



Pieces of the Risk Puzzle

Why is it so hard to get a simple answer about risk? Risk assessors put many pieces together to try to see the whole picture. Asking “Am I at risk?” is really asking:

“If I am *exposed* to a certain *concentration* of a *hazardous toxin*, and my body gets a *dose* of it, what is the *probability* that I will be *susceptible* to a *severe effect*?”

Many of these “pieces of the risk puzzle” involve a standard to which you can compare your own situation. As each comparison goes up or down, so does the level of risk.

Hazard / Toxicity: *How toxic?*

Compare the Reference Dose (RfD) for your toxin to the RfD for other similar toxins. The most toxic contaminants will have the lowest RfD.



As Toxic As...? EPA IRIS



The RfD for Aroclor-1254 is 30 times smaller than the RfD for cyanide. So Aroclor-1254 is 30 times more toxic than cyanide!

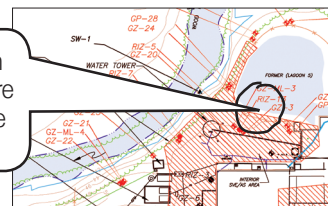
Concentration: *How much? What levels?*

Compare test results to a comparison value or legal limit. Was it under or over the limit? How much?



Compare to Standards ATSDR ToxFAQs

The TCE levels in well #5 were more than 10 times the legal limit!



Exposure Type: *How does it get in me?*

Research how easily the toxin gets into the body in different ways: Touching, eating, breathing, drinking.



Risk: Points of Contact ATSDR ToxFAQs



The factory is closed, but winds keep blowing factory dust towards my house. I wonder if it's in the ground water too...

Exposure Time: *How often? For how long?*

Longer exposure means more risk. You can be at risk from acute exposures (intense, for a short time) or chronic exposures (light, over a long time).



Exposed!

The air is bad where I work... but how long am I exposed? Hmm... 40 hours a week, 52 weeks per year, minus vacation and holidays...



Dose / Body Burden: *How much did get in me?*

Dose is the amount of toxin absorbed per kilogram body mass; compare to Reference Dose (RfD) for that toxin. Body burden is the concentration of a toxin in body fluids or tissue, as determined by medical tests; compare to public health guidelines.



EPA IRIS Summary



There's lead paint in my house, so I get my kid tested. The CDC says that over 10µg/dL is unsafe. Fortunately, his levels were less than 1 µg/dL.



Pieces of the Risk Puzzle

To explore all topics below, see:  *A First Look at Health Studies*

Health Effect or Outcome: *What could happen to me?*

Different toxins and exposures may have different effects: Cancer, asthma, reproductive, immunity, etc.

 *ATSDR ToxFAQs*

It says here: some PCBs can cause skin lesions, immunity problems, liver damage, and even liver cancer.



Probability: *What percent get sick? With what?*

Compare your risk factors with other cases of similar exposures and outcomes: How many were affected?

 *EPA IRIS Summary*

In this study, kids who were exposed to high levels of pesticides were twice as likely to show symptoms of ADHD as kids with low exposure.



Susceptibility: *Am I more at risk than others?*

The probability of some effects varies with factors like age, weight, sex, reproductive stage, diet, smoking, combinations with other toxins, and family history.

 *ATSDR ToxFAQs*



My family has a history of breast cancer, and I already have diabetes. I'm probably more susceptible to this toxin than most people.

Uncertainty: *Is this the key concern?*

We're surrounded by toxins. It's hard to prove a health problem comes from just one thing.

The asphalt plant makes my asthma terrible!



Are you sure it's the plant, not the highway? Or your sister's smoking?



Statistics for Action Activities: sfa.terc.edu/materials/activities.html

Activities for each component of risk that can help you explore that component in greater depth.



Statistics for Action Data: sfa.terc.edu/data/public.html

ATSDR ToxFAQs and ATSDR Toxicological Profiles: ToxFAQs are an alphabetical list of toxins, each with a short, simple description of where it's found, how it can harm people, and any relevant regulations. Toxicological profiles are similar but with much more technical and medical detail.

EPA Standards: Maximum Contaminant Levels (MCLs) in drinking water, soil screening levels, air quality standards. Also, check your state's environmental department; they may have stricter standards.

EPA IRIS (Integrated Risk Information System) Summary: Summaries about risk from specific toxins, like Reference Dose (RfD), Reference Concentration (RfC), Cancer Slope Factor, Unit Risk Factor.

CDC WONDER: Wide-ranging Online Data for Epidemiologic Research. Data about disease and mortality by county. Your state public health department may have data on a town-to-town levels.