective measures to most adequately protect the public during or after a radiological emergency.



<<Maybe cut??>>

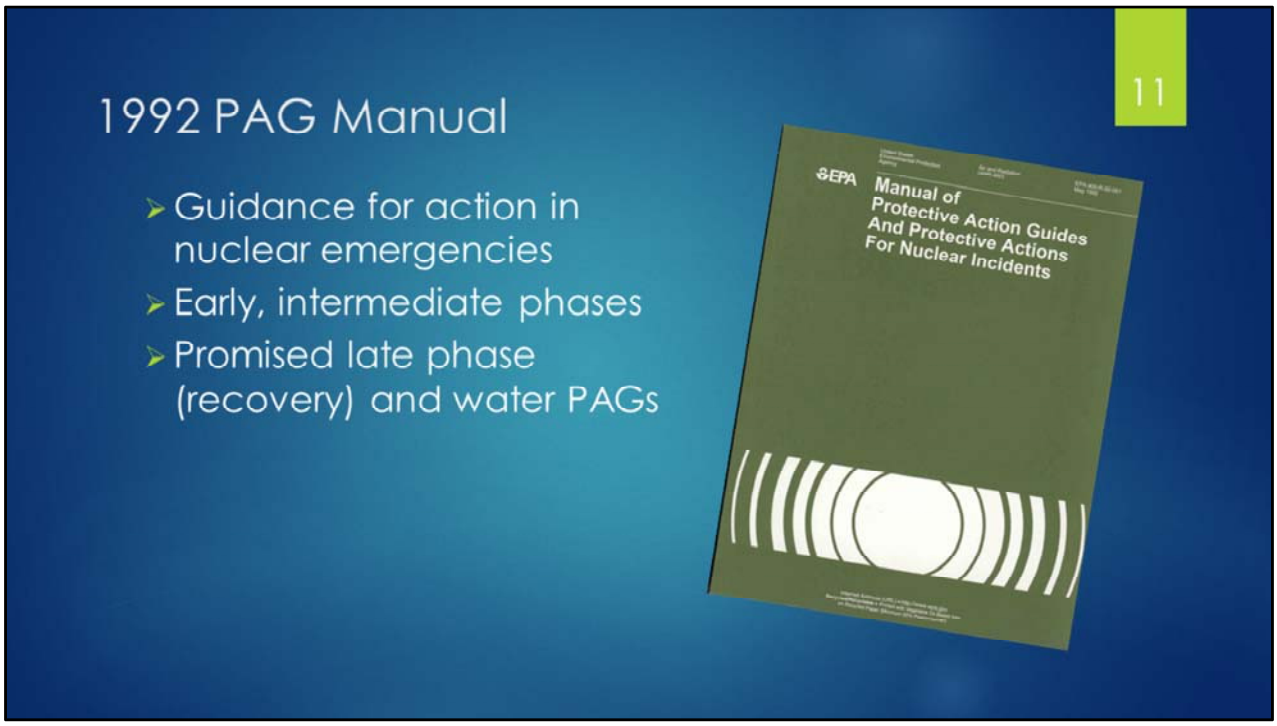
PAGs are not new! In the 1960s the Federal Radiation Council developed guidance at which implementation of protective actions may be appropriate. The council also provided general guidance for the protection of the public against exposure resulting from the accidental release of radioactive materials in the environment. These guidance measures specifically provided a numerical value for an Iodine-131 PAG.

The Council later provided guidance for situations involving contamination of the environment by additional radionuclides.

<<Maybe cut??>>

There have been several versions of the PAG manual since those initial guidance documents issued in the 1960's – with each new manual building on the ideas presented in the previous one and including new advancements in the scientific understanding of radiation dose and risk to human health.

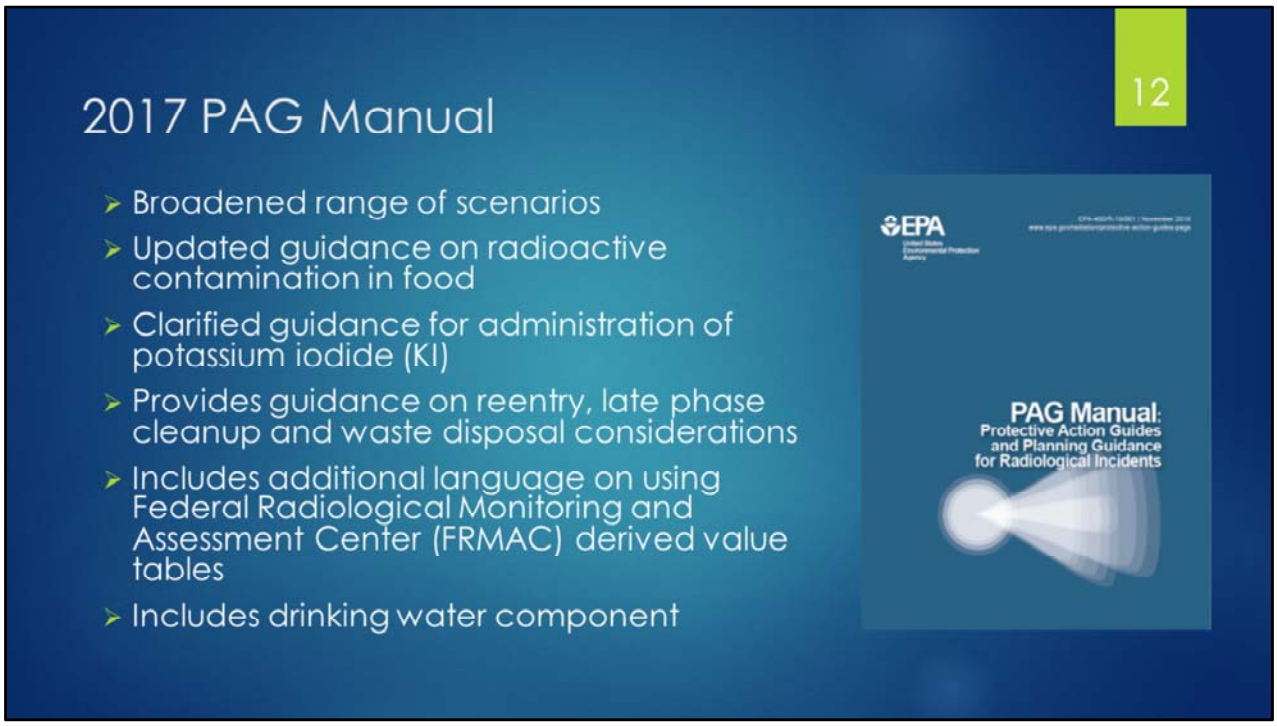
In order to fully understand the changes in the 2017 PAG manual, and how many advancements have been made, it's important to understand what was included in the 1992 PAG manual – the last final PAG manual released by EPA.



The 1992 PAG manual provided emergency management officials at the federal, state, and local levels with the technical basis to plan responses to radiological emergencies. It was written to accommodate the "worst release" scenario deemed likely at the time– and at that time the "worst release" scenario was considered to be a major accident at a commercial nuclear power plant, that would result in significant off-site release of radioactive material.

The manual included PAG levels for only the early and intermediate phases following a radiological emergency and only promised late phase PAGs as well as drinking water PAGs.

I think that we can all agree that a lot has changed in terms of the needs from state, local and tribal governments since 1992. The good news is, there is nothing wrong with this PAG Manual, it's just a bit outdated.

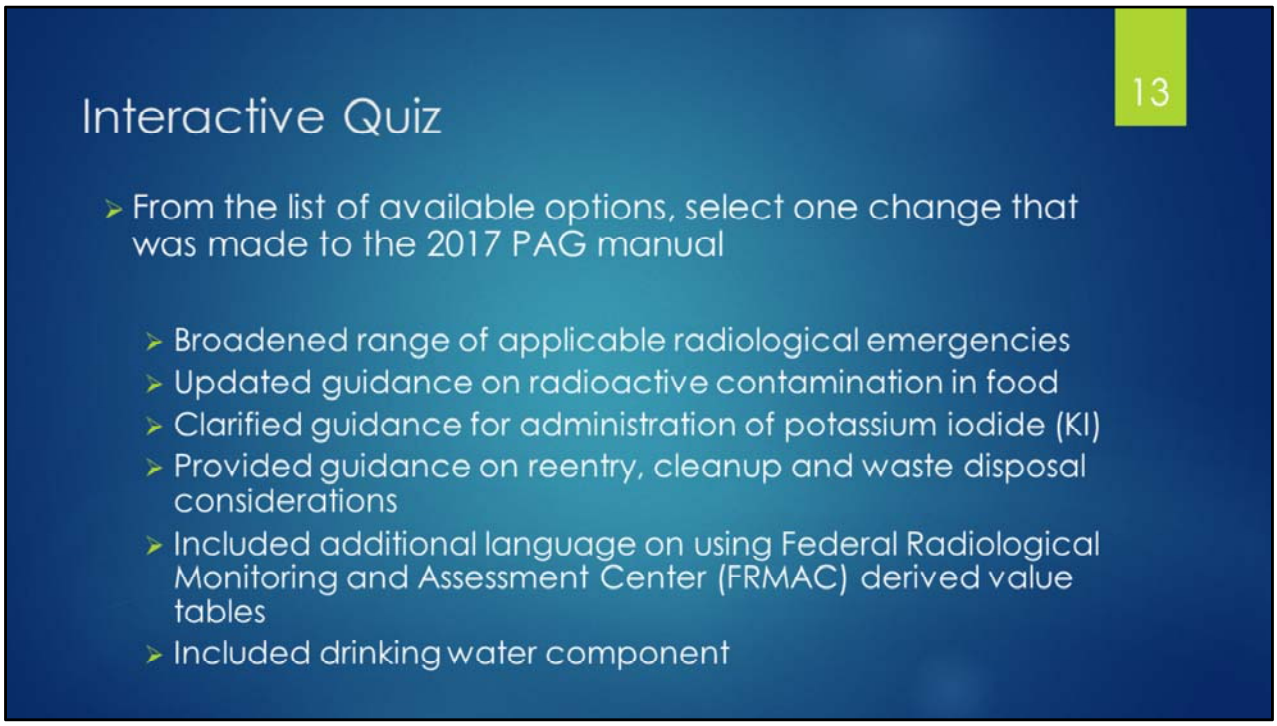


That leads us to the start of today's webinar - the new PAG Manual that was issued in January of 2017!

As part of a response to comment effort, members of the public, state, and local emergency response and health organizations along with industry associations, and national and international radiation protection organizations provided more than 5,000 comments on the full PAG manual. We used those comments to make updates in the 2017 PAG Manual. Significant changes from previous PAG manuals were made, based on those comments.

- The 2016 PAG Manual now applies to a broader range of radiological emergencies – we already talked about many of these during our interactive experience.
- In regard to food guidance, emergency planners are referred to current guidance on radioactive contamination in food from the U.S. Food and Drug Administration (FDA). In the 2017 PAG manual, the EPA adopts the FDA guidance issued in 1998. I should note that this is **a significant update** from the 1992 version of the PAG Manual. However, for the most part, prior to the 2017 PAG manual release, most everyone had already incorporated this guidance.
- In the 2017 PAG manual, EPA has adopted the latest guidance from FDA on the administration of a potassium iodide – abbreviated KI.

- The Manual also contains brief planning guides on reentry for members of the public and workers who would support the recovery of an affected area.
- As for cleanup and waste disposal considerations, the 2017 Manual provides additional guidance for planning a cleanup process as well as considerations for planning the disposal of radioactive waste.
- For projecting doses, the 2017 PAG Manual points users to the Federal Radiological Monitoring and Assessment Center (FRMAC) Manuals. The FRMAC Manual's dosimetry is based on the International Commission on Radiological Protection's Publication 60 (ICRP 60) series.
- And of course, as many of you may already know, the 2017 PAG includes a drinking water component. This is the first time a drinking water PAG has been included in issued PAG manuals.



Today's webinar is all about the 2017 PAG manual and I really want to hammer home some of the important changes that have been made. Which makes this the perfect opportunity to introduce our first interactive quiz!! From the list of available options that you'll see on your screen in just a minute, please select the radio button for a change that was made to the 2017 PAG manual.

<<Host to change layout to interactive quiz>>

Now that we have the quiz on your screen, let me repeat the question and give folks a moment to answer: please select the radio button for a change that was made to the 2017 PAG manual.

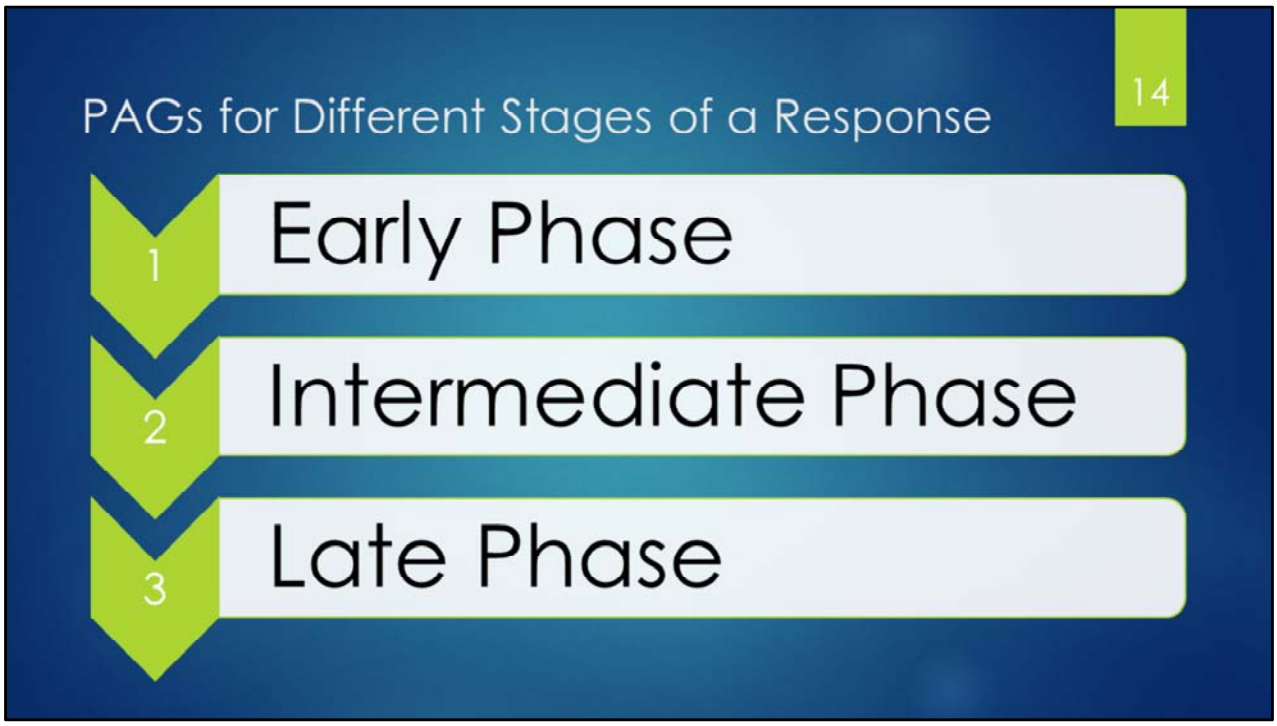
Radio button choices include that the 2017 PAG manual:

- Broadened range of applicable radiological emergencies
- Updated guidance on radioactive contamination in food
- Clarified guidance for administration of potassium iodide (KI)
- Provided guidance on reentry, cleanup and waste disposal considerations
- Included additional language on using Federal Radiological Monitoring and Assessment Center (FRMAC) derived value tables

- Included drinking water component

<<Host to go over questions as results come in>>

Thank you for all of the responses. It looks like we had a few popular choices - **<<mention highest value received>>.** But this really was a trick question – the 2017 PAG manual was a huge effort, and all of the choices on your screen were correct.



We all know that after a radiological emergency, the situation AND the best available information may change quickly. To most adequately respond to any given incident, planners divide each incident into Early, Intermediate and Late Phases and apply different PAGs as the emergency response progresses.

We will go into each of these phases, and the protective actions recommended included in the 2017 PAG manual for each phase in much more detail in the following slides, but I first wanted to be sure to introduce each of the phases so that you could become more familiar with what we are talking about; especially if these classifications are unfamiliar.

- **The Early Phase** is the beginning of a radiological incident. It is absolutely crucial during this period to implement *some* type of immediate protective actions for protection of the public. These actions must be based primarily on the status of the radiological incident and the prognosis for worsening conditions. When available, predictions of radiological conditions in the environment or actual environmental measurements may be used. This phase may last from hours to days.
- **The Intermediate Phase** is the period beginning after the sources and releases of radiological material have been brought under control. During this phase reliable environmental measurements are often available for use as a basis for decisions on protective actions. This phase may overlap the early phase and late phase and may last

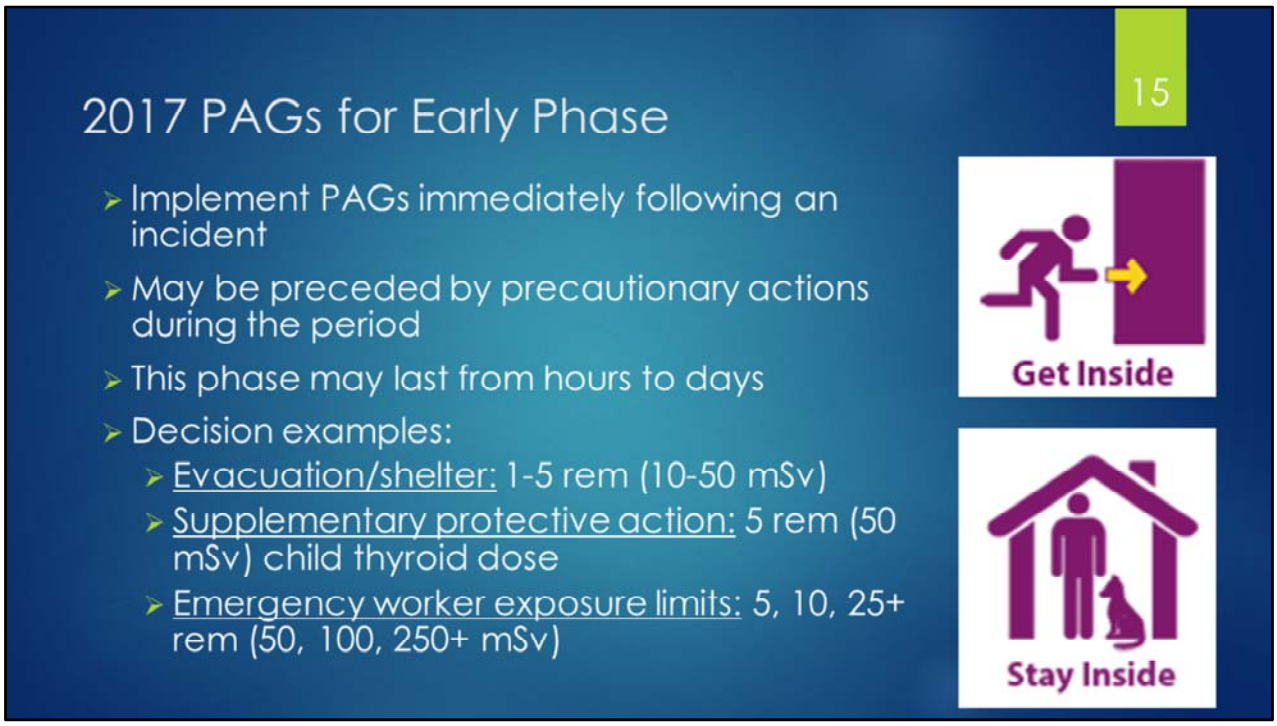
from weeks to months.

- **Finally, the Late Phase** is the period that begins only once recovery actions have brought radiation levels in the environment to acceptable values. It ending when all recovery actions have been completed. This phase may extend from months to years. A PAG level, or dose to avoid, is not appropriate for long-term cleanup.

The phases cannot be represented by precise periods of time – and may even overlap – but to view them in terms of activities, rather than time spans, can provide a useful framework for emergency response planning.

We saw this happening (and still happening) in Japan after Fukushima. The country went through early and intermediate phases of their response in 2011. And now, in 2017, we are still in late phase so many years after the initial accident.

<<This is a lot of information to take in, does anyone have any questions, if so, please raise your hand>>



In the early phase of a radiological emergency, there may be little or no data on actual releases to the environment and responders may have to rely on crude estimates of airborne releases.

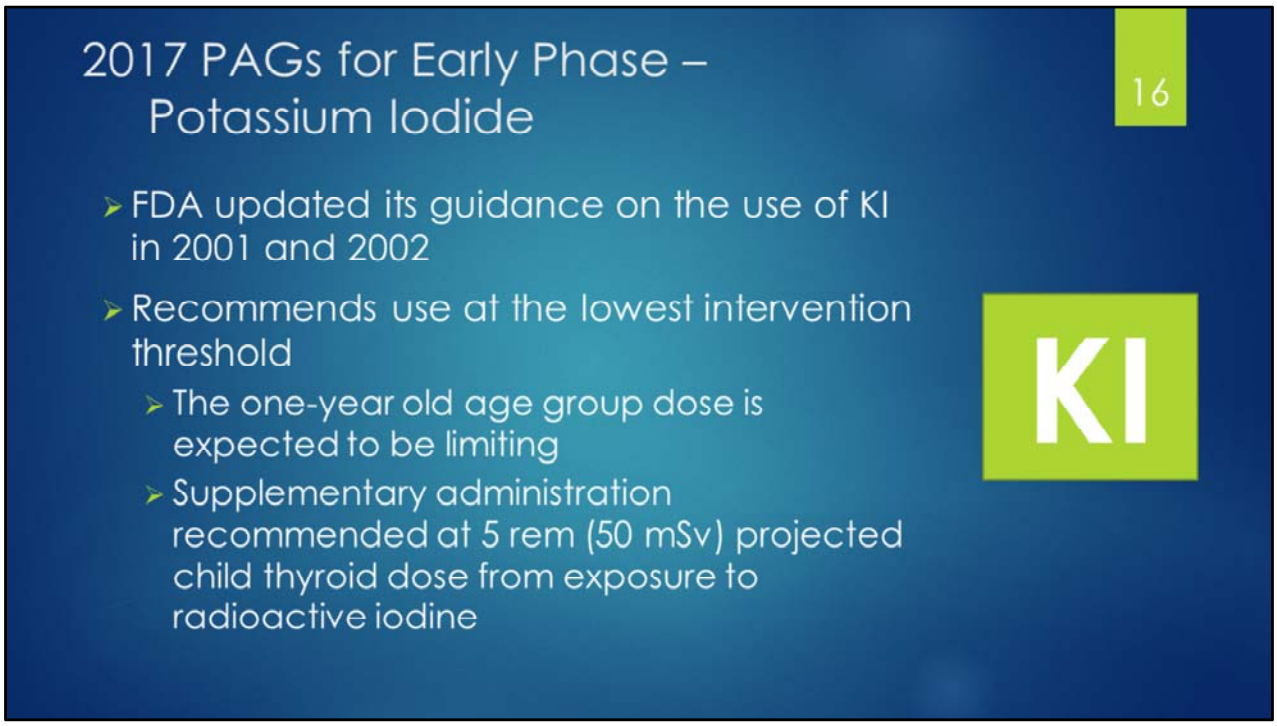
Decision time frames are short during the early phase and preparation is critical to make prudent decisions when data are lacking or insufficient. However, this is also the key time frame where it is absolutely necessary to implement protective actions immediately to protect workers and the public.

Decisions to implement PAGs for the early phase are based on the current status of the radiological incident and the prognosis of worsening conditions. Depending on the conditions, this phase may last from hours to days.

In the early phase, sheltering-in-place and evacuation are the principal protective actions. These actions are meant to avoid inhalation of gases or particulates in an atmospheric plume and to minimize external radiation exposures.

Decision examples based on the 2017 PAG that may be necessary to protect public health during the early phase may include:

- **Evacuation and shelter in place,** which is recommended if 1-5 rem (10-50 mSv) is projected over four days. A decision to evacuate weighs avoid dose against feasibility, and risk associated with the evacuation itself. There are several planning considerations included in the PAG Manual about whether to advise evacuation, or shelter in place.
- **Supplementary protective action, can be taken** if radioactive iodine is released. KI should be considered as a supplementary protective action if the projected child thyroid dose exceeds 5 rem (50 mSv) – note that this threshold is **lower** than the 1992 guidance. Remember that some communities do not use KI and some do, it is okay if your community does not use it.
- **Emergency worker exposure limits,** are imposed if doses of 5/10/25 rem/yr. (50/100/250 mSv) are expected to be incurred over the response duration. Recommended limits of exposure for emergency workers remain unchanged from the 1992 PAG Manual. The higher limits are based on task (e.g., protecting large populations or critical infrastructure or lifesaving) and are clearly situation dependent.



We touched on this very briefly already, but it is worth mentioning again. Potassium iodide – abbreviated as KI and also called "stable iodine," is used to partially block uptake of radionuclides by the thyroid. KI can be used as a type of supplementary protective action during an early phase response when radioactive iodine is released in the environment.

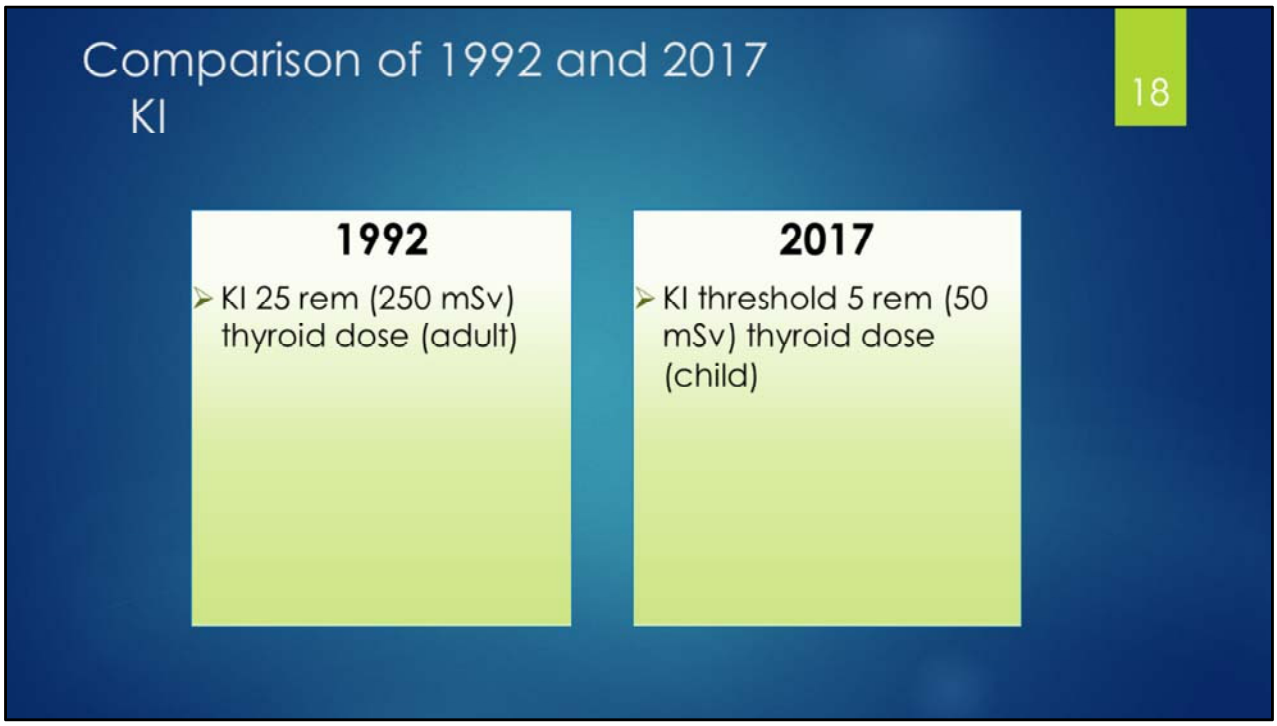
In the 2017 PAG manual, EPA adopts the FDA guidance issued in 2001. This FDA guidance recommended lowering the projected thyroid dose at which the administration of KI is warranted. The PAG manual recommends a simplified approach where the new guideline, 5 rem, child thyroid, is recommended for the entire population and is set at a level that is protective of the most vulnerable member of the population - children. If a community uses KI, everyone can be advised to take KI if the child thyroid dose projection exceeds 5 rem.

This change was made in part because of child thyroid cancer studies following the Chernobyl incident. This change is consistent with the idea of conservatism built into the PAG levels when they were set. It results in an appropriate level of dose avoidance for the whole community, including all age groups, for an emergency. Dosages, however, are still complicated.

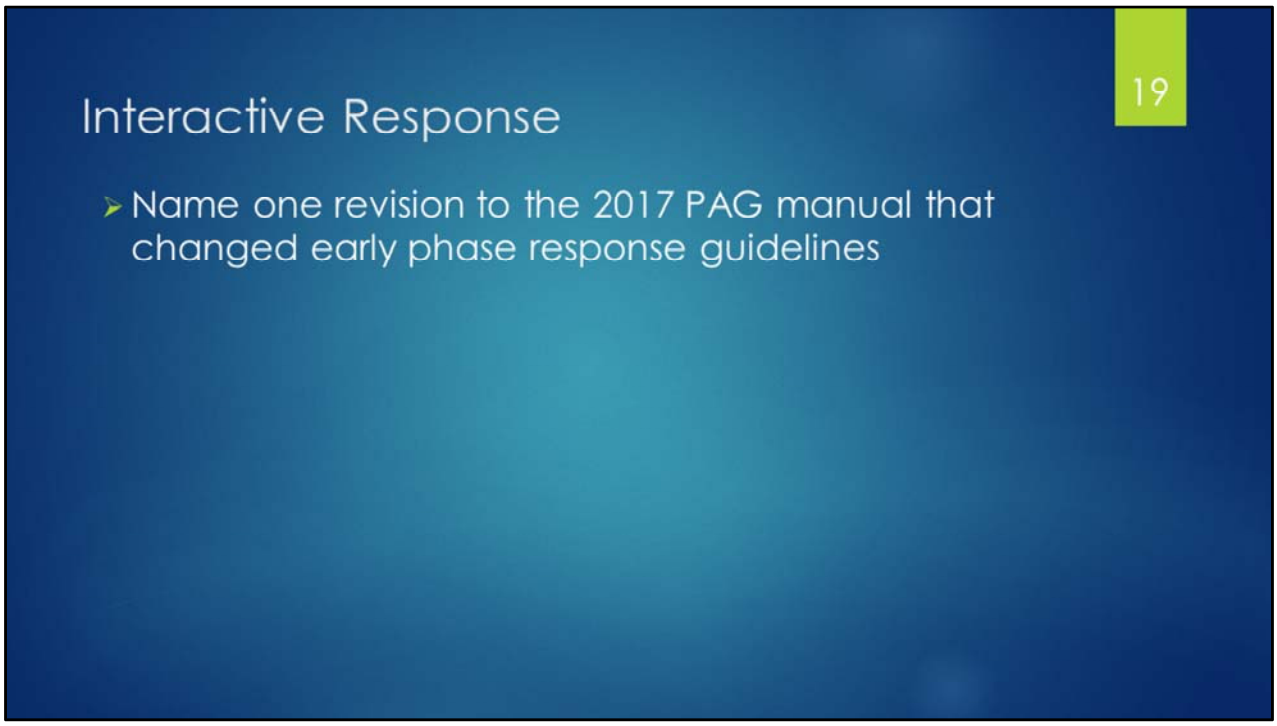
Again, one of the purposes of today's presentation is to really hammer in some important information that was updated in the 2017 PAG manual. To do this, I'm going to start to introduce some comparison slides that highlight the differences between the 1992 PAG manual and the revised, newly issued 2017 PAG manual.

The following is a side-by-side comparison of the changes made to PAG early phase response guidelines for evacuation and shelter:

For the sheltering-in-place or evacuation of the public, the protective action guide range of 1-5 rem remained unchanged; however, in the 2017 PAG, there is no specific organ dose recommended.



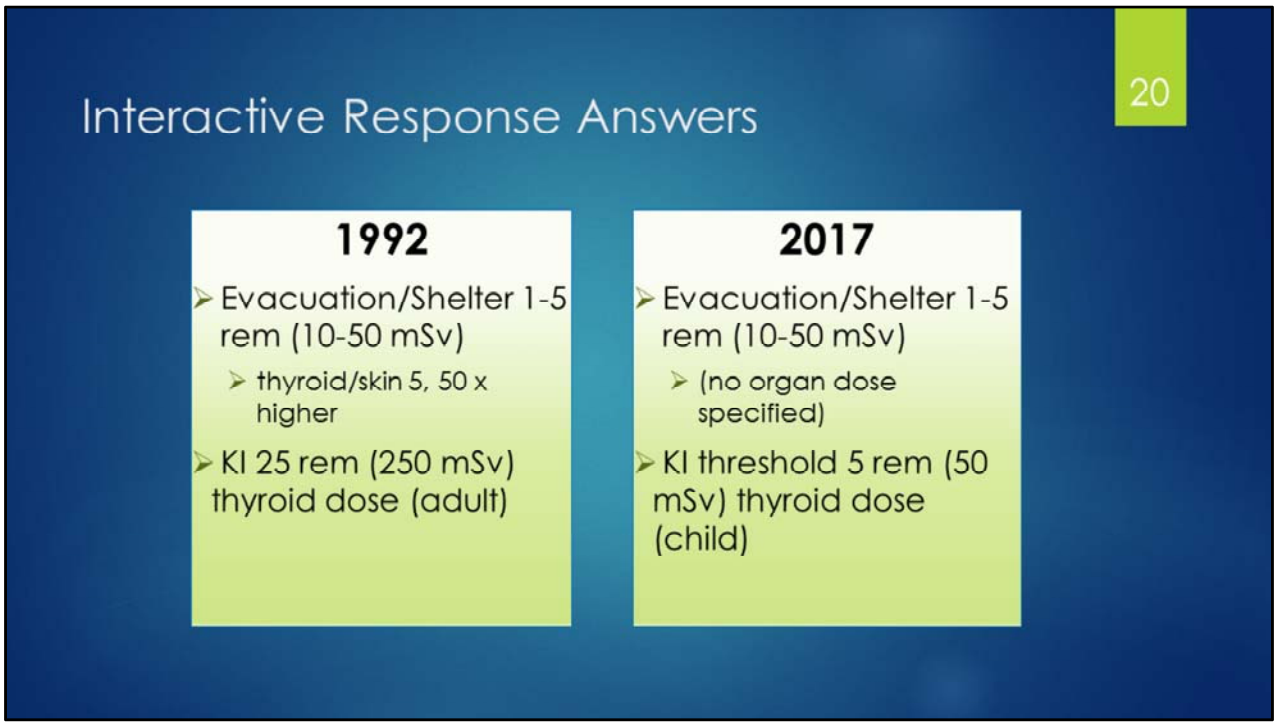
For communities that use it, (KI) should be considered as a supplementary protective action if projected child thyroid dose exceeds 5 mrem (50 millisieverts). This PAG is lower than the 1992 guidance. The lower dose, which the FDA adopted in 2001, is for protection of children based on studies of Chernobyl exposure data.



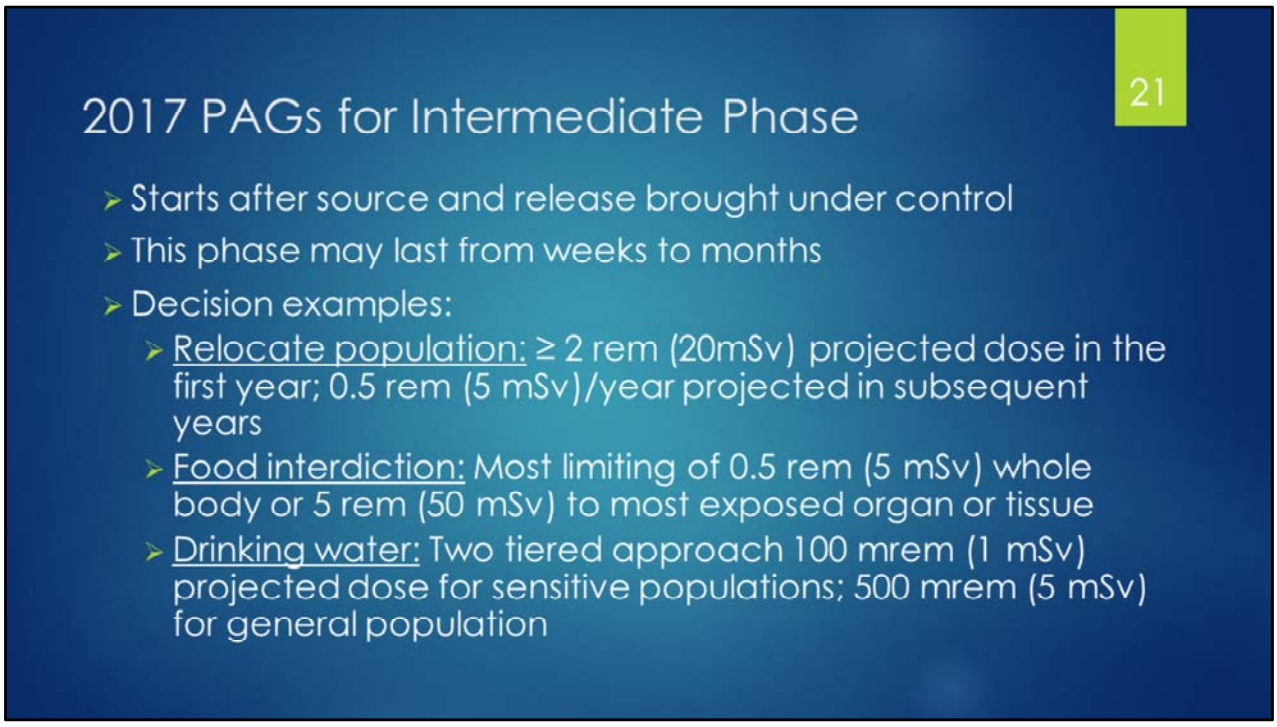
I've just highlighted two important revisions to the early phase guidance issued in the 2017 PAG manual. I'd now like to ask a volunteer, or volunteers to name one of these two revisions. Feel free to chat me in the chat box, or unmute your phone line to answer.

Let me repeat the question while everyone has a chance to respond. Name one revision to the 2017 PAG manual that changed early phase response guidelines. I'm not necessarily looking for values here, but just topical areas. I want you to be familiar enough with the types of updates that were made in the 2017 PAG manual so if a real emergency occurred tomorrow, you could have enough baseline knowledge to remember to look up these topics, and the revised guidance values in the PAG manual and go from there.

<<Host to review answers>>



Thanks for the responses! Our audience was **<<correct/mostly correct>>.** You'll remember that two big changes to the early phases PAGs were to the topics of evacuation/shelter and to KI. I'll leave the slide up for a few seconds so you can take a look at some of the specific changes.



Moving on. The intermediate phase starts after the source and releases of the radiological materials have been brought under control. At that time, the source and releases may not have necessarily ceased, but are no longer growing. Reliable environmental measurements are typically available

during an intermediate phase response, for use as a reference when making important decisions on protective actions.

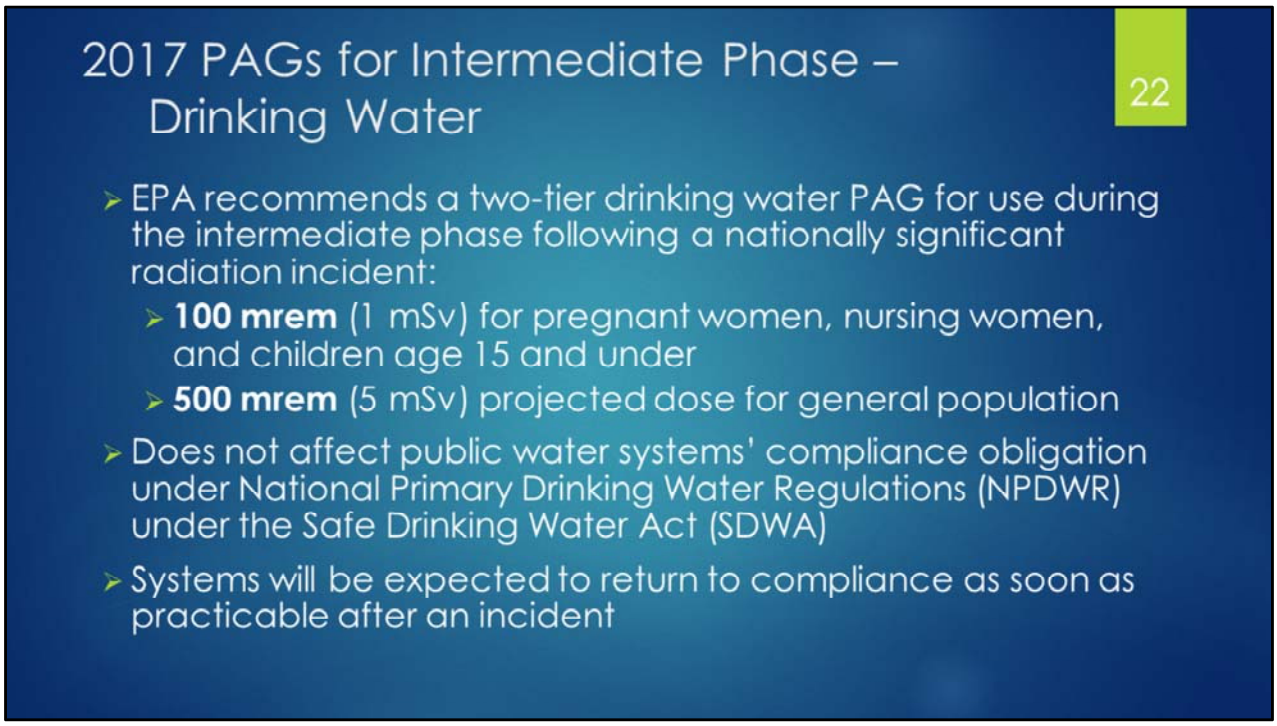
Intermediate phase protective actions are intended to reduce or avoid dose to the public, to control worker exposures, to control the spread of radioactive contamination, and to prepare for late phase cleanup operations. The intermediate phase of a radiological response may last for weeks or months.

During the intermediate phase, several decision-based PAG actions may occur. Commonly we talk about 3, which I show on this slide.

- **Relocation of the public,** is recommended at a dose of greater than or equal to 2 rem (20 mSv) PAG projected dose for the first year and 0.5 rem (5mSv) per any subsequent year. In this phase, with federal support from FRMAC, scientists can run dose calculations with RESRAD-RDD or Turbo FRMAC; and the user can choose sensitive age groups, or enter lower guidelines, if desired. Additionally, local decision makers can adapt the guidelines with incident specific considerations and implement variations as needed. Emergency managers may recommend simple dose reduction techniques if < 2 rem (20 mSv) projected dose in the first year.
- **Food** and drinking water exposure calculations are considered separately from the relocation PAG projection. PAG level set at 0.5 rem (5 mSv)/year projected whole body

dose, or 5 rem (50 mSv)/year to any individual organ or tissue.
- **Drinking water,** PAG levels are set at 100 mrem for sensitive populations and 500 mrem for the general population.

Note that the drinking water PAG is a new feature in the 2017 PAG manual, and I know a lot of folks are very interested in the topic. I'd like to touch on a few additional drinking water related points in the next slide.



The drinking water PAG is perhaps the biggest change in PAGs in a long time. For that reason I've devoted a whole slide to discuss the new guidance.

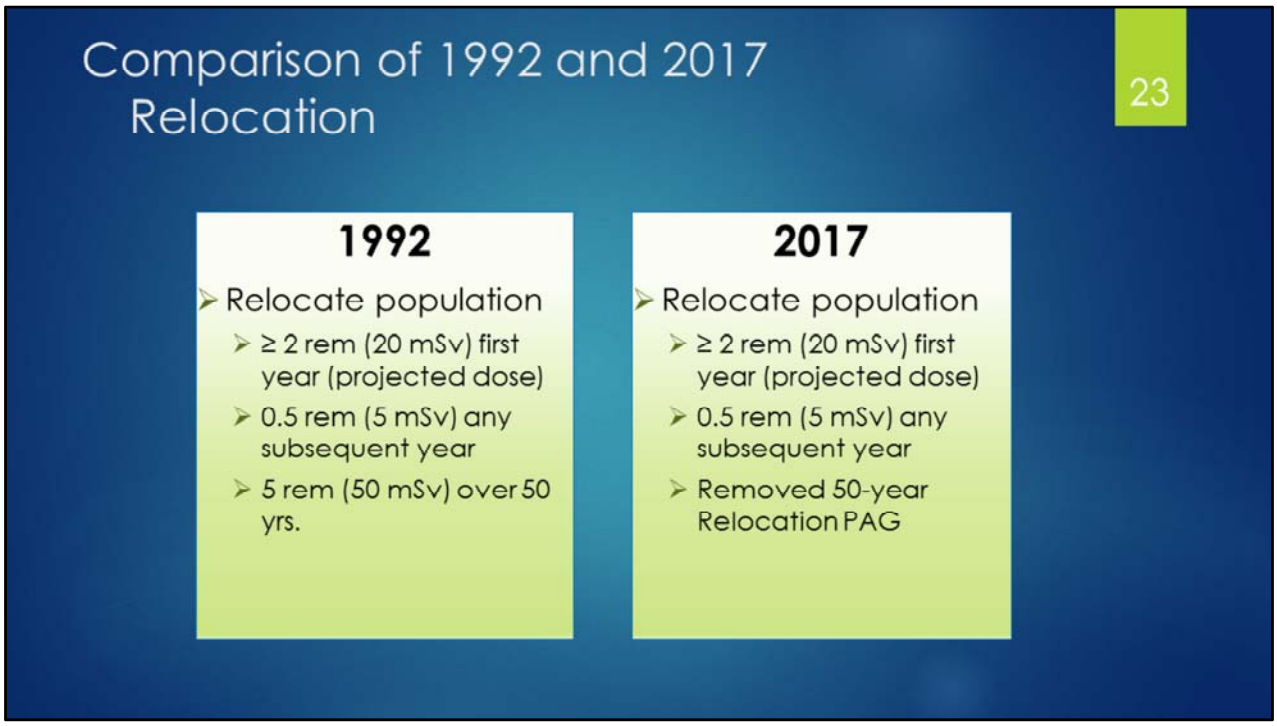
EPA recommends a two-tiered drinking water guide for use during an emergency: 100 millirem for pregnant and nursing women and children and 500 millirem for anyone over the age of 15. <u>These are doses that we want to avoid – not doses that we want the public to get.</u>

Emergency responders and radiation experts have the ability to take radiation readings and project a dose and if we are "predicting" that children, pregnant and nursing women will get 100 mrem from drinking water in the first year after an incident, EPA is recommending that steps be taken to limit that exposure. If we predict that anyone over age 15 will receive 500 mrem in one year, then EPA also recommends that steps be taken to limit that exposure.

Authorities have flexibility on how to apply the PAG. In some cases, they may find it prudent to use the PAG of 100 mrem as a target for the whole population, while in other circumstances, authorities may find that it makes sense to use both targets simultaneously. For example, emergency managers can use a two-tiered approach to focus on protecting the most sensitive population with limited alternate water resources. If bottled water must

be rationed, for example, authorities may make the bottled water available to children, pregnant women and nursing women, and instruct the rest of the population to use a public drinking water supply that will not trigger the 500 mrem PAG.

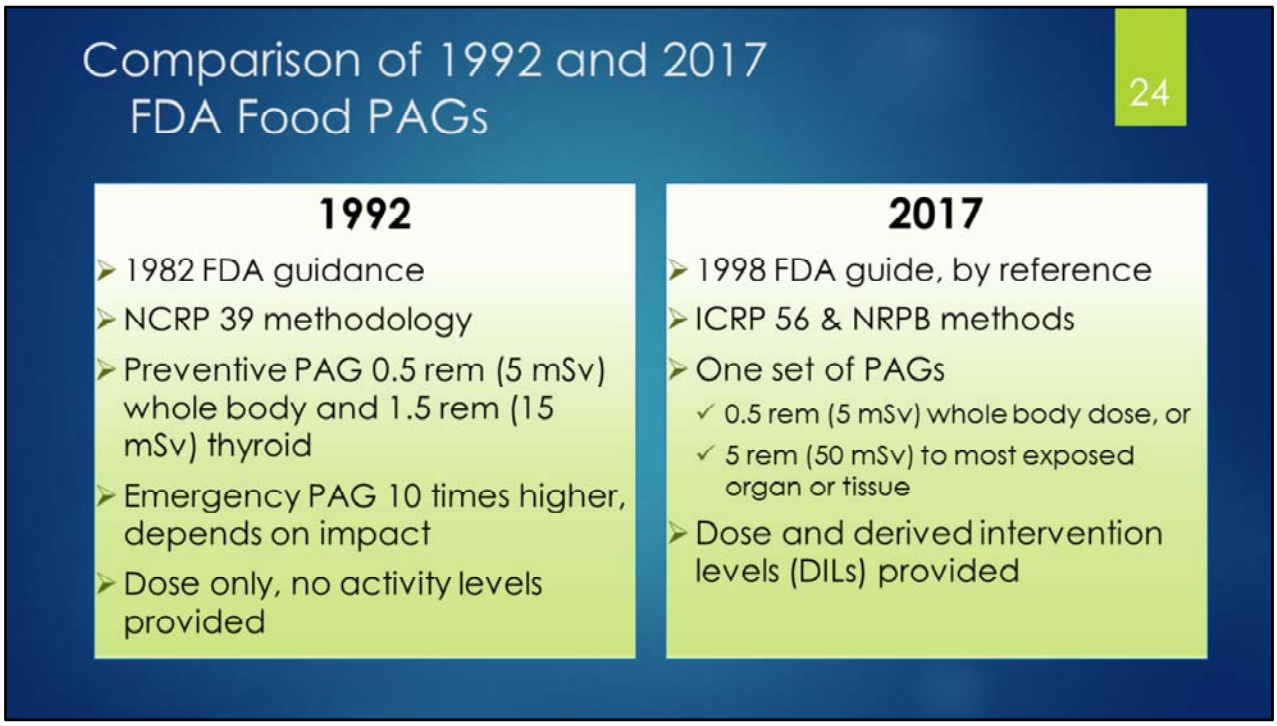
As stated above, the PAGs are intended as guidance only, and local authorities should take into account local circumstances (e.g., incident scope and community needs) when implementing any course of action to protect the public.



This slide format should look a little familiar to you. We're now going to talk about some of the important revisions to intermediate phase PAG levels in the 2017 and 1992 PAG manuals.

Remember relocation means moving out for potentially a long time, maybe until cleanup is complete.

The Relocation of the public PAG was adjusted to remove the 1992 provision about 5 rem over 50 years. The interagency PAGs Subcommittee found that there might be confusion between it and long-term cleanup goals… or that it might be misunderstood that relocation might have to last as long as 50 years!

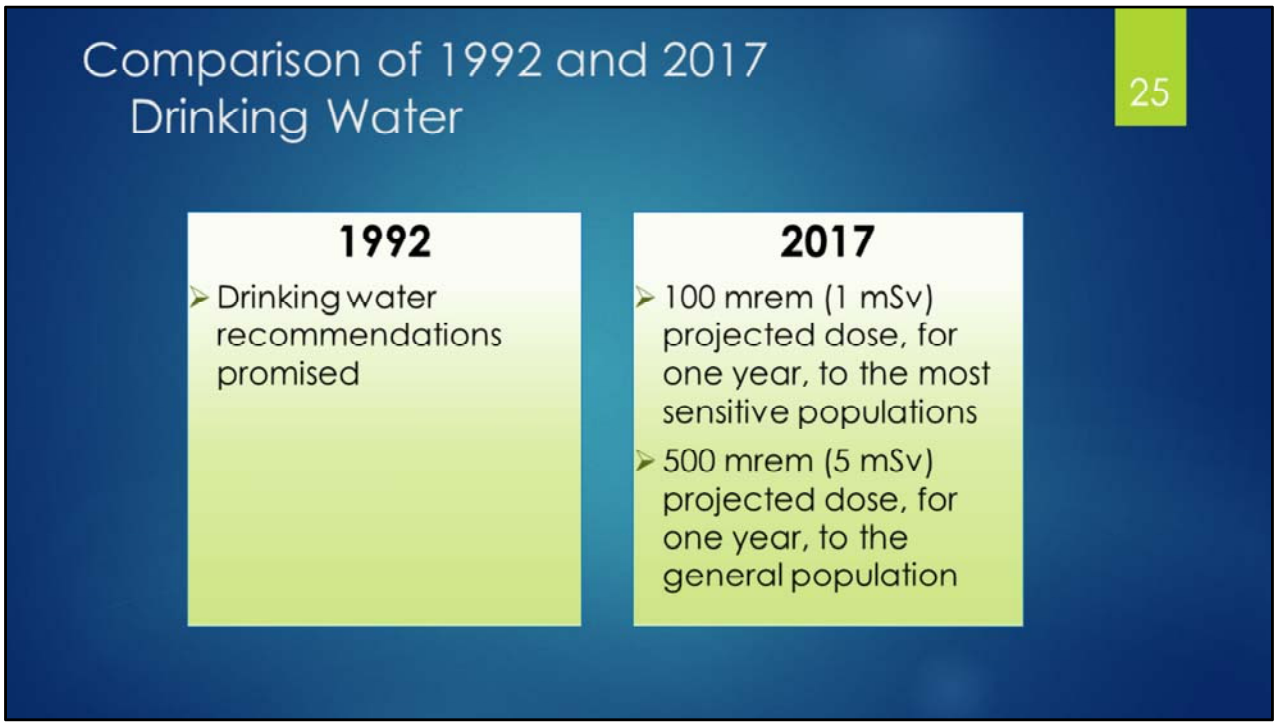


On your screen now you will see a comparison of the FDA Food PAGs - This is not really new news, all organizations that use FDA PAGs had already implemented this update long ago, however we are covering it now on this slide for completeness, since it is a change from the 1992 PAG manual.

FDA provided Dose and Derived Intervention Levels (DILs), which is a concentration derived from the intervention level of dose at which introduction of protective measures should be considered. FDA always says that in a real event, incident-specific factors will be used to develop DILs appropriate for the situation. Note also that if FRMAC is generating Intervention Levels for any of the "non-FDA" radionuclides not explicitly address in FDA's 1998 guidance, then FDA's guidance is to use the ICRP 60 series to assess these radionuclides.

<<Host does not need to say the acronyms below, they are just here FYI>>

NCRP = National Council on Radiation Protection
ICRP = International Commission on Radiological Protection
NRPB = National Radiological Protection Board (UK)

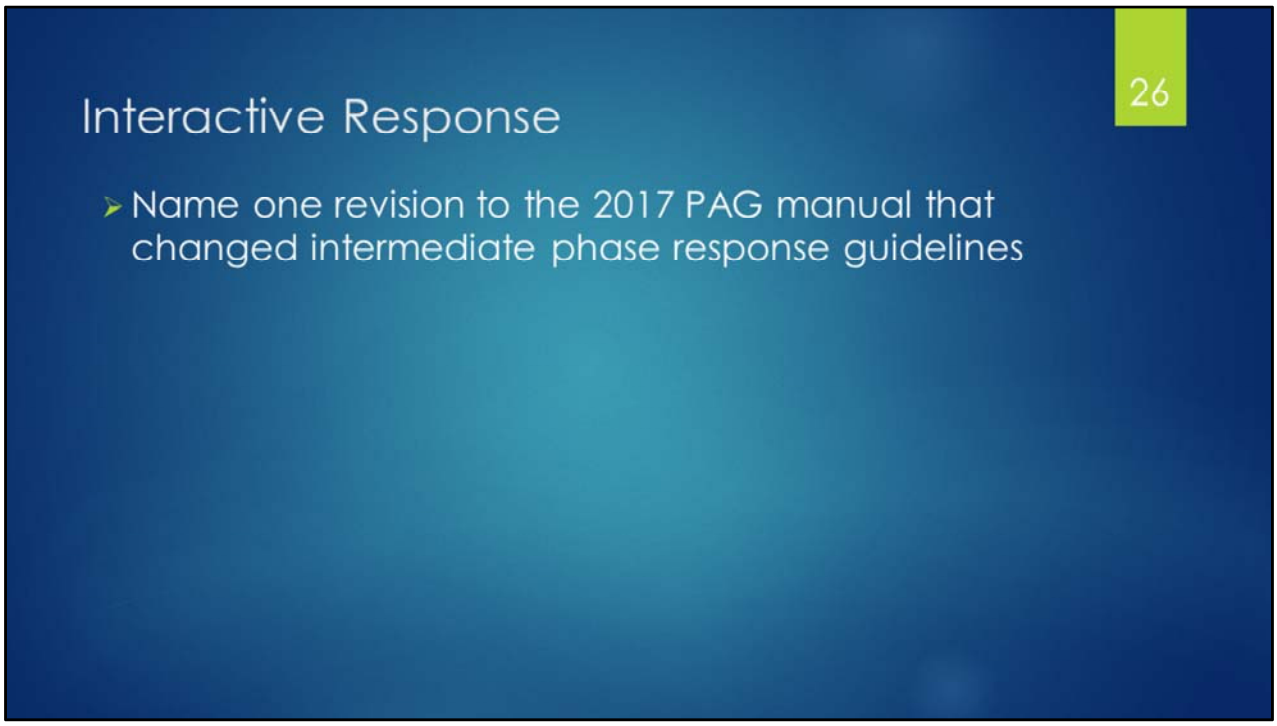


The drinking water PAGs are the first new PAG in many years. Before the 2017 PAG manual was issued drinking water recommendations were only promised. So you can see a lot has changed!

The drinking water PAG topic is important that we've devoted a separate webinar in this series to talking about how you might implement this guidance in your plans. Raise your hand if you've already attended one of our drinking water PAG webinars!

<<Host to watch for hands>>
<<Host to clear hands>>

That's fantastic – there will be a few more opportunities to join in on a drinking water PAG webinar if you are interested.



I've just highlighted three important revisions to the intermediate phase guidance issued in the 2017 PAG manual. I'd like to call on a volunteer or volunteers to name at least one of these revisions to the intermediate phase PAGs

Let me repeat the question while everyone has a chance to respond. Name at least revision to the 2017 PAG manual that changed intermediate phase response guidelines. I'm not necessarily looking for values here, but just topical areas.

First I will take some volunteers – but I'm not am not afraid to call on someone if I don't see enough participation!

<<Host to review answers>>

Thanks for the responses! Our audience was **<<correct/mostly correct>>.** You'll remember that three big changes were to the relocation PAG, food interdiction levels and the addition of a drinking water PAG.

PAGs for Early & Intermediate Phase – Reentry Matrix

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Table 4-2. Reentry Matrix: Quick Reference to Operational Guidelines[a]

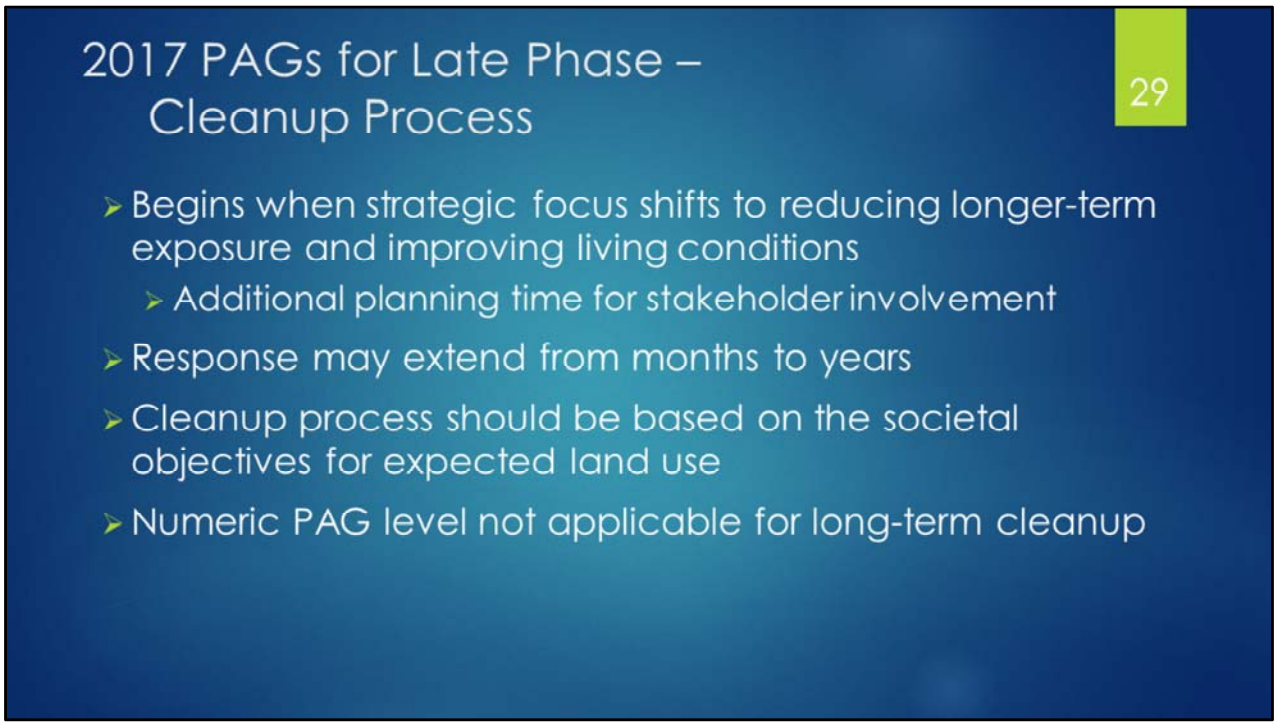
PHASE	ACTIVITY	SUGGESTED LEVELS	CLEANUP ACTIONS[b]
Early Phase	**Sheltering or Evacuation for the Public**	**Public**: 1-5 rem (10-50 mSv) projected over four days (see Chapter 2). A decision to evacuate weighs anticipated dose against feasibility of evacuating within a determined time frame, along with the risks associated with the evacuation itself.	It is too early for organized cleanup, due to chaos of the situation and higher priorities such as lifesaving activities and clearly identifying shelter and evacuation zones. Any cleanup or decontamination information should focus on personal decontamination. It is doubtful any large-scale effort could change evacuation or shelter recommendations during this period (first 4 days). Once evacuation is completed, there are simple actions that cities can implement themselves: rinsing roofs and streets, street sweeping. The objective of these actions is to move the bulk amounts of contamination away from occupied areas or areas where reoccupation is a priority. These actions should be based on measured amounts of contamination and priority of the location. Workers may face high dose levels and will need health physics support.
	Emergency Worker Protection	**Emergency Worker**: 5/10/25 rem (50/100/250 mSv) incurred over the response duration. The higher limits are based on task (e.g., protecting large populations or critical infrastructure or lifesaving). Emergency worker doses will be tracked with dosimeters. Emergency workers have knowledge of the risks associated with radiation exposure, training to protect themselves, and dosimeters to track their doses (see Chapter 3).	

Another important highlight is the "Re-entry Matrix Following a Radiological Incident or Accident" found on pgs. 50 – 52 of the 2017 PAG manual. The very first section of this matrix is shown on your screen – but trust me, there is much more to see if you open the PAG manual.

During the early and intermediate phases of a radiological emergency, individuals will need to enter the relocation area to collect their belongings, maintain or repair critical infrastructure, and to work on preliminary recovery activities. The Reentry Matrix provides a quick reference for public and worker dose guidelines and considerations for decontamination ongoing during this phase.

Operational guidelines include detailed numeric guidance, specific discussions about applicable dose-based limits, timeframes and pathways of exposure related to reentry tasks. The term reentry is used for emergency workers and members of the public going into radiologically contaminated areas, temporarily, under controlled conditions. As part of the U.S. response to the Japanese Fukushima accident, scientists performed dose calculations to ensure that passengers and workers on train trips through contaminated areas do not exceed doses typically received from cosmic radiation during an international flight. DOE's Argonne National Laboratory scientists used the RESRAD-RDD tool and hand calculations to approximate doses from the NPP radionuclides.

I bring this table up, because it’s important to know that it is available as a resource. You don’t need to memorize it, but knowing that it is available will help you with reentry decisions in your next drill or exercise.

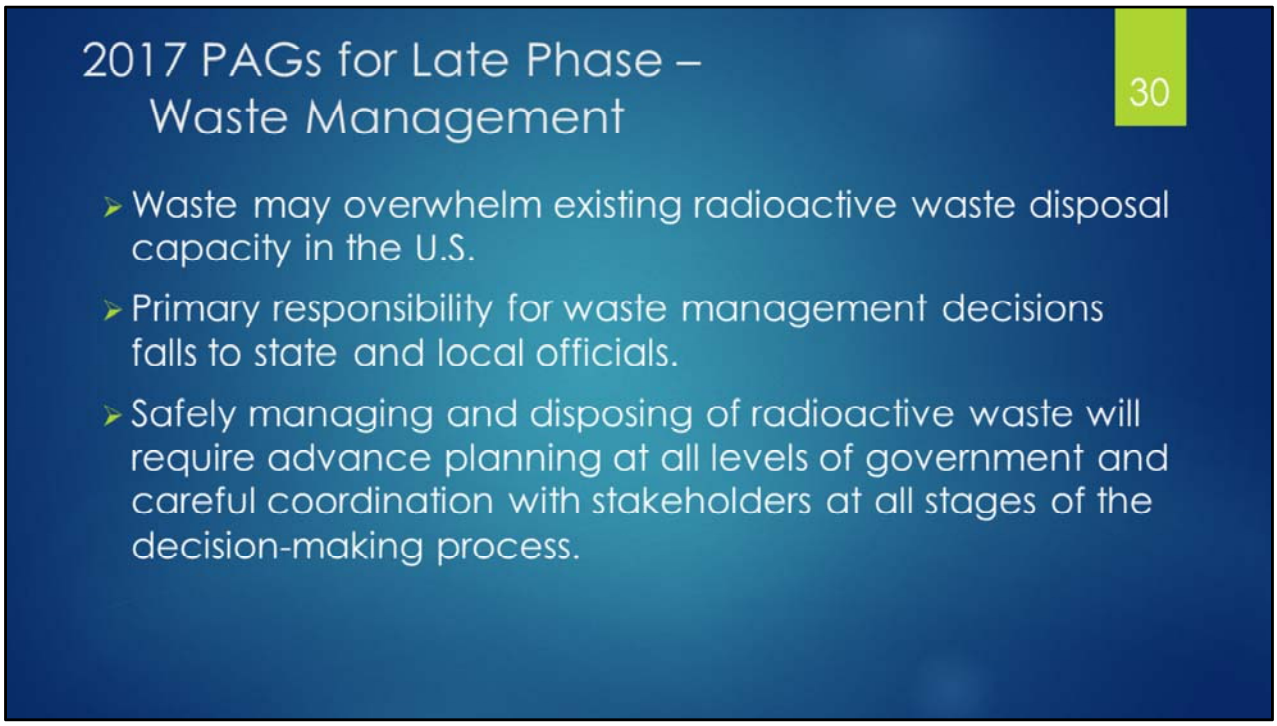


Late phase clean up begins sometime during the intermediate phase and proceeds concurrently with intermediate phase protection action activities. I mentioned earlier in the presentation that often, response phases overlap, and that is true here. The transition to the late phase really is marked by a change in the approach. Response strategies during the late phase are driven by strategies that focus on reducing longer-term exposure and improving interim living conditions rather than by urgency which drives the early and intermediate phase approaches.

During the late phase of a radiological incident, decision-makers will have more time and information allowing for better data collection, more complex modeling, stakeholder involvement, and options analysis. Community members will influence decisions such as if and when to allow people to return home to contaminated areas. There will be populations, who were not relocated or evacuated, living in contaminated areas where efforts to reduce exposures will be ongoing.

This should not come as a shock – the late phase can last for many months to years. During this phase there are no applicable numeric PAG levels for long-term cleanup.

For instance, around Fukushima, which happened in 2011 the Japanese are *still* in the late phase conducing waste management.

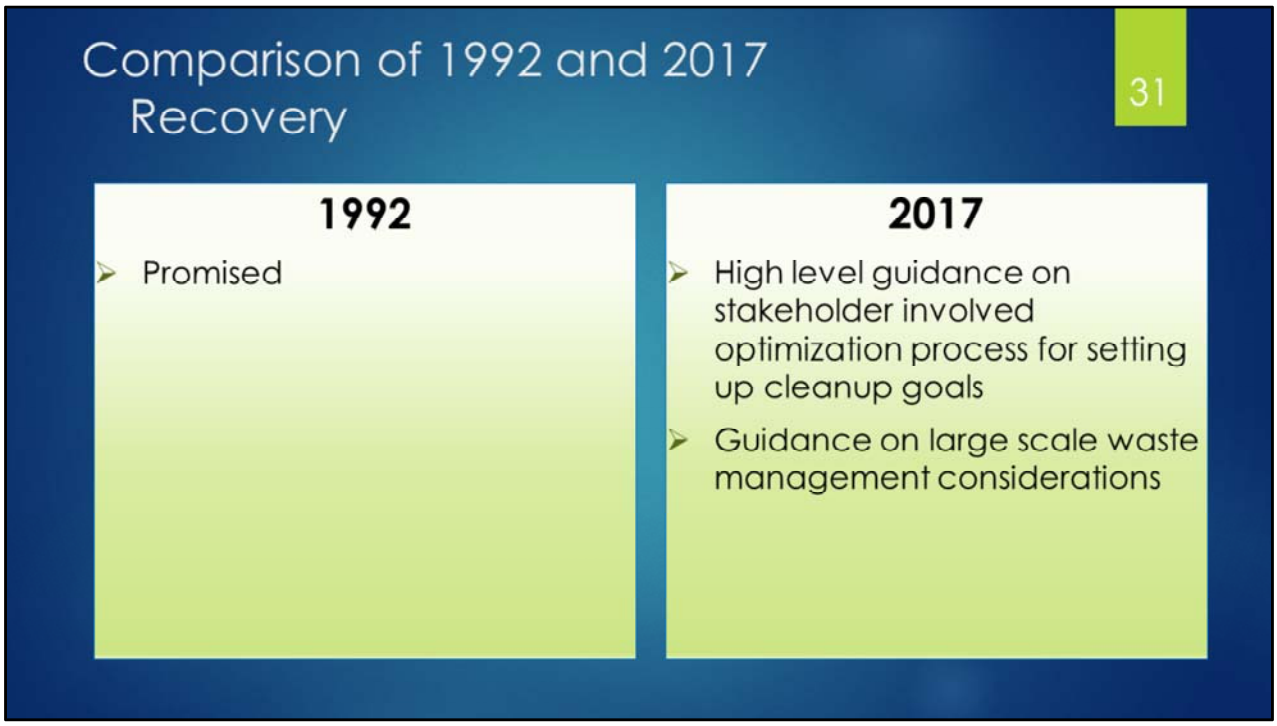


If a large-scale radiological incident were to occur in the United States, the complexity of radiological waste disposal has the potential to be huge but would ultimately depend on the magnitude of the release and the decisions related to site cleanup, both of which will determine the amount and types of waste requiring disposal.

States hold primary responsibility to identify and provide waste management options, including disposal capacity; in the event of a terrorist attack, the federal government can offer a range of assistance to states to identify and implement waste management options.

Stakeholder involvement groups presents opportunities to involve members of the community in providing sound, cost-effective waste staging and disposal recommendations that will protect human health and the environment.

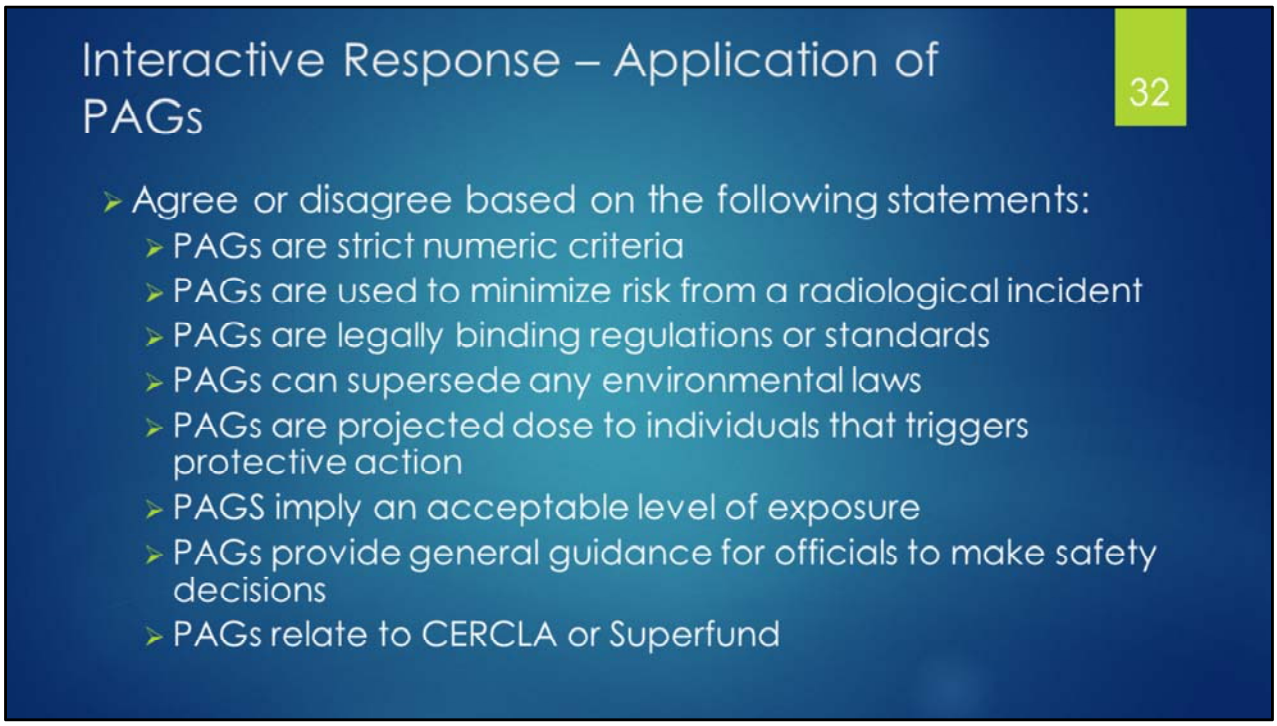
The new waste management discussion includes some possible solutions to a situation involving more radioactive waste than all of our US repositories could handle. It was co-authored by experts from DoD, DOE, EPA and others who would have a role in supporting states dealing with such an incident.



An example provided in the PAG manual includes a clean up process adapted closely from the "Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents" from the Department of Homeland Security; which describes a hypothetical organization to integrate federal cleanup support activities with state and local governments and the public.

Empaneling groups early on to represent stakeholders and interested community members will allow discussions to begin on setting goals, understanding risks and mitigative actions, and to set priorities. The guidance discusses setting up a Technical Working Group to provide support to a Stakeholder Working Group who will inform late phase priorities.

By incorporating this guidance from DHS 2008, the final PAG Manual is superseding that DHS guidance.



We've are now wrapping up today's PAG manual webinar – and I want to make sure we have adequately addressed what PAGs are, but just as importantly, what they aren't.

In just a moment I am going to ask you to agree or disagree with some statements to test your knowledge

PAGs are strict numeric criteria – For those who disagreed – that is the correct answer

PAGs are used to minimize risk from a radiological incident – For those who agreed – that is the correct answer

PAGs are legally binding regulations or standards – For those who disagreed – that is the correct answer

PAGs can supersede any environmental laws – For those who disagreed – that is the correct answer

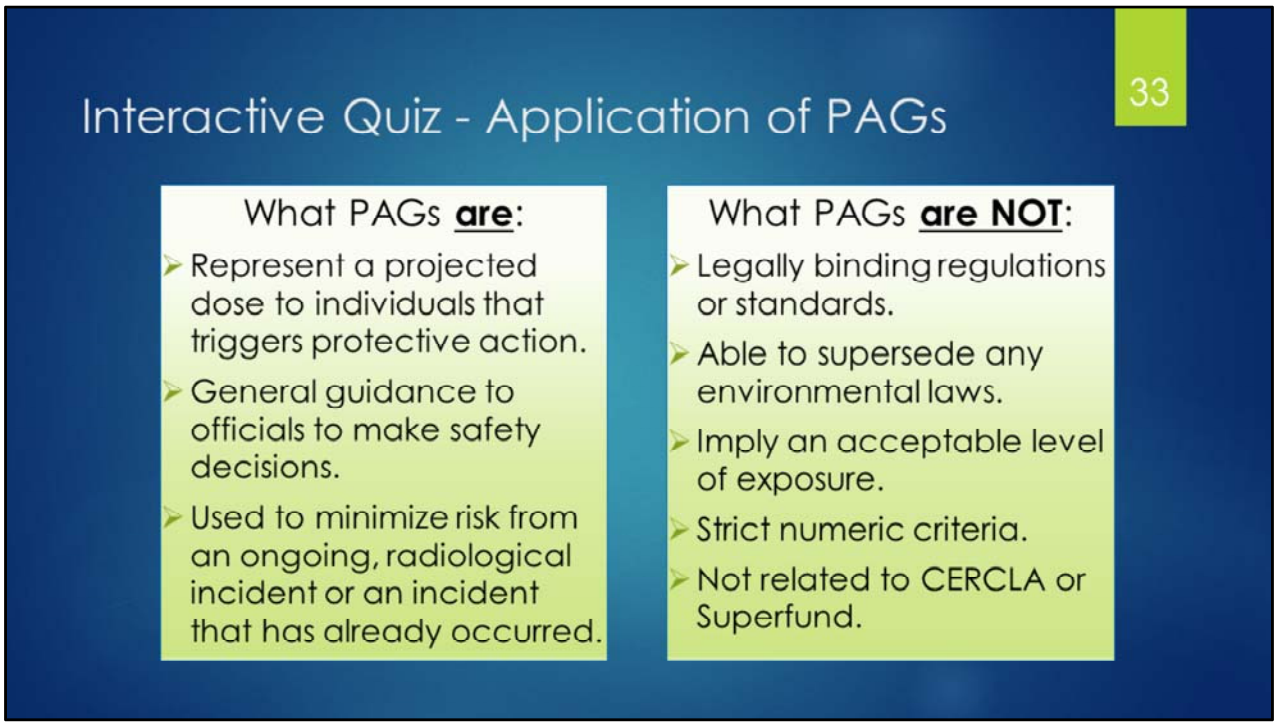
PAGs are projected dose to individuals that triggers protective action – For those who agreed – that is the correct answer

PAGS imply an acceptable level of exposure – For those who disagreed – that is the correct

answer

PAGs provide general guidance for officials to make safety decisions – For those who agreed – that is the correct answer

PAGs relate to CERCLA or Superfund – For those who disagreed – that is the correct answer



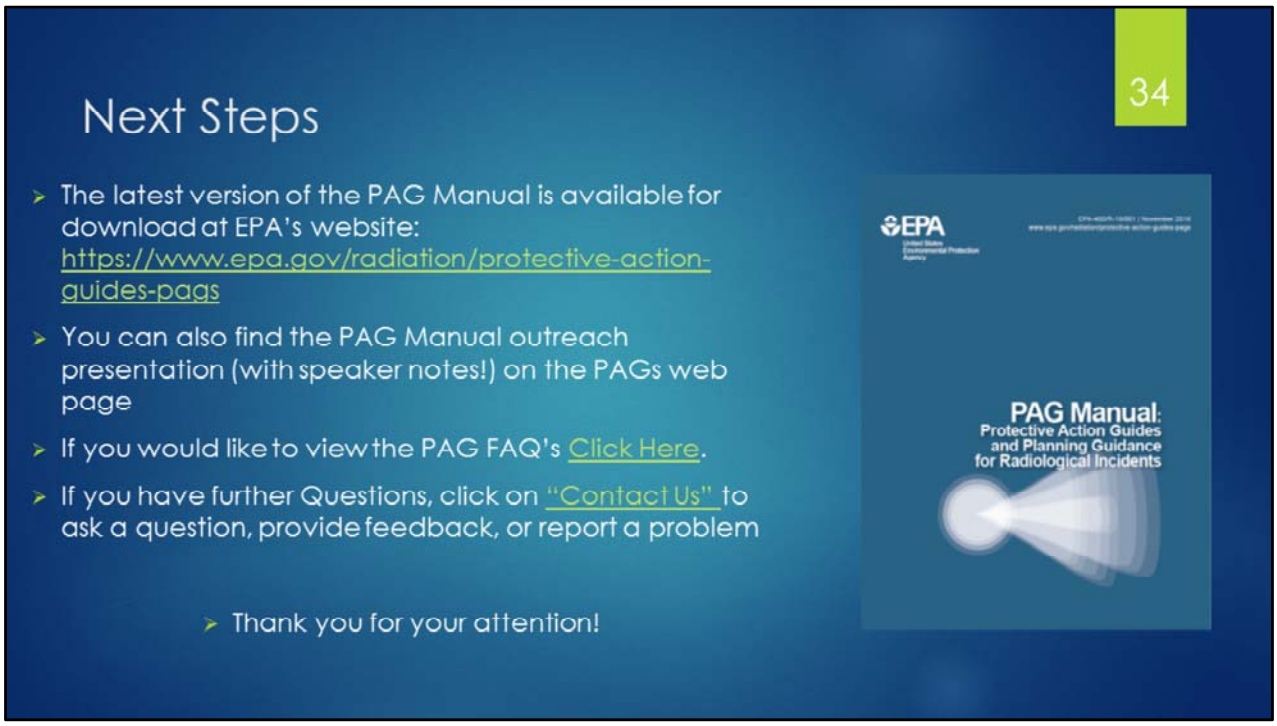
Focus on avoided dose: Radiation emergency experts have protocols to make estimates of a projected public dose downwind for the first hours or days, and that is compared to PAGs.

The forward looking projection sometimes is hard to not compare to regulatory 'safe' levels – they are apples and oranges. The goal of using PAGs is to avoid the projected dose, by taking an action to take the source or the person away.

It is important to note that PAGs are not meant to be applied as strict numeric criteria, but rather as guidelines to be considered in the context of incident-specific factors.

- Not for radioactively contaminated sites
- Releases, incidents, or accidents
- Public protection is the focus
- Guidance, not regulatory
- Not related to CERCLA or Superfund
- Avoided dose ≠ safe limit to allow

Also note that several states have their own adaptations to PAGs



We are going to make these slides and speaker notes available to you all, and will work your questions into FAQs.

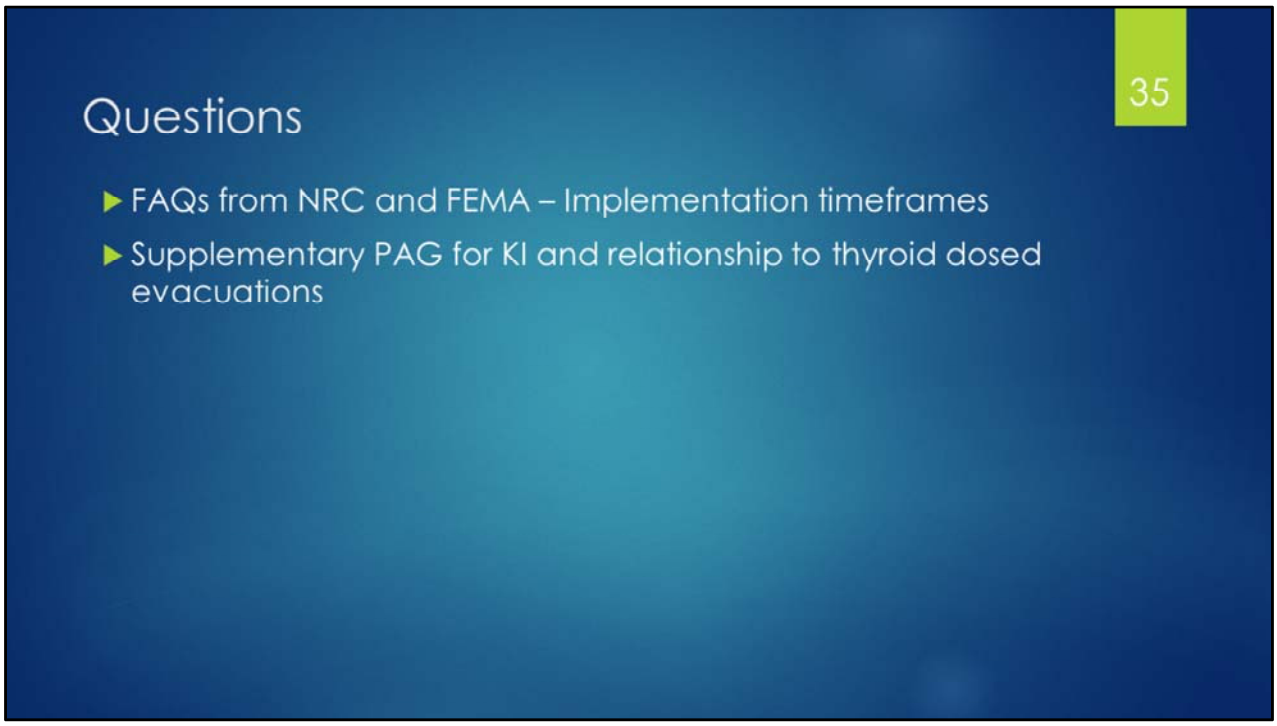
Go check out the new FAQs we've posted on the link here (you can click the link right now right in Adobe Connect), and feel free to type your comments or questions into the Chat box.

We plan to host another series of webinars to discuss the drinking water PAG in more detail, soon.

<<If time allows>> We have a few minutes for questions today, so I'd like to take the opportunity to ask for anyone with questions to unmute yourself and speak up over the phone line, or type your question in the chat box.

Thank you for participating in our webinar today.

<<First take questions from the audience>>



We've received a few emailed questions in the past month about the PAG manual, and since we have time I'd like to ask our resident expert Sara DeCair to go over these for the benefit of our entire audience.

Sara, take it away!