FACT SHEET

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Risk Assessment

Office of Land Quality

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What is Risk?

Risk refers to the possibility that people, plants, and animals could be exposed to chemicals released into the environment and the potential that exposure could cause negative or harmful effects.

There are different ways that people and other living things come into contact with chemicals. The steps IDEM takes to reduce risk and protect humans and the environment depends on how contact may occur, commonly referred to as the route of exposure. The Indiana Department of Environmental Management (IDEM) evaluates the following routes of exposure when assessing risk:

- Direct contact with chemicals in water or in the soil;
- Ingestion of chemicals in water or soil; and
- Inhalation of volatile chemicals in air.
  (See VI Factsheet- idem.IN.gov/files/factsheet_olq_remediation_vapor_intrustion.pdf)

Depending on the extent of the chemical release and how long it takes certain chemicals to degrade in the environment, one of following could occur: no exposure; short-term exposure; or exposure that could occur over longer periods of time.

Risk Assessment Process

After a chemical release into the environment is discovered, experts collect samples from the soil, water and air to determine the type and extent of the release. They use this sampling data to assess the risk of the chemical to humans, animals, and plants. The likelihood that people, plants or animals may come in contact with the chemical depends on the concentration and how long the chemical remains in the environment before breaking down (degrades).

IDEM's risk assessment process accounts for current and future risk exposure. If a chemical concentration exceeds IDEM Published Levels (see below), it does not necessarily mean that health problems will occur, but it does indicate the need for further evaluation and appropriate mitigation actions.

A medical professional with expertise in chemical exposure can advise you, provide a diagnosis, and provide treatment (if necessary) should you have concerns about the potential effects of a chemical exposure.

Determining Which Levels to Use in Risk Assessment

The U.S. Environmental Protection Agency (U.S. EPA) creates Regional Screening Levels (RSLs) by using equations that combine how much people might be exposed to a chemical (either over a short or long period) with how toxic the chemical is. Their calculations also consider the potential for harmful effects to vulnerable populations such as children, pregnant women and the elderly.

IDEM uses the U.S. EPA's RSLs to determine Indiana's Published Levels (PLs) that consider specific environmental conditions within the state. IDEM has studied and adopted PLs for over 800 different chemicals.

PLs, like RSLs, tell experts if more information should be collected or if action should be taken to reduce the risk of people and the environment being exposed to that chemical.

Calculating Indiana's Published Levels

IDEM considers several factors when calculating PLs. Two key considerations are 1) how hazardous the compound is (toxicity) and 2) how much exposure is expected based on-site conditions. These factors are

explained below. Chemical toxicity data is updated regularly on EPA website. IDEM reviews this data and IDEM calculates PLs annually.

IDEM uses a target cancer risk of 1 in 100,000 to calculate PLs for carcinogens (chemicals that may cause cancer). This means that if 100,000 people are exposed to levels of a carcinogenic chemical above the PL for a long time, one person out of 100,000 may have a slightly higher chance of developing cancer. PLs for non-carcinogenic chemicals are set at conservative levels at which no health risk is expected. If a chemical is both carcinogenic and has other health risks, IDEM chooses the lower of the two levels to be extra safe.

Other considerations include the amount of time a receptor (potentially exposed human or animal) may be exposed to chemicals. For example, people are expected to spend a significant amount of time in their homes and children, pregnant women, and the elderly are vulnerable populations. Therefore, IDEM uses the most protective assumptions in the calculation of PLs used for residences (homes), schools and daycares (children and elderly). For indoor air exposure, these assumptions are that residents will spend 24 hours a day, 350 days a year, and 26 years at the home, school, or daycare. This means that the PLs used to assess exposure risk at those locations represent a concentration of a chemical that if exceeded may have higher rates of adverse health effects after exposure to that elevated concentration for 24 hours a day, 350 days a year, and 26 years.

Table 1 in IDEM's Risk-based Closure Guide contains Published Levels for the following:

- Soil - residential, commercial, excavation
- Groundwater
- Indoor air- residential, commercial
- Exterior soil gas - residential, commercial
- Sub slab soil gas (vapor beneath the slab of a building) - residential, commercial
- Conduit (i.e., sewer lines) - residential, commercial

Table 2 contains soil PLs for sites with different recreational uses (*i.e.,* community park, athletic field, trail).

Other Standards or Levels Used in Risk Assessments

In addition to IDEM published levels, other standards used in assessment of exposure risk may include:

- Health Advisories - The U.S. EPA establishes Drinking Water Health Advisories for some chemicals in accordance with the Safe Drinking Water Act. These advisories provide information for chemicals that may cause human health effects when consumed in drinking water. However, they are not enforceable regulatory standards.
- Indiana Surface Water Quality Standards - Standards for assessing chemicals in surface waters.
- U.S. EPA Region 4 Screening Values - When assessing ecological exposure risk, US EPA's Region 4 soil, sediment, and surface water screening values can be used along with information regarding sensitive or endangered species within the area of a release.

Resources

U.S. EPA. 2022. *Regional Screening Levels User's Guide.* epa.gov/risk/regional-screening-levels-rsls-users-guide

IDEM. 2022. *Risk-based Closure Guide*. idem.IN.gov/files/nrpd_waste-0046-r2_attch.pdf

U.S. EPA. 2018. *Region 4 Ecological Risk Assessment Supplemental Guidance*. epa.gov/risk/regional-ecological-risk-assessment-era-supplemental-guidance

IGA. Updated 2023. Title 327 Indiana Administrative Code Article 2. *Water Quality Standards*. iac.iga.in.gov/iac/iac_title?iact=327