

Rubber Mulch: A Safe Play Surface?

We Can All Agree

We want the best for the children in terms of health and safety, including their physical, emotional, and cognitive development. We share this fundamental mission.

At this stage, the goal of the Isaac Dickson PTO Rubber Mulch Committee is to educate the school board and faculty so we can work together to find a solution for removing the rubber mulch from the 2 playgrounds and the Exceptional Children play area at IDES.

Rest assured we are not here to place blame. If the school board had known about the health and impact safety issues with rubber mulch, we feel certain board members would not have approved it as a playground surface for IDES. After you read the data, we think you will agree.

Substantiated Facts

1. Rubber mulch consists of shredded tires that contain chemicals labeled by the [EPA](#), [CDC](#), [American Cancer Society](#), and [World Health Organization](#) as **carcinogens**, **neurotoxins**, **hormone disruptors** ([phthalates](#)), and **polycyclic aromatic hydrocarbons (PAHs)**.

Note: “crumb rubber” is an umbrella term used in many studies. [Rubber mulch and crumb rubber in artificial turf](#) are **both made from recycled tires**. Rubber mulch *is* crumb rubber.

2. Up to [30% of tires](#) are made of **carbon black**—classified as a **Group 2B carcinogen** by the [International Agency for Research on Cancer](#) (an agency of WHO). Carbon black is a compound composed of many chemicals and can include PAHs.

[CDC warning](#): “Carbon black may cause adverse health effects following exposure via inhalation, ingestion or dermal contact.” Carbon black dust [spreads easily in air](#) through virtually any air current. The [CDC's occupational safety guidelines](#) state that workers should use, “**N-, R-, or P- Series Particulate Respirators**,” to minimize health hazards. CDC guidelines also say to **wash skin promptly** with soap and water, **remove clothing** contaminated with carbon black immediately, and **shower** before putting on street clothes.

3. Environment and Human Health, Inc. (EHHI), a non-profit of physicians, public health and policy experts, commissioned a study conducted at Yale University. **Yale researchers found [96 chemicals](#)** in the crumb rubber, including **12 known or probable carcinogens**.

[12 Carcinogens](#)

- 2-mercaptobenzothiazole - Carcinogen, toxic to aquatic life
- 9,10-dimethylantracene - Carcinogen, respiratory irritant, can cause asthma
- Bis(2-ethylhexyl) phthalate - Carcinogen, may cause damage to fetuses
- Fluoranthene - Carcinogen, one of the EPA's 16 priority pollutants, a PAH
- Heptadecane – Carcinogen
- Phenol, 4-(1,1,3,3-tetramethylbutyl) - Carcinogen
- Phenanthrene - Carcinogen, a PAH
- Phthalimide - Carcinogen, skin, eye and lung irritant, a fungicide

12 Carcinogens (continued)

- Pyrene, 1-methyl - Carcinogen
- Tetratriacontane - Carcinogen, eye, skin irritant; may harm central nervous system
- Pyrene - Carcinogen, toxic to liver and kidneys, a PAH
- Carbon Black – Carcinogen; not analyzed by this study since it is a composite

5. The Yale Study also found crumb rubber contains **20 lung, skin, or eye irritants**. Among these, Yale found [24% are respiratory irritants that can cause asthma symptoms](#).

20 Irritants

- 1,4-Benzenediamine, N-(1,3-dimethylbutyl)-N'-phenylIrritant - causes skin & eye irritation
 - 1,4-Benzenediamine, N-(1-methylethyl)-N'-phenylIrritant - causes skin & eye irritation
 - 2(3H)-Benzothiazolone – causes skin and lung irritation
 - 2-Dodecen-1-yl(-)succinic anhydride - causes eye, skin and lung irritation
 - 3,5-di-tert-Butyl-4-hydroxybenzaldehyde - causes eye, skin and lung irritation
 - Anthracene - causes skin, eye and respiratory irritation; can cause coughing & wheezing
 - Benzenamine, 4-octyl-N-(4-octylphenyl) - causes eye and skin irritation
 - Benzenesulfonanilide - Considered hazardous, very little testing has been done on it.
 - Benzothiazole, 2-(methylthio) - causes skin and eye irritation
 - Dehydroabietic acid - Toxic to aquatic organisms
 - Docosane - causes skin irritation
 - Hexadecanoic acid, butyl ester - eye, skin & lung irritation, can have reproductive effects
 - Methyl stearate - causes eye, skin and lung irritation
 - Octadecane - causes skin, eye and lung irritation
 - Octadecanoic acid - causes skin, eye and respiratory irritation
 - Oleic Acid - causes skin and eye irritation
 - Phenol, 2,2'-methylenebis[6-(1,1-dimethylethyl)-4-ethyl - skin, eye & respiratory irritation
 - Tetradecanoic acid - Toxic to aquatic organisms. Skin and eye irritant
 - Anthracene, 2-methylAcute - aquatic toxicity, probable eye, skin and lung irritant
 - Anthracene, 9-methylAcute - aquatic toxicity, serious eye irritant
6. Rubber mulch off-gasses noxious fumes, including VOCs, SVOCs, and many of the lung irritants listed above. [A press release by EHHI](#) states that the health data they analyzed, "...showed the presence of volatile organic hydrocarbons, semi-volatile hydrocarbons and harmful particulates in the air."
7. Separate, independent studies by [Yale University](#), the [EPA](#) and [OEHHA](#) all found that rubber mulch contains [heavy metals](#), including **lead, zinc, arsenic, and cadmium**.

The amount and types of heavy metals vary from tire to tire, due to a lack of standardization among tire manufacturers. Researchers, while acknowledging inconsistencies, have found **heavy metals above safe levels—as shown in many studies, including these 3 reports:**

- [Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products, p.56](#)
- [Release of Polycyclic Aromatic Hydrocarbons and Heavy Metals from Rubber Crumb in Synthetic Turf Fields, p.4](#)
- [An Evaluation of Potential Exposures to Lead and Other Metals as the Result of Aerosolized Particulate Matter from Artificial Turf Fields, p.32-33](#)

8. The [EPA warns](#): “**Lead is particularly dangerous to children** because their growing bodies absorb more lead than adults do and their brains and nervous systems are more sensitive to the damaging effects of lead.”

“**Even low levels of lead** in the blood of children can result in:

- Behavior and learning problems
- Lower IQ and Hyperactivity
- Slowed growth
- Hearing Problems
- Anemia”

9. A [2012 study published in the international journal Chemosphere](#) identified many of the same chemicals found by the Yale study. The study found that many of the hazardous substances in crumb rubber were at high or extremely high levels. Researchers also confirmed that the **particles are volatile (turn into gases) even at room temperatures**. “The presence of a high number of harmful compounds in these recycled rubber materials ...should be carefully controlled, and their final use **should be restricted or even prohibited** in some cases.”
10. Some [tires contain carbon nanotubes](#), which scientists say can [lodge in the lungs](#) and potentially [cause a form of lung cancer](#) called mesothelioma, much like asbestos.

Turfgrass Producers International—a group promoting turfgrass—published a [newsletter on carbon nanotubes](#). Referencing a study at the University of Edinburgh in Scotland, it says, “Their research showed that long, **needle-thin carbon nanotubes could lead to lung cancer** and inhaling carbon nanotubes could be as harmful as breathing asbestos.”

The newsletter also notes, “Peter Gehr, a professor of Histology (the study of tissue) and Anatomy at the University of Bern in Switzerland stated that **synthetic nanoparticles can penetrate tissue and cells, and spread throughout the body—even to the brain.**”

11. A [2007 Study](#) from the California Office of Environmental Health Hazard Assessment (OEHHA) found five chemicals, including four PAHs, on wipe samples of crumb rubber. One of the PAHs, “chrysene,” was higher than the risk level established by the OEHHA. According to the [EPA](#), PAHs can be swallowed, breathed into the lungs, or passed through the skin, and [may increase a person’s chance of developing cancer](#).
12. Scientists and physicians also warn there are **unknown dangers of exposing children to multiple toxic chemicals at the same time**. [Dr. Gaboury Benoit](#), Yale University professor and lead investigator in the Yale study, stated: “There are 100 compounds. Only 50 of which have been evaluated in terms of their toxicity. Of those, most of them are carcinogens or irritants. ...The shredded tires contain a veritable **witches’ brew of toxic substances.**”

[Dr. Jerry Sibert](#), a physician, stated, “They’re not exposed to just one, but to all of [the chemicals] simultaneously...They can enhance the toxicity of them, so for manufacturers to say any one particular chemical is not dangerous is **false logic.**”
13. [Material Safety Data Sheets](#) (MSDS) provided by tire manufacturers confirm the presence of carcinogens and harmful chemicals in rubber mulch. And as you know, scientific studies also prove the presence of these chemicals. **Tire ingredients are not under debate.**

So How Could It Be Safe?

Rubber mulch and synthetic turf companies—backed by industry lobbyists and scientists-for-hire—say their products are safe and do not pose a health risk. They simply ignore **EPA, CDC and WHO warnings and classifications** attached to dozens of individual tire ingredients.

The crumb rubber industry uses **their own limited scope studies** to make safety claims. And sadly, consumer protection laws do not require companies to prove their products are safe.

The scientists we spoke to from Yale, the EPA, and OEHHA, **do NOT recommend crumb rubber for children’s play**. When you read the studies we’ve provided in the timeline, you can be the judge. Scientific data concludes the ingredients in crumb rubber pose a health risk. We must **listen to the scientists and physicians**—not the people who are making money off of crumb rubber.

Regulations... or Lack Thereof

1. Crumb rubber as a play surface for children is [not regulated](#) in terms of its chemical components. Exposing children to the toxic chemicals in crumb rubber is **not proven safe**.
2. All playground surfaces, including rubber mulch, **must comply with the [ASTM F1292](#)** standard, which specifies impact attenuation requirements—to cushion falls and prevent serious injuries. However, there are no mandatory standards that regulate the chemical makeup of playground infill.
3. According to [NBC’s in-depth report](#) in 2014, “The Consumer Product Safety Commission has no plans to create standards for the chemical composition of tire mulch....”
4. But in 2015, the **CPSC retracted former statements suggesting crumb rubber is safe**. The CPSC issued this disclaimer in the [2015 Public Playground Safety Handbook](#):

"The 2010 edition of the Handbook...identifies shredded/recycled rubber mulch as an ‘Appropriate Surfacing’ product, given that this product can meet the impact attenuation requirements of ASTM F1292, as long as minimum depths of the material are maintained, as specified in Table 2 of Section 2.5. This notation is solely focused on the impact attenuation to minimize serious head injuries, and **not on other aspects that may pose other risks, such as chemical exposure or ingestion.**"
5. Tire manufacturing is regulated by federal and state governments. The [EPA website states](#):
“The EPA has identified rubber tire manufacturing facilities as **major sources of hazardous air pollutants emissions.**”
6. Although rubber mulch is not classified as a toy, our children at IDES play with the shredded tires like they would a toy. Based on known tire ingredients, however, crumb rubber would [likely fail](#) to meet [Toy Safety Standards](#) set by the Consumer Product Safety Commission.
7. The North Carolina Department of Agriculture has issued a notice titled, “[Ground Rubber: Potential Toxicity to Plants](#)” to inform growers that rubber is unsuitable for nursery crops.

Crumb Rubber Linked to Cancer?

[Soccer goalies](#) represent a disproportionate number of the [reported cancer cases](#) suspected of being associated with crumb rubber fields. [Parents and child advocates](#) believe this is because goalies dive into the rubber, getting marks on their skin and breathing dust and VOCs near the ground.

Children Play with Rubber Mulch

It is important to observe how our children at IDES interact with the rubber mulch because it directly impacts their chemical exposure. They **play with the rubber mulch** on an intimate level. They bury each other in it. They throw it at each other, fill buckets with it, and crawl in it on their hands and knees. They also leap into the rubber mulch, stirring up dust.

Steven Lee Johnson of Sitework Studios stated in his letter to Don Sims dated November 9, 2016, following his site visit at IDES: "While we were on site, we spent time watching children play and could quickly see how the mulch is a play material in itself. Children were using their hands to move it around, etc. Children had used buckets to move and play with the mulch."

To illustrate, we have **photographs** showing IDES children playing with the rubber mulch. Unfortunately this playful behavior puts our children at a **greater risk of hazardous exposures**.

A kindergartner at IDES was recently diagnosed with asthma, and her mother expressed concerns about the rubber mulch. In written correspondence, this mom stated that her child's **asthma attacks first began on the IDES playground**, and have recurred on the playground.

Head Injury Risk & Other Code Violations

The playful activities described above have another unintended consequence. Throwing, piling, jumping, and even running in rubber mulch redistribute the impact cushion. To meet safety guidelines, there should be a **consistent 6-inch layer of rubber mulch**.

1. Rubber mulch on playgrounds **requires constant monitoring and maintenance** in order to achieve the [CPSC standards requiring a 6-inch layer of rubber mulch](#). So far, we've found consistency is very difficult to achieve.
2. [A study performed by California's OEHHA](#) found that **69% of rubberized playground surfaces failed to meet impact attenuation standards**—compared to a 100% pass rate for surfaces made of wood chips. Analysis revealed that loose-fill shredded tires move around and are "kicked away, leaving only a relatively thin layer behind." The conclusion: **rubber mulch poses a greater head injury risk**.
3. IDES playgrounds would have recently failed safety inspections, according to playground specialist Jeff Bliss with Bliss Products. We have pictures taken on November 2, 2016 to illustrate the safety violations, including **thin-to-zero ground coverage**. After witnessing the violations, Don Sims had his crew performed maintenance to achieve a 6-inch layer of rubber mulch.

4. On the site visit referenced in Stephen Lee Johnson's November 9, 2016 letter, he states that, "In areas with heavy use, i.e., bases of slides, entry and exit platforms, the mulch was less than 6" thick," wrote Johnson. "Mulch, including wood chips, requires monitoring and grooming to maintain consistent thickness. ACS maintenance staff groomed the mulch recently." As witnessed by a third party, **this proves that only a few days after maintenance groomed the mulch, it was still not meeting safety guidelines.**
5. We returned to the playground on November 18, 2016, and photographed the same safety violations.
6. At a recent PTO meeting, the mulch committee learned that two children, a first grader and a fifth grader, have broken bones on Seth's Playground this fall. These injuries raise additional concerns regarding the impact safety of the rubber mulch.
7. Due to children playing with the rubber mulch, the conditions change day to day and require constant monitoring and maintenance. Given the higher injury risks, the rubber mulch must be maintained frequently. **Even with weekly maintenance, we cannot be 100% certain the rubber mulch will remain 6 inches deep—to meet the head impact safety standard.**
8. The installation of **additional rubber mulch on November 23, 2016**, may assist with safety for a brief amount of time. However, the rubber mulch will continue to require constant maintenance and monitoring. The mulch is easily moved and kicked away by the children, resulting in bare spots on the playground. **It poses a significant injury risk.**
9. When our crews do perform maintenance, workers should probably **use respirators** as stated in the [CDC Occupational Safety Guidelines for Carbon Black](#).
10. Playground specialist Jeff Bliss and Yale scientist Gaboury Benoit both say rubber mulch should be **replaced every 10 years** because it gradually disintegrates to dust, posing greater inhalation risks over time.

Rubber Mulch is Not More Economical

1. Rubber Mulch was initially selected based on a belief it would be easy to maintain and have lower replacement costs. This is simply not true. According to Evelyn Anderson, CPSI and owner of Asheville Playgrounds, pre-engineered **wood chips last 15 years** (vs. 10 years for rubber mulch), and wood chips only have to be topped off **every 4 or 5 years**. As we know, the IDES playgrounds **required a new load of rubber mulch after only 3 months**.
2. Considering the frequent maintenance and replacement schedule required to meet safety standards, rubber mulch will likely cost significantly more than wood mulch over time.
3. Playground injuries will continue to occur. Should an injury be associated with non-compliant surfacing depth, playground administrators can be held liable. We must consider this cost.

State and Federal Action Plans

1. In 2015, California's Office of Environmental Health Hazard Assessment (OEHHA) and the Department of Resources, Recycling and Recovery agreed to spend nearly 3 million dollars to conduct a [3-year study of potential health effects](#) associated with the use of recycled waste tires and playground and artificial turf products. The study will conclude in mid-2019.
2. In January 2016, in the wake of growing health concerns and a rising number of cancer cases among young athletes who play on crumb rubber fields, [Senators asked President Obama for a federal investigation](#) into the potential safety hazards of crumb rubber.
3. A month later, in February 2016, the EPA, CDC, ATSDR, and CPSC announced a new [Federal Research Action Plan on Recycled Tire Crumb Used on Playing Fields and Playgrounds](#) to answer environmental and human health questions.
4. What do we do in the meantime? In the 2014 NBC report, the EPA stated the use of crumb rubber is a "[state and local decision](#)." It is now up to ACS to analyze the data available and make the right decision to protect our children from the risks posed by crumb rubber.

Questions under debate

By now, you are probably thinking, "Why would we expose our children to known carcinogens, heavy metals, and hormone disruptors?" "Is it realistic for us to assume that we can maintain the required depth of surfacing when we know it moves with daily activity?" "Is there any "safe" level of exposure?" Both sides of the debate actually agree more studies are needed.

Questions about rubber mulch that demand further study:

- To what degree are toxins being inhaled, ingested or transmitted through skin?
- Is there a way to quantify the risks of cancer, asthma, neurotoxicity, etc?
- How many chemicals are in tires? Scientists say it could be thousands.
- When all chemicals are combined, how do they react together?

Until these questions are answered, we can refer to the scientific studies led by certified medical labs, and the opinions from research scientists, toxicologists, epidemiologist, and physicians.

History Lesson

It can take decades to prove a product is toxic. In our country, toxins are deemed innocent until proven guilty. And lobbyists fight hard to defend their lucrative industries. We saw this with cigarettes and asbestos.

Another example? Childhood cancer rates rose in the 1950s, and a study linked it to mothers who received abdominal X-rays while pregnant. Yet it took **20 years** after the study was published for the medical establishment to stop exposing pregnant mothers to abdominal X-rays.

As parents and child advocates, we can likely agree, history is nothing but entertainment unless we apply lessons from the past. **We cannot wait years for the government agencies, medical establishment and the crumb rubber industry to reach a conclusion.** The health of our children and teachers is at stake.

Join the Movement

Crumb rubber is the subject of [world-wide debate](#) and has been **banned** or **replaced** in a growing number of countries, U.S. states, municipalities, and school districts. We have included some of these in the crumb rubber timeline.

Removal and Replacement Costs

As a matter of record, the Asheville City School Board approved the decision to purchase and install the rubber mulch at IDES. For this reason, we are respectfully asking the school board to pay for the removal and replacement of the rubber mulch at all 3 locations on the IDES grounds.

Next Steps

Having read through a wide range of studies, the IDES PTO has valid concerns for our children's health and safety. That said, we are kindly asking for the school board to remove and replace the rubber mulch as soon as possible.

In the meantime, we are asking for alternative play arrangements on the field or elsewhere. With the goal of minimizing toxic exposures, we also feel it is imperative to notify all parents of the [safety precautions provided by Mount Sinai](#). The recommendation list includes hand washing, shoe removal, and showers (not baths).

The bottom line, ACS could be held accountable, even liable, for the safety and health concerns related to crumb rubber. Any delays in removing the rubber mulch could cost more in the long run.

Thank you for your time and consideration on this matter!