

# Risk assessments: a tool for better decision making

BY KATHRYN E. KELLY Dr. P.H.

Is this water safe to drink?  
Will I get cancer from eating pesticides on fruits and vegetables?

Is it safe to live near an incineration facility?

How do I know for sure?

These are common questions of the environmentally-conscious 1990s. Finding answers to these questions involves the application of two increasingly used tools: risk assessment (the science support — "What do the data say?") and risk management (the policy decision — "Now that we know, what do we do about it?").

## Is It Toxic?

A fundamental concept of toxicology, established by Paracelsus in the 15th century, is "The dose makes the poison."

This means that all substances (even water) are toxic at some dose, and that just because a substance is present does not mean there will be an adverse health effect. Risk assessment is the process of asking: Where is the contamination coming from? Where is it going? What is in it? Who is being exposed to it? The information provided by toxicologists in the risk assessment gives the risk managers the essential details they need to answer the final question — Now that we know what the effects are, what are we going to do about it?

## Assessments

In assessing risk, the first question to ask is, how toxic is this substance? And once the inherent toxicity of the substance is known, is there enough of this substance to cause an adverse effect if someone is exposed to it?

Food is a very simple example of the range of effects of chemical substances. While moderate amounts are necessary for survival, too little or too much results in adverse effects of starvation or obesity. Some chemicals are more toxic than everyday food, but still show the same range of effects; for example, arsenic is a substance which may be essential to health in small quantities, has no apparent effects at moderate doses, and can be fatal at high concentrations.

In contrast, some pesticides and other substances may not have any beneficial value to humans, even in small quantities.

## Exposure Potential

Controlling exposure to a hazardous substance, either at home or in the environment, will greatly reduce the potential for adverse health effects. For instance, there are often high concentrations of lead near urban roads due to years of emissions of leaded gasoline. Because children do not generally play in dirt at busy roadsides, that is not considered as much of a potential health concern as much lower concentrations in drinking water to which children are unavoidably exposed.

## Risk Management

But is the water safe to drink? The risk assessment provides the scientific data, but it does not say whether a contaminant is "safe." That is a value judgment best made by those exposed to the contaminant and by the health officials whose job it is to protect public health.

Therefore the main benefit of a health risk assessment is to provide the decisionmakers with a tool to help them assess a given situation. In evaluating safety and the acceptability of risk, those affected need to know what the scientific data say, and also what the costs are of alternatives, any regulatory or legal limitations, and any number of other factors which allow them to carefully weigh the risks, costs, and benefits of a decision. That is why a health risk assessment helps provide an answer to the question "Is it safe?", but never answers the question directly.

## Shortage of Professionals

Perhaps the major drawback of risk assessment is a shortage of qualified scientists available to assess these risks. Just as one looks for evidence of appropriate credentials and training in lawyers, architects, and other professions, it is important to screen carefully for the qualifications of the firms or individuals conducting a risk assessment.

As a scientific document, it should be prepared by senior scientists with advanced (usually

doctorate) degrees in toxicology or public health. In lieu of professional standards or licensing, which do not yet exist, "Diplomate of the American Board of Toxicology" (designated as DABT) is the premier credential to look for in assessing qualifications for preparing a scientifically thorough risk assessment.

## Uncertainty in Assessments

Another major limitation of risk assessments is that we never have as much data as we would like in support of these evaluations, given the importance of these decisions about public health and the environment. Therefore the assumptions used in the risk assessment should be carefully described, so that readers can determine for themselves whether the assumptions regarding uncertain data were adequately conservative and based on the best available information.

## Best Available Tool

Despite its shortcomings, risk assessment is widely considered the best available tool for presenting scientific data to decision makers. The current administrator of the Environmental Protection Agency, William Reilly, has strongly endorsed the risk assessment process as the best means of making better decisions about protecting public health and the environment.

Perhaps Fortune said it best in an article titled "The Big Cleanup Gets It Wrong" (May 20, 1991):

"For all its faults, risk assessment is clearly preferable to what we have now — a hubbub of self-interested partisanship with no agreed goals and standards. As it matures and gets more accurate, this technique should prove increasingly useful as a way to set sensible spending priorities, identify new dangers, and rein in legislators and lawyers with something approaching a rational consensus. In any event, it sure beats setting the nation's environmental agenda every day in the press."

*Kathryn Kelly is the president of Environmental Toxicology International Inc., in Seattle.*