THE RELATIVE RISK SITE EVALUATION PROCESS

Your Questions Answered

Introduction

The Department of Defense is working to clean up the environment at military bases around the world. At any base, many different areas of possible contamination may need to be studied and cleaned up. How does the Department of Defense know where to begin?

The Department of Defense has developed a new way to set priorities for environmental cleanup at military bases. This process is called the Relative Risk Evaluation Process. It is used to rate areas on or near bases that contain chemicals or other dangerous materials that may be harmful to people or the environment. Each area (or "site") is evaluated and rated as having a high, medium, or low chance to harm humans or the environment. This rating is the site's Relative Risk. Sites with a higher Relative Risk are usually studied and cleaned up first.

This fact sheet explains the Relative Risk Evaluation Process, gives an example of how the process works, and tells you where to get more information.

? Why Is This Process Necessary?

In the past, we didn't know that everyday work at military bases could cause environmental problems. Some of the jobs that caused environmental problems were fueling, fuel storage, equipment upkeep, fire fighter training, and waste disposal. These jobs often caused chemicals to be released into the air, soils, groundwater, and surface water. One Air Force base may have 100 or more sites of possible contamination that need to be studied. Some of these sites will be found to be harmless. Others will need to be watched closely to see if any environmental problems develop. Others will need to be cleaned up. Studying and cleaning up these sites is complicated, and it can take years.

The Relative Risk Evaluation Process puts each site into either the *High*, *Medium*, or *Low* Relative Risk category. That way, the high-risk sites can be studied and cleaned up first.

? How Does This Process Work?

First, three separate evaluations are conducted at each site, for (1) surface water, (2) groundwater, and (3) soil. Surface water is water that is above ground, such as lakes and streams. Groundwater is under the ground's surface, such as the water found in wells. Air is not studied separately, because air contamination usually comes from soil contamination.

During the evaluation process, three questions are asked. How much contamination exists? Is the contamination moving? Are there people or sensitive environments nearby? Answers to these questions are put together into a chart to find how much risk may be posed by the contamination.

The process gives three separate risk ratings for each site: one for surface water, one for groundwater, and one for soil. The overall Relative Risk rating for the site is the highest of the three ratings.

WHY IS THIS PROCESS NECESSARY?

HOW DOES THIS PROCESS WORK?

WHAT QUESTIONS ARE ASKED?

WHAT HAPPENS TO THESE RATINGS?

CAN YOU GIVE ME AN EXAMPLE OF HOW THIS PROCESS WORKS?

WHAT HAPPENS NEXT?

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What Questions Are Asked?

Question 1: How Much Contamination Exists?

First, the contamination itself is studied. The level of contamination is compared to standard levels that are used to tell if cleanup is needed. For cancer-causing chemicals, the standard is based on the level that poses no more than a 1 in 10,000 risk of an additional case of cancer in the population. For chemicals that do not cause cancer, the standard is the daily exposure level below which scientists expect no harmful health effects.

The concentration of each chemical found at the site is divided by the standard concentration level to get a ratio. If there is more than one chemical at the site, the ratios for each chemical are added together. Depending on how large this number is, one of three ratings is assigned: *Significant* (over 100), *Moderate* (2-100), or *Minimal* (less than 2).

Question 2: Is the Contamination Moving?

As contamination moves through the environment, people and animals in its path may become exposed.

Therefore, the ability of contaminants to move through the environment is an important factor in evaluating possible risk. For example, if fuel is spilled on hard clay soil, it may not move very far. In contrast, fuel spilled on sandy soils will move more quickly, and could reach surface water or groundwater used as a drinking water source.

In evaluating the likelihood for contamination to move away from a site, one of three ratings will be assigned. If contamination is moving through the environment, the site's rating for contaminant movement is *Evident*. If it could move or if more evidence is needed, its rating is *Potential*. If there is evidence that it cannot move away from the site, its rating is *Confined*.

Question 3: Are People or Sensitive Environments Nearby?

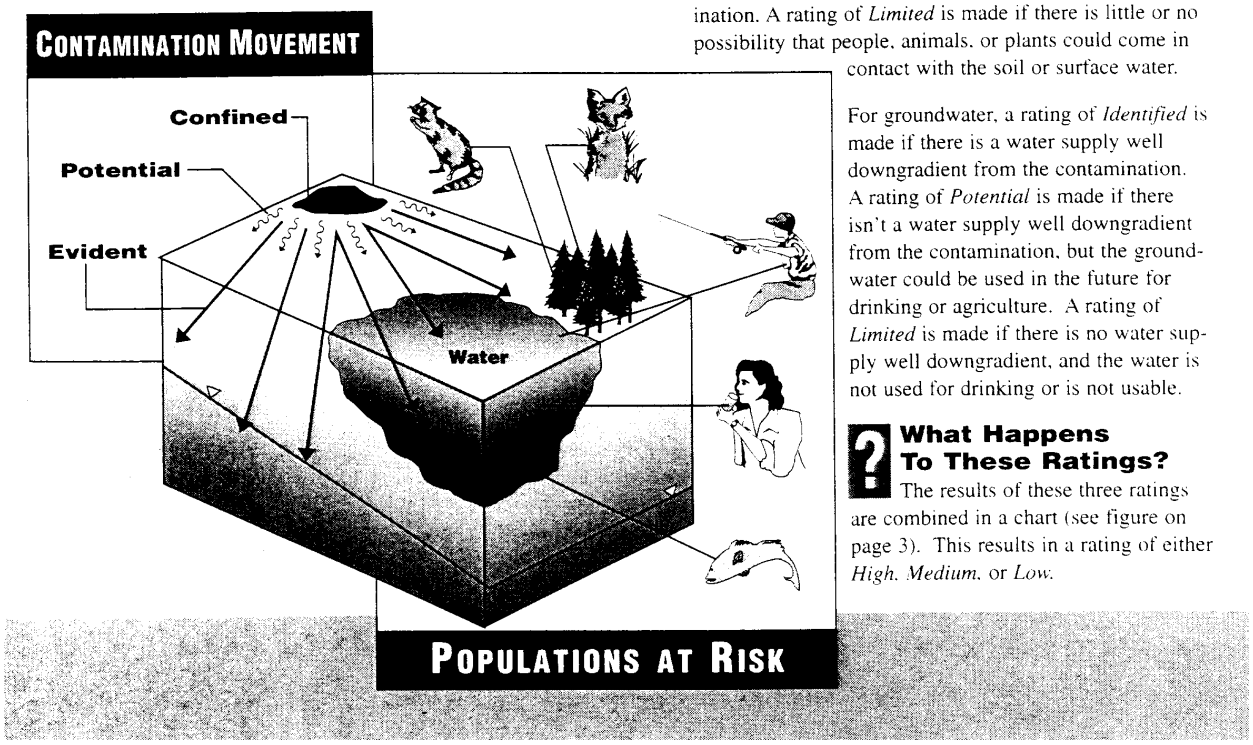
This factor evaluates the likelihood of people, wildlife, or plants near the site becoming exposed to and harmed by the contamination. Again, one of three ratings is assigned.

When evaluating soil or surface water, a rating of *Identified* is made if there are people, plants or animals that could come in direct contact with the contamination. A rating of *Potential* is made if it is possible that people, animals, or plants could come in contact with the contamination. A rating of *Limited* is made if there is little or no possibility that people, animals, or plants could come in contact with the soil or surface water.

For groundwater, a rating of *Identified* is made if there is a water supply well downgradient from the contamination. A rating of *Potential* is made if there isn't a water supply well downgradient from the contamination, but the groundwater could be used in the future for drinking or agriculture. A rating of *Limited* is made if there is no water supply well downgradient, and the water is not used for drinking or is not usable.

What Happens To These Ratings?

The results of these three ratings are combined in a chart (see figure on page 3). This results in a rating of either *High*, *Medium*, or *Low*.



The Relative Risk Evaluation Matrix

CONTAMINATION MOVEMENT	CHEMICAL HAZARD SIGNIFICANT			CHEMICAL HAZARD MODERATE			CHEMICAL HAZARD MINIMAL		
	I	P	L	I	P	L	I	P	L
E	HIGH	HIGH	MED	HIGH	HIGH	MED	HIGH	MED	LOW
P	HIGH	HIGH	MED	HIGH	MED	LOW	MED	LOW	LOW
C	MED	MED	LOW	LOW	LOW	LOW	LOW	LOW	LOW

POPULATIONS AT RISK

Because we are combining three factors in this chart, and not just two, we start by choosing which version of the chart we will use, based on how much contamination is present. If the chemical hazard rating is Significant, *we use version 1. If it is* Moderate, *we use version 2. If it is* Minimal, *we use version 3.*

We then find the square where the correct information about contamination movement and populations at risk meet. That square indicates the Relative Risk rating.

E = Evident
P = Potential
C = Confined
I = Identified
L = Limited

At the end of the process, each site has three separate ratings, one for groundwater, the second for soil, and the third for surface water. The highest risk rating becomes the overall rating for the entire site. For example, if a site has groundwater rated as *High*, and soil and surface water rated as *Low*, the overall Relative Risk for the entire site would be *High*.

Can You Give Me An Example of How This Process Works?

Certainly. Let's say that the site we are examining is a fire fighter training area on base. For twenty years, fire fighters trained here, putting out practice fires fueled by waste oils, fuel, and solvents. These materials have contaminated the soil and groundwater. No one works there now, and a fence around the area keeps people out.

First, we conduct a groundwater Relative Risk evaluation.

Chemical Hazard. The groundwater near the fire training area contains benzene and vinyl chloride. In groundwater, benzene was found at levels up to 130 parts per billion. (Parts per billion is a unit of measurement used to express small quantities of chemicals in water, soil, or air. In this example, it means that there are 130 parts of benzene for every billion parts of water.) This amount is above the accepted standard for benzene of 39 parts per billion. By dividing 130 by 39, a ratio of 3.3 is identified for benzene. In groundwater, vinyl chloride was found at levels up to 2,000 parts per billion, which is above the accepted standard of 2 parts per billion. By dividing 2,000 by 2, a ratio of 1,000 is reached for vinyl chloride. Adding 3.3 to 1,000 results in a total of 1,003.3. Because this is above 100, the hazard level is *Significant*.

Contamination Movement. Monitoring wells placed around the site indicate that the contaminated groundwater is moving. Therefore, contamination movement is *Evident*.

Populations at Risk. There is a threatened water supply well downgradient from the fire fighter training area. Therefore, the possibility that contamination could reach people is *Identified*.

Putting all this information together into the Defense Department's chart produces a Relative Risk rating of *High* for groundwater. The same process will be completed for soil and for surface water, but we already know that the fire fighter training area has an overall Relative Risk rating of *High*, because the overall site rating is always equal to the highest rating assigned at that site.

What Happens Next?

Every site on base that may be contaminated is evaluated using this system. Relative Risk is one factor used to decide which sites will be studied and cleaned up first. Other factors include regulatory agreements and other risk related studies, such as risk assessments and public health assessments which identify and evaluate risks to public health and/or the environment from potential exposure to contamination. The focus will always be on cleaning up the most potentially harmful sites first to protect people living or working nearby and the environment.

4 RELATIVE RISK PROCESS

For More Information

Information Repositories

Anyone interested in learning more about environmental issues at Elmendorf Air Force Base (AFB) should visit one of the information repositories listed below. They contain materials about environmental cleanup programs at Elmendorf AFB and a copy of the Administrative Record file, which contains copies of documents used to make decisions about cleanup at Elmendorf AFB.

Information Contact

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Bureau of Land Management
Alaska Resources Library
222 West 7th Avenue, No. 36
Federal Building, First Floor
Anchorage, AK 99513
(907) 271-5025
Hrs: M-F, 8:00 am to 5:00 pm

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Consortium Library, Reserve Desk
3211 Providence Road
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Hrs: Vary. Call for a schedule.

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