Superfund Risk Assessment and How You Can Help

0:09

Narrator: There's a Superfund site near my home. Am I exposed to chemicals from this site? Will the contaminants at the Superfund site make me sick? Is the water that comes out of my tap safe to drain? The playground's clean enough that they'll be safe for my children. What about the food I eat? Is it free of dangerous chemicals?

0:31

Narrator: In communities across the country, people are asking important questions about their health and the environment. They want to know what risks they face. Assessing risk is an important part of the Environmental Protection Agency Superfund process.

Community Member: In 63, they were not supposed to be producing the asbestos, if I'm correct.

Narrator: We're listening. We've heard that you want more involvement in the risk assessment process. In fact, we want and need your involvement. Your knowledge can help us prepare the most thorough risk assessment. Together, we can evaluate the risk of the Superfund site in your community.

1:15

Timothy Fields Jr (U.S. EPA Assistant Administrator): Hello, my name is Tim Fields. I'm in charge of EPA's Toxic Waste Clean Up program that was created to make communities safer places to live. In this video, we will describe EPA Superfund risk assessment process, what it is, how it works, and most importantly how you can be involved. I hope that this video will further your discussions with EPA. Know that at the conclusion of this video you will have a

better understanding of EPA Superfund risk assessment process and how you can be involved in that process.

2:02

Narrator: At EPA, our bottom line is to protect human health and the environment. In this video, we'll show you how people like you across the country are helping us in an important part of the Superfund process.

Let's begin with a brief overview of the Superfund law and what a Superfund site is.

2:31

Narrator: There are hazardous waste sites scattered across the US. Many of these sites were polluted years ago, before people understood how some chemicals can harm people's health and the environment. Waste was dumped on the ground, in rivers, or left out in the open. They're found around places like old warehouses, manufacturing plants, processing plants, mines, and landfills. People live near these places and may become exposed to harmful chemicals that spread through the air, water, and soil.

3:07

Narrator: In 1980, Congress created the Superfund program to clean up hazardous waste sites and make the communities around them safer places to live. The goal is to reduce risk to people and the environment. Risk is a key concept, and characterizing risk is the goal of the Superfund risk assessment. Risk means the chance of harm or loss. Here we'll use a more specific definition of risk: the chance that chemicals from a Superfund site will cause health and ecological problems.

At superfund sites, the EPA evaluates risk to both humans and the environment, but in this video we're going to focus on risks to human health —

that is, risks to you, your family, and your community. We have a process to figure out this risk. The process results in numbers that indicate how great the risks are. In general, the goal of the risk assessment is to answer three basic questions: Who is at risk? How great is the risk? And what is causing the risk?

4:14

Elmer Akin (EPA Risk Assessor): Risk assessment is a tool that EPA uses in the Superfund program to evaluate the risk posed by a site to people that come in contact with that site or may live nearby.

Narrator: During the risk assessment, we evaluate risks from what people do with the site now and what they may do there in the future. Assessors ask questions like: Is it safe to live near the site? Is it safe to swim near the site or to eat fish caught near the site? Is it safe to drink groundwater from the area around the site? Is it safe for children to play on a nearby playground?

Elmer Akin (EPA Risk Assessor): The risk assessment seeks to evaluate the risk for all people that might come in contact with the site — whether by entering the site itself or through releases into the surrounding neighborhood. That includes children, pregnant women, or any sensitive population that may be exposed.

5:22

Narrator: We use risk assessments as opposed to health studies for an important reason. Health studies work when people are already suffering health effects. A risk assessment can evaluate risk before people become ill.

Elmer Akin: In that sense, the risk assessment is a very powerful tool for determining that the risk is unacceptable and that the agency needs to take some action to clean up that site.

Narrator: The risk assessment helps us evaluate the site and make decisions about cleaning it up. Ultimately, it helps us make decisions that will make the community a safer place to live.

5:57

Narrator: Now let's turn to the Superfund risk assessment process. Risk assessment has four parts:

1. Data collection and evaluation
2. Exposure assessment
3. Toxicity assessment
4. Risk characterization

The first part is Data collection and evaluation. In data collection and evaluation, we gather information and collect samples around the site. This information is then used in the next parts: exposure assessment (discovering what contaminants people are exposed to and how much they might be exposed to), and toxicity assessment (determining what illnesses or health effects may be caused by these contaminants). All of this information is combined in the last part: risk characterization. In risk characterization, we describe the risks to people from chemicals that contaminate the site. The risk characterization is then used to make decisions about how to best clean up the site.

Diana Hammer (EPA Community Involvement Coordinator): Throughout the Superfund risk assessment process, community involvement is very important. Community members have a lot of very valuable information that they can bring to the risk assessment — information about past site practices, possible exposures, and future land use plans. All this information can help us tailor the risk assessment to fit the particular situation in that community.

7:08

Narrator: Now we'll go through each of the four parts of the risk assessment in more detail and show you how you and your community can be involved.

7:15

Narrator: During data collection and evaluation, EPA has to find out what happened at the site and what contaminants may be left. The data are often in the form of samples that we collect at the site. We'll collect samples of things like soil, air, water, fish, and garden vegetables — anything that might contain contaminants. You can see that it's important for us to collect samples in the right places so that we don't miss any chemicals.

So we begin by collecting information. For instance, we'll look at old photographs, maps, and documents. These can tell us where we're most likely to find chemicals, but they can't tell us everything. So we also talk to people, because people who live near a Superfund site often know things we couldn't learn anywhere else — things like where pollutants might be, how they got there, and how people might come into contact with them. That kind of information is critical to designing an effective sampling plan.

8:14

Narrator: The small town of Fort Valley, GA, is a good example of how people can help us figure out where pollution might be. There's an old pesticide plant near downtown. The site is contaminated with pesticides. EPA figured that out pretty quickly, but it wasn't clear what other areas of town might be contaminated. For instance, part of this ditch flows through the pesticide plant. From the plant, the ditch used to flow along the street, although it's covered up now.

Rev. Morris Hillsman (Fort Valley Resident): They were thinking it was obvious: because the ditch was on one side of the street, the contaminants would be there. But they had no way of knowing that during the floods, that ditch would often flood because debris would stop up at the different intersections, and once it stopped up, the ditch would flood both east and west into the yards of the residents. And we were aware of it because we saw it every day.

Narrator: After learning that from the people who lived here, we took samples from the yard that may have been flooded and we found contamination.

Marvin Crafter (Fort Valley Resident): We suggested to the agency that this possibly was a route of exposure, you know, one that they inevitably did not know about, but after they tested, the test proved that maybe we were right, and there were high levels of contaminants found all along the ditch.

We didn't show EPA during the testing phase of this thing, any area that was not seriously contaminated. That's basically because of our history and because of our knowing what went on in this community.

Narrator: And that's not all we discovered by talking to people who grew up here. We also learned that pesticide from the plant didn't just spill into the ditch. It also blew from the plant into the surrounding neighborhood.

Marvin Crafter (Fort Valley Resident): "We could wake up in the morning, smell the air and tell you what color the water in the ditch was, you know, because it was that normal."

Narrator: Armed with information from the community about the spread of chemicals from the site by air and water, EPA began testing to determine the extent of contamination in the neighborhood. As a result, EPA was able to take

action in Fort Valley to protect the community — a direct result of the community's cooperation with risk assessors.

Rev. Morris Hillsman (Fort Valley Resident): "EPA listened to what we were saying. We talked with them, and we had very good communication. Our day-to-day knowledge — such as the knowledge that we had — was information that had never been printed anywhere in any textbooks. It was a day-to-day situation. Things that we knew, we saw the debris, we saw the dust, we knew that it was airborne."

Narrator: In Fort Valley, people helped us find the pockets of pollution. In other areas we know where the pollution is. But to clean it up effectively, we have to figure out how it got there.

11:23

Narrator: In southeastern North Dakota, we knew there was pollution in the groundwater. It was showing up in wells. The big question was: how did it get there? To find the answer, we talked to farmers like Roy Hout. They took us back to the great depression, when grasshoppers infested the fields around here.

Roy Hout (farmer): "They would just eat up the crops. I can remember with my dad's cornfield, they started on the outside edge of it and kept working in until there was no corn left. There was nothing but black dirt."

Narrator: By talking with farmers like Hout, assessors learned that people used arsenic to fight the grasshoppers.

Roy Hout (farmer): "The county would bring out some of this poison. It was arsenic. They put it in the sawdust, and I don't know if it did much good or not. I suppose it helped some."

Narrator: Farmers spread the arsenic by laying sawdust on their fields. EPA figured out that the arsenic had slowly sunk down through the soil and into the groundwater — the same groundwater that people drink. Knowing how the arsenic was getting into the groundwater helped design an effective sampling and cleanup plan.

12:34

Narrator: During sampling, there's another key concept that comes into play. When Risk assessors are determining how contaminants might affect people, they can do it in two ways. They can rely on actual samples or they can use a combination of sampling and mathematical models that predict the movement of chemicals.

For instance, in Selma, CA, there's a Superfund site next to a Raisin vineyard. Risk assessors knew there were contaminants in the soil and in the groundwater.

Michell Lau (EPA Project Manager): "I believe the original assumption was that the contaminated groundwater in the aquifer would be drawn up into the plant and therefore into the fruit itself. They use the levels of contamination that were in the groundwater to calculate the uptake of the water through the plant and into the fruit."

Narrator: That means assessors figured out how much contamination would be in the raisins without actually testing the raisins. It was simply a calculation of how much contamination would work its way from the ground through the roots and into the fruit. But after talking with people who worked at the vineyard, they learn more about how the raisins are actually made.

Rudy Alcoser (Grape Farmer): "The farm laborers come in with, with knives and they cut the stems and put them in the in the pans and then lay out the

paper tray. And they dump them on the tray and then they go to the next one until they're all the way down to the end of the row. We lay them out for approximately 14 to 21 days."

Narrator: With this new information about how the raisins are made, assessors realize that using the calculation alone wouldn't determine how much contamination was in the raisins.

Michell Lau (EPA Project Manager): "We thought the grapes could be contaminated by dust blowing over them since they were drying out in the open air uncovered, and therefore wanted to test the fruit itself for levels of contamination."

Narrator: Talking to the community here allowed us to tailor the risk assessment process to this particular situation, in this case the way raisins are made.

14:40

Narrator: In Port Lavaca Texas, working with the community helped tailor the assessment of the way people live. The town is on a Bay along the Texas Gulf Coast, and the Bay is a big part of people's lives here. When residents found out that the local industry had released mercury into the Bay, they were concerned. It got people like Sue Crober asking questions.

Sue Crober: “Knowing that the markers over there, could I still go fishing a little at the Bay?"

Narrator: They asked the questions and they also helped to answer them. For example, to figure out if people could still eat fish, we had to sample fish from the Bay. But to do that accurately, we had to know where people fish, what they catch, and how much fish they eat. So we sought out local fishermen like Russell Janik and sent them a survey.

Russell Janak (Port Lavaca Fisherman): "The survey was how many times you fished. And they want to know what parts of the Bay you fished cause they give you a good map. It was a real good map. And then you put your dots where you thought you're good ---they said it was confidential--- where your hot spots were. And you put all your dots and they ask you kind of like your diet, what'd you do with your fish?"

Narrator: The survey gave us a detailed view of where people fish, what they catch, and more.

Sur Crober (Port Lavaca Resident): EPA found out through their survey people do depend on Lavaca Bay for their for their diet, whether it be at the fish market or where they go out and catch the fish themselves or go to restaurants. They depend on the good seafood and the good fish. And I think that was one of the reasons that EPA was intent on helping its problem solved, because the community is dependent on this Bay."

Narrator: In each of these examples, by working with the community, we were able to make our risk assessments more accurate.

Diana Hammer (EPA Community Involvement Coordinator): Only people who live in a community truly understand what their daily activities are and what their future activities are likely to be. When community members bring that kind of information to us, we can incorporate it into the risk assessment, and that makes the risk assessment much more accurate. It better reflects what's going on in that particular community.

17:01

Narrator: Knowing what and where to sample is important, but it's also important to take and analyze the samples in the right way. You see, our chemical analysis of environmental samples has two objectives: to figure out

which chemical substances are present in the sample and how much is present.

With that in mind, we follow strict procedures to make sure we know exactly where a sample comes from and to make sure that no other chemicals come into contact with the samples.

Larry Reed (EPA Deputy Director of Emergency & Remedial Response): "There are two main factors that we must keep in mind in making sure that samples are taken properly. First is we have to know the location where those samples are taken so that we can make sure that we are protecting people from those potential exposure points. The second key factor when we're looking at ensuring that samples are taken properly is to ensure we've got the right types of containers to be used for those samples. We're always concerned that there could be some external contamination of those if they're not using the appropriate containers."

Narrator: The chemicals in the samples are often in very tiny amounts and have to be handled carefully and with special equipment. In the risk assessment, we can only use data that has been collected and analyzed according to these procedures. This is the evaluation part of data collection and evaluation.

With proper sampling, we can learn a lot about a site. We can develop pictures that show what chemicals are on the site and exactly where they are. Then we can use a geographic information system called GIS to show the relationship between people and the contamination.

For instance, we can show people's homes in relation to where our sampling found contaminants. We can also predict what's likely to happen in the future. This computer animation shows contaminated groundwater, where it is, and

how it's moving. This is especially important if the contaminants are heading toward drinking water wells, for example.

The result of all the sampling and lab work is a list of chemicals found at the Superfund site. It's important to keep a few things in mind about this list of chemicals. Some may occur naturally on the site and are considered contaminants. Some might not be harmful, and some might be harmful, but they may be in places where people will never come into contact with them. With all that in mind, at this point, we refer to this list as chemicals of potential concern.

The rest of the risk assessment will be a process of determining what chemicals of potential concern will become chemicals of concern.

19:50

Narrator: The next step is to figure out how much of the chemicals of potential concern a person may be exposed to, and to do that we have to find out how people might come into contact with them. We do this in the exposure assessment.

Exposure assessment links contaminants at the site with people near the site. It describes how people might come into contact with the site contaminants.

Exposure assessment seeks to answer 3 questions: How people can be exposed, who could be exposed, and how much contamination could they be exposed to?

For people to be exposed to chemicals from a Superfund site, two things have to happen. First, the chemical has to get to the person, for instance, arriving in tap water. That's called an exposure pathway.

Then it has to get inside the person's body, for instance, by drinking the water. That's called an exposure route.

Exposure pathways can be complicated. For instance, in Lavaca Bay, Texas, mercury spilled from an industrial plant into the Bay. From there, it got into fish, which were caught and eaten by local fishermen.

There can be a lot of different exposure pathways, and sometimes there are more than one at the same site. For instance, people fishing in a Bay could be one, people swimming in the same Bay could be another.

In a situation like that, we have to add together the two exposures to get a complete picture.

Exposure routes — how chemicals get into the body — are a little simpler.

There are just three: ingestion, which means eating or drinking contaminants; inhalation, or breathing in contaminants; and dermal, which means contaminants come into contact with the skin.

We also have to consider multiple routes, just as we sometimes have to consider multiple pathways.

To continue the previous example, eating fish from the Bay would be ingestion, and if people also swim in the Bay, we would have to also consider a dermal route. And in that case, to get an accurate assessment of risk, we would have to combine a person's exposure by ingestion with the person's dermal exposure.

In figuring out ways that people may be exposed to chemicals in an area, it's important to look at how the area is used. In Fort Valley, GA, we knew this area would be used for a Public Library. That helped us to understand how people might be exposed to any chemicals.

Even though different land uses may result in different types of exposure, some aspects of exposure are very similar from one Superfund site to another, and that can help us in assessing risk. That's because we have standardized assumptions for most behavior patterns that are similar across the country, like how much air someone breathes or the amount of water a person drinks.

Jayne Michuard (EPA Risk Assessor): We use standard assumptions to have some consistency from site to site when we evaluate risks at sites because we don't always have the opportunity to go out and collect site-specific information on certain parameters.

Narrator: For instance, in North Dakota, once we knew how much arsenic was in the water, we could use standard assumptions to estimate how much arsenic people were getting each day.

But standard assumptions don't work in every case.

Jayne Michuard (EPA Risk Assessor): Standard assumptions are very useful, but by definition they are standard. And as we know, every community is different. So we need to talk to the community and make sure that the assumptions we're making in the risk assessment reflect the activity patterns in that community. And if they do differ, then we modify the assumptions in the risk assessment.

Narrator: That's what happened in Port Lavaca. Our survey asked local fishermen what they did with the fish they catch.

Russell Janak (Port Lavaca Fisherman): "Oh, I eat them. I mean, I don't hardly go fishing and don't catch a fish and always bring them in and I eat, we eat them. I mean, it's, it's, it's everything is like this. I'm not a catch and release type of guy."

Narrator: That's what most people here told us. And it's something we took into account in assessing the risk from pollution in the Bay.

Gary Baumgarten (EPA Project Manager): "I've been talking to the community. We found out these people eat a lot of fish. I'll say maybe like twice what our standard assumptions are that we would use in a risk assessment. So this gave us probably a better handle on our risk assessment. If we'd use the standard assumptions, we maybe would have underestimated the potential risk for the community down here."

Narrator: Talking with a community can also tip us off to unusual exposure pathways that we might not think of.

This is the ditch that carried contaminated water in Fort Valley, GA. Buried in the banks are pockets of a type of chalk called kaolin. It's the same substance used in some over-the-counter medicines and some people dig it up and eat it.

Marvin Crafter (Fort Valley Resident): "It's called white dirt. It's used by the kaolin industry for various reasons, but we used to go, the further down that this went, the deeper it got and the water cut into the kaolin later, later and somewhere in our evolution somebody tasted that and it tasted good and it became a serious commodity. As you can see in the walls of this ditch, you see speckles of it all along,

Narrator: The kaolin in the ditch picked up contamination from the polluted water, but without help from the people who live here, it's unlikely that risk assessors could have known about this important exposure pathway.

Finding out how people interact with their environment is one key to understanding how they can be exposed to chemicals from a Superfund site.

The other key is to understand how the chemicals interact with the environment. Do they dissolve in water? Do they stick to soil? Do they

concentrate in fish? Do they break down in soil or water and become harmless? Or do they change into something more toxic?

Answering these questions helps us determine how much of a chemical people might be exposed to.

At this point, we have a pretty good idea of how people can be exposed to chemicals. Now we have to figure out who could be exposed.

You can help us with this. You can tell us what kinds of activities might bring people into contact with contaminants. Do people garden in the area? Who eats food from the gardens? Do children or elderly people live in the area?

These things help us understand the possible exposures. Once we know how people are exposed and who might be exposed, then we're ready to estimate how much of site contaminants they might be exposed to.

The term we use for how much of a contaminant someone is exposed to is dose. To understand dose, let's use an example of someone drinking contaminated water. The dose would depend on how contaminated the water is, how much water the person drinks, and for how long the person drinks the contaminated water.

Then we have to consider who is being exposed because people are different. For instance, children will usually get a higher dose than adults even if they're exposed to the same amount of a chemical. It has to do with the size of their bodies and other factors. To make sure we account for size differences, we calculate doses for several groups of people, including adults and children.

Then we figure out who is most likely to get the highest dose. For instance, it might be children who live the closest to the Superfund site, or it might be an elderly person who has lived near the site for a longer period of time.

Whoever it turns out to be, the highest dose becomes what we call the Reasonable Maximum Exposure, or RME. It includes reasonable exposure from all pathways and routes. That means it includes the possibility that a person may be exposed at home, work, and play.

For example, an RME dose for a drinking water pathway may assume that the most water a person would drink each day is 8 glasses. We would also include other water exposure pathways such as the RME dose from showering and the RME dose from swimming in contaminated water.

The RME dose is the level of exposure we use in performing the rest of the risk assessment.

28:17

Narrator: The next step is to figure out how toxic the chemicals of potential concern are. This part of risk assessment is called toxicity assessment.

The toxicity of a chemical is its potential to cause harm. In the toxicity assessment, we find out what health effects might result from the chemicals of potential concern.

It answers two key questions. What potential health effects or harm can the chemicals cause? And how much of the chemicals does it take to cause these effects?

This is important because at this stage of risk assessment, we only know that people may be exposed to the chemicals. We don't yet know if that exposure would cause harm.

Some chemicals are generally harmless. Some are safe or even beneficial in small doses, but can be dangerous at high doses. And some are harmful even in low doses.

The key is that the dose makes the poison, as a doctor named Paracelsus said hundreds of years ago.

To find out about chemicals' toxicity, we refer to large databases. They list hundreds of chemicals. They show what harm chemicals could do to people and how much of the chemicals it takes to cause harm.

Information in the databases is obtained from research done by universities, industry, governments and other researchers around the world.

The research is performed at laboratories such as EPA's National Health and Environmental Effects Research Laboratory in North Carolina. Scientists here perform experiments to determine what effects various chemicals could have on people. In some cases, they work with isolated cells and chemicals, using reactions and test tubes to reproduce what could happen inside the human body.

Sometimes they study what has happened to people when they were accidentally exposed to chemicals in the past. Some scientists use computer models. These can help understand the way chemicals interact with cells inside our bodies. But each of these techniques have limitations.

Linda Birnbaum (EPA Toxicologist): "It's very important to understand that people are more than the sum of their parts. We're not just a collection of different kinds of cells or different kinds of tissues or different kinds of organs. What makes us human and what makes animals is the fact that all these tissues and cells and organs work together. There's no way that we can simulate that in isolated cells or isolated organs, or even in a computer program. In fact, we need to actually examine how things function in a living, breathing creature."

Narrator: It would be unethical to intentionally expose people to possibly harmful chemicals. So scientists perform carefully controlled experiments on lab animals. They expose animals to chemicals the same way people can be exposed. Then they observe the results.

From these observations they can begin to understand what the chemicals do and how they do it. Animal testing has some advantages. Many have much shorter life spans and reproductive cycles than human beings. That means we can study long term effects like the development of cancer in a relatively short period of time. And when we find that a chemical has a certain effect on animals, we know it often has the same effect on humans.

Linda Birnbaum (EPA Toxicologist): “People are kind of animal. We've known for a long time that the basic biology and the basic physiology, the basic biochemistry, are very similar between animals and people. If we can understand how a chemical causes an adverse effect in animals, it is likely that we can understand whether or not such an effect will occur in people as well."

Narrator: By referring to this research, we learn how much of the chemicals of potential concern it takes to cause health effects and what effects the chemicals can have. It's important to understand that chemicals can cause many different kinds of health effects.

In the toxicity assessment, we group these effects into two main categories: cancer and harmful effects that are not cancer.

For instance, some chemicals cause cancer. Other chemicals don't cause cancer but can cause other health effects like nervous system problems or birth defects.

This distinction is important because the risk for cancer and non-cancer effects are determined and calculated in different ways.

Here's why. Although we know a lot more than we used to about how chemicals cause cancer, scientists still don't know exactly what dose of a chemical causes cancer.

So toxicologists use experiments, for instance, on animals, to find out what dose can cause cancer. For most carcinogens, as the dose increases, the risk of cancer increases proportionally. From this information, we calculate what we call a cancer slope factor. From the slope factor, we can determine how likely it is that a person will develop cancer from a certain dose of a carcinogen.

Chrsitopher Weis (EPA Toxicologist): What the graph shows is that as the dose increases, the probability of cancer goes up in a straight line or linear fashion.

Narrator: You can see that as the dose gets lower, the risk gets lower. But for most carcinogens we assume that as long as there's exposure, the risk never disappears entirely.

It's different for most chemicals that only cause non-cancer effects. For these, scientists figure out what dose people, including children, can get each day over a lifetime without having any harmful health effects. We call this safe dose the reference dose.

We use the term reference dose because when we're trying to see if a chemical will cause harm, we compare it or refer back to this dose as a safe dose. So if the dose or amount people receive is the reference dose or less, we believe it's not harmful. But a dose that is more than the reference dose may be harmful.

EPA is continually studying the biological response to chemicals in the environment. That is, how different chemicals actually cause harmful effects in our bodies.

As we learn more, we may change our approach for evaluating the toxicity of some carcinogens and non-carcinogens. In the meantime, to make sure we're protecting people, EPA will continue to add margins of safety in its risk assessments.

34:57

Narrator: This brings us to the last part of the risk assessment process, which is called risk characterization. In risk characterization, we answer these questions.

> What are the health risks from the site?
>
> Which chemicals are posing the health risks?
>
> Which exposure pathways create the risks and what are the uncertainties? Meaning, how sure are we about our risk calculations and anything that could affect the calculated risk level?

The risk characterization uses information from each of the previous steps. From the data collection and evaluation, we developed a list of the chemicals of potential concern and where they are found at the site. From the exposure assessment, we learned who is exposed, how they are exposed, and how much of the contaminants they are exposed to. And from the toxicity assessment, we found out how toxic these contaminants are.

We use all of this information to calculate the risks of cancer and non cancer toxic health effects from the site.

Looking at these risks helps us focus our cleanup efforts on the greatest threats to people's health.

For instance, we review the chemicals we found at the site. They're on the list of chemicals of potential concerns.

We use the information we've gathered to see if each one actually poses a risk. The ones that don't are dropped. The ones that do become chemicals of concern. If there are more than one, we combine the risks to get a total risk.

Sometimes the list of chemicals of potential concern can be very long. After we learn more about the site from the exposure and toxicity assessments, we may find out that only some of the chemicals actually pose a risk.

For instance, of all the chemicals that are in Lavaca Bay in Texas, we determined that only the chemical mercury posed a risk to human health. And we know that the risk comes from a specific pathway, eating fish caught in the Bay.

In North Dakota, there may be a variety of chemicals in the ground, but only arsenic was a risk, and the pathway that caused that risk was drinking well water.

In Fort Valley, GA, a few pesticides posed a risk to the health of the people who live here, and they come from a couple of pathways — breathing or ingesting contaminated dirt and clay.

The chemicals of concern are specific to each site, so the ones in your community may be different.

Now that we know what the risks are, what chemicals pose the risks, and which exposure pathways create the risks, we have to figure out what are the uncertainties.

That means determining how sure we are that we have calculated the risks to people as accurately as possible. We ask, is it possible that the risks are greater or lesser than we have calculated?

For example, we may ask people in a community if their plans for using the site have changed since we conducted the exposure assessment.

Kevin Garrahan (EPA Risker Assessor): “We know there are uncertainties in the risk assessment process because our mission is to protect public health and the environment. Where these uncertainties exist, we will use assumptions that are protective of everyone who might come in contact with the site.”

Narrator: For instance, when we aren't sure about the toxic effects of chemicals on people, EPA adds a margin of safety so we don't underestimate the harm a chemical might do to a person.

The risk characterization takes us to the end of the risk assessment. We've now answered the key questions about the site. What are the risks, what chemicals pose the risks, how could people be exposed to those chemicals, and what are the uncertainties?

We can now use this information, as well as information about risks to the environment, to develop a cleanup plan that will make the site safe for both current and future uses. Protecting the health of your community.

In risk assessment our bottom line is to protect you and your community. The way you use a site and the way you plan to use it in the future is very important in making clean up decisions. Your knowledge can help the risk assessor prepare the most complete risk assessment. Your comments are especially helpful during the early steps.

You can help by providing information about the site's history, telling us about your current activities, and the community's plans for the future use of the land. Together, we can work toward our common goal of making your community a safer, healthier place to live.

Timothy Fields Jr (U.S. EPA Assistant Administrator): “I hope this video has helped you to better understand the Superfund risk assessment process and how you can be involved. I encourage you to meet with your EPA team. I encourage you to ask questions. I encourage you to get involved with this important part of the Superfund cleanup process. Thank you."