



## FAQs: Crumb Rubber & Artificial Turf

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From high school athletic fields to playgrounds, artificial turf fields and crumb rubber infill are now commonly found playing surfaces in the United States. Although millions of children play on them every day, we still do not have ample information regarding the potential adverse health effects from prolonged exposure to artificial turf and its main component, crumb rubber. This FAQ will provide you with an overview of the currently available research and offer tangible steps to best protect children if they do routinely play on these questionable surfaces.

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### What is Crumb Rubber?

Crumb rubber is the end result of shredding and grinding retired tires until the pieces are the size of a large grain of sand. Producing crumb rubber is a way of recycling used tires that would have otherwise ended up in landfills.

Commercial applications of crumb rubber include: foundation waterproofing, rubberized asphalt, and infill for artificial turf fields and playgrounds. It is estimated that 40,000 shredded waste tires are used to create the infill for just one artificial turf field! Therefore, it is important that the possible negative health ramifications associated with artificial turf's main component are considered.

### What is Artificial Turf?

Artificial turf or 'synthetic turf' is made of plastic blades of grass, backing material to hold the blades, and infill (usually crumb rubber that helps support the blades). Crumb rubber infill is estimated to be about 90% of the weight of fields, thus forming the vast majority of the playing

surface.

Artificial turf was initially created with the intention of preventing head injuries, as the crumb rubber would cushion the blows from impact. However, since its development, there have been growing concerns about the negative health effects potentially associated with exposure to the crumb rubber infill, as well as the artificial turf field itself.

### Why should I be concerned?

Modern tires are derived from a mixture of natural and synthetic rubber, petroleum products, carbon black (material produced by the incomplete combustion of heavy petroleum products), and metals such as: cadmium, lead, and zinc. Given that artificial turf fields are made from old tires, any chemical that the tires were exposed to during their "vehicle lifetime" can become absorbed into the tire material. Other toxics found in crumb rubber and artificial turfs include: asbestos-twin carbon nanotubes (CNTs), arsenic, polycyclic aromatic hydrocarbons (PAHs), phthalates, volatile organic compounds (VOCs), and dioxin-like benzothiazole. Of the 92 chemicals found within crumb rubber, 11 of them have been identified as known or suspected carcinogens; many of the other compounds present in crumb rubber have not been adequately tested for impact on human health.

As the aforementioned tire crumbs are so small, many athletes complain that the minute particles get into their eyes, hair, and ears. Exposure doesn't stop with the actual time spent on the playing fields or playgrounds - the small turf pieces routinely cling to clothes and shoes, and are

therefore tracked into cars, homes, schools and child-care facilities. Over time, weathering, exposure to sunlight, and general usage lead to the breakdown of tire crumbs. The plastic blades then break into even smaller particles, potentially releasing lead, cadmium, zinc, PAHs, VOCs, CNTs, and benzothiazole. These small pieces can become suspended in the air and then breathed in by athletes, children, and others who utilize the artificial field for playing, walking, or laying on.

Finally, there are additional dangers that arise from exposure to artificial turf, unrelated to its chemical make-up: the application of flame-retardants and pesticides, heat and physical injury. Flame-retardants are commonly applied to artificial turf to keep fields sterile. Even though artificial turf does not have to be mowed, crabgrass and other weeds can start growing in and underneath it. To keep its manicured appearance, weed killers (pesticides) need to be applied. Artificial turf absorbs heat and reaches 40 – 60°F higher than surrounding temperatures. On an extremely hot day, one can smell the turf melting. Athletes who have played on artificial turf during hot days report blistered skin, and melted cleats, water bottles and equipment. Players also report more severe skin abrasions from turf-burn, which “shaves” skin from limbs (Note: Skin abrasions from turf-burn are at risk for Methicillin-resistant Staphylococcus aureus (MRSA) infection). This is due to the fact that the plastic blades are much more rough and rigid than natural grass.

### **What are common health effects associated with exposure to Crumb Rubber and Artificial Turf?**

The following health concerns are associated with only a handful of toxic additives in crumb rubber and artificial turf. As

mentioned earlier, there are many more hazardous ingredients that have not been adequately tested for their impact on human health.

Lead, a toxic heavy metal, can be found in both the tires used to produce crumb rubber and the plastic grass on artificial turf. The Center for Disease Control and Prevention (CDC) and American Academy of Pediatrics (AAP) state there is no safe level of lead exposure, and affected children can experience headaches and abdominal pain. Other effects of high lead exposure include: hearing problems, delayed growth, decreased IQ, behavioral and learning problems, damage to the brain and nervous system, and in extreme cases, death.

Dioxin-like benzothiazole irritates the respiratory system and skin, which potentially exacerbates asthma and causes rashes. Additionally, benzothiazoles and PAHs activate the same systems as dioxins, which are carcinogenic and endocrine disrupting.

CNTs look and behave like asbestos fibers; they penetrate deep into the lungs and can cause mesothelioma - a cancer in the tissue that lines the lung.

VOCs are emitted from fields, especially on hot days, and inhaled by anyone on the field. The mixture of chemicals can irritate eyes, nose, throat, and skin. High levels of exposure can cause damage to the liver, kidney, and central nervous system, and young children can experience learning and behavioral problems.

The hot artificial turf fields can also cause heat stress, leading to heat exhaustion and heat stroke. Children playing on this hot surface are more at risk for dehydration, fatigue, and other heat-related symptoms.

### What policies are in place to protect children?

Currently there are no federal regulations for crumb rubber or artificial turf; nor are t. The Consumer Product Safety Commission (CPSC) does not regulate them as children's products, even though a vast majority of U.S. children are regularly exposed to crumb rubber and artificial turfs! However, the U.S. Environmental Protection Agency (EPA), Agency for Toxic Substances and Disease Registry (ATSDR), and CPSC all acknowledge the potential health concerns. In February 2016, the aforementioned agencies launched a "multi-agency [Federal Research Action Plan on Recycled Tire Crumb Used on Playing Fields and Playgrounds](#) to study key environmental and human health questions" (EPA 2017).

Despite the lack of federal action, some states and communities are leading the charge against crumb rubber and artificial turf. For example, California passed a bill, effective until January 1, 2020, that requires consumers to gather information about artificial turf companies before installation the surface at schools and public recreational parks. Cities and towns in Washington, Connecticut, California, Minnesota, and Maryland have proposed or enacted moratoriums or bans on crumb rubber and/or artificial turfs for playgrounds and/or fields.

### What can I do?

**1. Follow the research.** Some studies have assessed the health effects associated with exposure to artificial turf and crumb rubber. However, these studies only give a partial assessment of the inherent 'exposure risk'. Both the EPA and the

CPSC state that they do not know enough about artificial turf fields to claim that they are safe. The CPSC and CDC are still investigating the health effects associated with tire crumbs.

**2. Always assist children in washing their hands and forearms** when they return from playing outside - whether on artificial turf or natural grass.

**3. When possible, change clothes and shower immediately** after playing on artificial turf fields and playgrounds containing crumb rubber surfaces. Clothes worn on these surfaces should be taken off and turned inside out to avoid tracking contaminated turf dust and tire crumbs into the school, vehicle, home etc. These clothing items should be washed separately, and any shoes that have been worn on the field should be left outside or placed in a sealable bag before being brought into the home, school or child care facility.

**4. As a precautionary measure, limit the amount of time** a child spends playing on worn or visibly deteriorating surfaces. The older the field is, the more likely that small particles with toxic metals and/or chemicals are suspended into the air (creating artificial turf dust) and then breathed in by children.

**5. Avoid eating while on the field or playground.** If consuming beverages on or near the field/playground, make sure to keep drinks closed and put away in a bag, cooler, or other covered container, as dust and fibers from turf, as well as small tire crumbs, can settle on or within beverages.

**6. Supervise young children and avoid mouth contact on playground surfacing materials.**

**7. Be sure to clean equipment or toys immediately after being used on either artificial turf fields or playgrounds containing crumb rubber.**

## Resources

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