

## Investigation

# 3.10B: Environmental Toxins

The world in which we live is a dangerous place. Your health can suffer at the hand of criminals, accidents, or intentional acts by those around us. But did you ever stop to think about the potential dangers present in our **environment**. You can become ill because of the air you breathe, the land over which you walk, the food you eat, or the water you drink, even in your own home.

We tend to think that our living conditions are pretty good compared to those of people living in far away, relatively under-developed countries about which we read. But we have many of the same environment dangers here in the United States.

If you lived in an under-developed country, such as one of many on the African or Asian continents, you would have not only **diseases** spread by poor **hygienic conditions**, but also dangers from things you might not expect.

For the past several years an organization called *Pure Earth* has tracked environmental **toxins** around the world. They continue to rate lead as the number one most **debilitating** toxin in the entire world. You may have read recently about the health issues related to battery recycling plants in Mexico. You may find a battery recycling company near your neighborhood; but most U.S. companies send their batteries to Mexico to reclaim the valuable metals that make batteries work. People performing this work in Mexico don't have the protections provided American workers, so they are exposed to the dangers of chronic lead exposure.

**Lead** is a known neurotoxin; that means it attacks the **neurological** centers of the body. Children your age and younger are most susceptible to lead poisoning, which causes permanent brain and nerve damage. You may have heard about the problems of lead poisoning the children of Flint, Michigan; this was related to lead-containing drinking water coming from a nearby river.

Lead used to be a common ingredient in paint in our own country. Parents would paint their children's furniture pretty colors with lead-containing paint.

Many babies suffered acute lead toxicity after chewing on the painted surfaces as they were teething.

Lead is used in the factories of heavy industry. It seeps into the air, soil, and water. The air blows to where people live and breathe. The soil eventually erodes to where planting moves the lead into the roots and leaves, where they can be eaten in your lettuce, spinach, or other favorite vegetables. The **contaminated** water seeps into the water table and mixes with drinking water. None of this is good for our environment. *Pure Earth* estimates 26 million people worldwide are at risk of the dangers of lead toxicity.

In our country and others heavy metals contaminate our environment: cadmium, mercury, and arsenic are three major contaminants.

**Cadmium** is a metal used in zinc mining, some fertilizers, batteries, and electroplating. When your parents order chrome rims for their car they encourage the use of cadmium. When the World Trade Center came down in the terror attack in 2001, one of the main toxins that affected the first responders was Cadmium used in the building itself. The recent emphasis on battery powered cars, which limit burning fossil fuels, do utilize lead and cadmium. Even advances in technology require tradeoffs and analysis comparing the positive versus negative impacts to humans and our environment.

**Mercury** is another heavy metal greatly toxic to the human body. Years ago all thermometers utilized mercury to measure our temperature to identify a fever. Other uses for mercury over past decades included electrical switches and appliances in construction, florescent lights, barometers, and many other uses. Mercury was absorbed into the water and soil, diffusing and spreading it around the world. It made its way to our lakes and oceans. Several species of fresh and salt-water fish contain high amounts of mercury, their consumption recommended only in limited amounts. These fish include many favorites, such as tuna, swordfish, shark, and King mackerel. Mercury is no longer used in thermometers; it is recommended that alcohol or digital thermometers be used instead.

With new information about the hazards of environmental dangers of heavy metals and efforts to minimize their impact come new concerns brought on by new technologies. Fracking may be an excellent example. This relatively new technology was designed to increase the production of natural gas. Later it was determined that poisonous chemicals were, in some cases, getting into the aquifers providing drinking water to entire communities. Another suspected effect of fracking is the production of "man-made"

earthquakes. Oklahoma has become the leading earthquake state in the U.S. since the introduction of fracking there.

Exposure to **radioactive** materials such as **radon** and **uranium** are considered a major concern in the United States and other countries involved in nuclear energy and weapons. When the authors of this book were your age the "Cold War" was in full swing; The Soviet Union versus the United States. We were always told that nuclear war was almost eminent. Many homes actually built underground shelters as an opportunity to hide out following total destruction by a nuclear bomb. Fortunately, nuclear war never happened; those shelters would probably not saved us anyway. Our country tested underground nuclear weapons in the deserts of Nevada and New Mexico. These tests spread nuclear materials far and wide.

In search of more efficient electrical power, nuclear power plants were developed in America and other countries. **Nuclear power** plants bring inherent danger along with the promise of cheap energy. Russia suffered a nuclear disaster at its **Chernobyl** nuclear power plant in 1986. After all the years that have passed since that disaster, the area around the power plant remains uninhabitable today. You may recall the nuclear disaster that occurred in **Japan** in 2011 following the earthquake generated tsunami. There have been several near nuclear disasters in the United States. In California, the San Onofre Nuclear Power Plant was shut down due to the potential disaster that could occur should a large earthquake occur on the fault over which the nuclear power plant lies.

In addition to the dangers of radioactive nuclear material from bombs and power plants, natural radioactive material seep upward from within Earth. It is estimated that one in fifteen U.S. homes are exposed to excessive levels of **radon**. If you have granite countertops in your kitchen, your home may exhibit an elevated radon level.

Toxic radioactive materials are not such a risk in under developed countries; they don't have nuclear weapons nor nuclear power plants.

Exposure to **plastics** are a huge source of toxicity affecting our health. PCB's (polychlorinatedbiphenyls) are a form of plastic that was banned from further use back in 1976, yet it spread before that year so far into our air, water, and soil that it remains a problem to today. Protracted exposure is thought to cause nerve and other health problems, and has been linked to brain and liver cancer.

Another type of plastic that has proven toxic to humans, yet are impossible to completely avoid, are **Phthalates**, also known as 'fragrance plastics'. They are recognizable because they are soft and have that 'plastic smell'.

There use in showers curtains, furniture upholstery, and toys is well documented.

**Pesticides** represent another environmentally harmful agent. They represent something of a paradox, as their purpose is to eradicate another environmentally harmful agent: mosquitos and other pests. They are used mostly in agriculture to prevent crop destruction. Until 1972 **DDT** was the toxin of choice to eradicate insect pests until it was determined they caused cancer and neurological impairment in humans. By then they had contaminated our air, water, and soil so thoroughly that we still find traces of DDT in soil, water, and animal life today.

In addition to the environmental toxins introduced here, there are many more: materials such as asbestos used in construction, products still used today such as acetone and turpentine, and even discarded prescription drugs find their way into the air, soil and water. Inhaling nauseous fumes while painting your nails is not healthy. Human **prescriptions drugs** spreading in water have caused mutations in animals and fish, and are even detectible in municipal water systems.

Since the beginning of the industrial age fossil fuels have provided the power that allows us to work and travel. For over one hundred years we have been burning fossil fuels and spewing huge amounts of carbon monoxide and dioxide into the air. As the world's population and industries grew while animals were replaced as the source of transportation by cars, trucks, buses, trains, and airplanes, our atmosphere filled up with the toxic gases produced. The result is a warming of our atmosphere and shift in the climate patterns on Earth.

Aside from changing climate, the quality of the air you and I breathe affects our health. The **World Health Organization** estimates the 4.6 million people die each year as a direct result of air pollution. Interestingly, most of the effects come from indoor chemical fume exposure. If you think about it, most people spend about 90% of their time indoors. We are bombarded by fumes coming from our carpets, stoves, heaters, fireplaces, and more. Even the walls of our homes can contain toxic chemicals that leech into the air where we breathe them into our unsuspecting lungs. Equally as harmful to our health, yet totally preventable, is the inhalation of **carcinogenic** chemical from **cigarette smoke**. Is it amazing to you that so many people continue to smoke when the dangers are posted right on the package. The companies practically tell the smoker they will get cancer, yet smoking remains a pervasive problem. Unfortunately many are exposed to cigarette toxins through second hand smoke.

At one time smoking was actually promoted as a healthy lifestyle by the **Surgeon General** of the United States. Of course we now know that is

totally untrue. Both of my parents smoked cigarettes when I was a child; I despised even the smell of smoke. I eventually made a deal with my parents: I would eat dinner with them if they wouldn't smoke at the table. I probably was otherwise unaware of the horrible smell of everything in our house, including our furniture and clothes. That would only be apparent to someone whose sense of smell had not accommodated to that odor. It is no wonder so many suffer from asthma and other respiratory diseases.

**Chronic exposure** to these undetected toxins can cause cancer and other serious diseases.

We inhabit an environment loaded with potential to destroy our health and even end our life. As technology advances, along with the benefits we seem to eventually find new hazards for concern. Is climate change really Earth's greatest problem? What do you think?