



January 31, 2022

Dear Ms. Bryan and Members of the Cornwall Board of Education:

At the request of members of your community, I am writing to share scientific information about artificial turf, which I am confident will help you determine the best decisions to make for the children and adults in your community.

As President of the National Center for Health Research, I have shared similar information with Members of the U.S. Congress, state and federal agencies, state and local legislators, parents, and others who want to ensure that our children are not exposed to dangerous chemicals or metals when they play on artificial turf or playgrounds. Our nonprofit think tank is located in Washington, D.C. Our scientists, physicians, and health experts conduct studies and scrutinize research. Our goal is to explain scientific and medical information that can be used to improve policies, programs, services, and products.

We strongly urge you to consider the risks of replacing grass fields and natural playgrounds with artificial turf. In recent years, we've learned new information about lead and PFAS in artificial turf, as well as the risks of some of the newer infill materials that turf companies are using to replace tire crumb. Tire crumb has well-known risks, containing chemicals that disrupt hormones and have the potential to increase obesity; contribute to early puberty; cause attention problems such as ADHD; exacerbate asthma; and eventually cause cancer. I hope you have already educated yourselves about those risks, which are now widely understood by scientists, and have resulted in bans on tire crumb infill in many communities.

However, it is less well known that the plastic grass itself has dangerous levels of lead, PFAS, and several other hormone-disrupting chemicals as well. PFAS are of particular concern because they enter the body and the environment as "forever chemicals," which means that they are not metabolized and do not deteriorate. They accumulate in the body of humans and animals over the years. However, other hormone-disrupting chemicals are also dangerous because they are pervasive, and the impact of different types of hormone-disrupting chemicals is cumulative. Replacing tire waste with silica, zeolite, and other materials also has substantial risks.

Federal agencies such as the EPA and the U.S. Consumer Product Safety Commission have been investigating the safety of these products. Despite claims to the contrary, none have concluded that artificial turf is safe. Although the Trump Administration's EPA stated that there was no

conclusive evidence that the levels of chemicals in artificial turf were harmful to children, they made it clear that their research was based on estimates and assumptions rather than scientific research on children.

## **Lead**

As you probably know, the American Academy of Pediatrics states that no level of lead exposure should be considered safe for children, because lead can cause cognitive damage even at low levels. Some children are more vulnerable than others, and that can be difficult or even impossible to predict. Since lead has been found in tire crumb as well as in new synthetic rubber products, it is not surprising that numerous artificial turf fields and playground surfaces made with either tire crumb or “virgin” rubber have been found to contain lead. However, the Centers for Disease Control and Prevention (CDC) website also warns that the “plastic grass” made with nylon or some other materials also contains lead. Whether from infill, plastic grass, or rubber playground surfaces, the lead doesn’t just stay on the surface. With wear, the materials turn to dust that contains lead and other chemicals that is invisible to the eye and is inhaled by children of all ages when they play.

## **Why are chemicals that are banned from children’s toys allowed in artificial turf and rubber playground surfaces?**

Synthetic rubber and plastic are made with different types of endocrine (hormone) disrupting chemicals (also called EDCs).

As I noted earlier in this letter, these hormone-disrupting chemicals can cause or exacerbate numerous health problems that are common in every U.S. community: obesity; early puberty; attention problems such as ADHD; and asthma. For example, any parent can tell you how shocked they have been by girls’ earlier sexual development compared to when their parents were their age. Similarly, obesity, attention deficit disorders, asthma, and male infertility are clearly on the rise. In addition, early exposure to these chemicals can eventually cause cancer.

There is very good evidence regarding these hormone-disrupting chemicals in tire crumb, based on studies done at Yale and by the California Office of Environmental Health Hazard Assessment (OEHHA).<sup>1</sup>

A 2018 report by Yale scientists detected 92 chemicals in samples from 6 different artificial turf companies, including unused bags of tire crumb. Unfortunately, the health risks of most of the 92 chemicals had never been studied. However, 20% of the chemicals that had been tested are classified as probable carcinogens and 40% are irritants that can cause asthma or other breathing problems, or can irritate skin or eyes.<sup>2</sup>

There are numerous studies indicating that endocrine-disrupting chemicals (also called hormone-disrupting chemicals) found in rubber and plastic cause serious health problems. Scientists at the National Institute of Environmental Health Sciences (which is part of NIH) have concluded that unlike most other chemicals, hormone-disrupting chemicals can be dangerous at very low levels, and the exposures can also be dangerous when they combine with other exposures in our environment.

That is why the Consumer Product Safety Commission has banned numerous endocrine-disrupting chemicals from toys and products used by children. The products involved, such as pacifiers and teething toys, are banned even though they would result in very short-term exposures compared to artificial turf or playground surfaces.

A report that warns about possible harm to people who are exposed to rubber and other hormone disrupting chemicals at work explains that these chemicals “can mimic or block hormones and disrupt the body’s normal function, resulting in the potential for numerous health effects. Similar to hormones, endocrine-disrupting chemicals can function at very low doses in a tissue-specific manner and may exert non-traditional dose–response because of the complicated dynamics of hormone receptor occupancy and saturation.”<sup>3</sup>

Studies are beginning to demonstrate the contribution of skin exposure to the development of respiratory sensitization and altered pulmonary function. Skin exposure contributes to the total body burden of a chemical. In addition, the skin is a highly biologically active organ capable of chemical metabolism and can initiate a cascade of immunological events, potentially harming other organ systems.

### **Scientific Evidence of Cancer and Other Systemic Harm**

It is essential to distinguish between evidence of harm and evidence of safety. Companies that sell and install artificial turf often claim there is “no evidence children are harmed” or “no evidence that artificial turf causes cancer.” This is often misunderstood as meaning the products are safe or are proven to not cause harm. Neither is true.

It is true that there no clear evidence that an artificial turf field has caused specific children to develop cancer. However, the statement is misleading because it is virtually impossible to prove any chemical exposure causes one specific individual to develop cancer.

As an epidemiologist, I can also tell you that for decades there was no evidence that smoking or Agent Orange caused cancer. It took many years to develop that evidence, and the same will be true for artificial turf.

I have testified about the risks of these materials at the U.S. Consumer Product Safety Commission as well as state legislatures and city councils. I am sorry to say that I have repeatedly seen and heard lobbyists and scientists paid by the turf industry say things that are absolutely false. They claim that these products are proven safe (not true) and that federal agencies have stated there are no health risks (also not true).

In fact, we know that the materials being used in artificial turf and rubber playground surfaces contain carcinogens, and when children are exposed to those carcinogens day after day, week after week, and year after year, they increase the chances of our children developing cancer, either in the next few years or later as adults. The more frequently the fields are used, the greater the risks. That should be adequate reason not to install them in your community. That's why I have spoken out about the risks of artificial turf in my community and on a national level. The question must be asked: if they had all the facts, would any community choose to spend millions of dollars on fields that are less safe than well-designed natural grass fields?

### **Dangerously Hot and Hard Fields**

I was previously on the faculty at Yale and Vassar, and I know the climate in the Cornwall area well. When the weather is warm and/or sunny, it is usually quite pleasant to be outside – as long as you aren't on artificial turf or an outdoor rubber surface. Even when the temperature above the grass is 80 degrees Fahrenheit, artificial turf can reach 150 degrees or higher. Obviously, a 90 degree day is likely to be even hotter than 150 degrees on turf. That can cause “heat poisoning” as well as burns.

Artificial turf fields get hard as well. Turf companies recommend annual tests at 10 locations on each turf field, using something called a Gmax score. A Gmax score over 200 is considered extremely dangerous, and it is considered by industry to pose a death risk. However, the synthetic turf industry and American Society for Testing and Materials (ASTM), suggest scores should be even lower — below 165 to ensure safety comparable to a grass field. Will your community pay to have these tests conducted annually on all your public artificial turf fields? And if the results show the fields are dangerous, will your community close the fields until it pays to replace them?

The hardness of natural grass fields is substantially influenced by rain and other weather; if the field gets hard, rain or watering will make it safe again. In contrast, once an artificial turf field has a Gmax score above 165, it needs to be replaced because while the scores can vary somewhat due to weather, the scores will inevitably get higher because the turf will get harder. The reason why Gmax testing involves testing 10 different areas of a playing fields is to make sure all areas are considered safe. Some officials average those 10 scores to determine safety; however, experts explain that is not appropriate. If a child (or adult) falls, it can be at the hardest part of the

field, which is why safety is supposed to be determined by the score of the hardest part of the field.

## **Environmental Issues**

In addition to the health risks to school children and athletes, approximately three tons of infill materials migrate off of each synthetic turf field into the greater environment each year. About 2-5 metric tons of infill must be replaced every year for each field, meaning that tons of the infill have migrated off the field into grass, water, and our homes.<sup>4</sup> The fields also continuously shed microplastics as the plastic blades break down.<sup>5,6</sup> These materials may contain additives such as PAHs, flame retardants, and UV inhibitors, which can be toxic to marine and aquatic life. Microplastics are known to migrate into the oceans, the food chain, and drinking water, and they can absorb and concentrate other toxins from the environment.<sup>7,8,9</sup>

Synthetic surfaces also create heat islands.<sup>10,11</sup> In contrast, organically managed natural grass saves energy by dissipating heat, cooling the air, and reducing energy to cool nearby buildings. Natural grass and soil protect groundwater quality; biodegrade polluting chemicals and bacteria; reduce surface water runoff; abate noise; and reduce glare.<sup>12</sup>

## **Envirofill and Alternative Infills**

Envirofill artificial turf fields are advertised as “cooler” and “safer,” but our research indicates that these fields are still at least 30-50 degrees hotter than natural grass. Envirofill is composed of materials resembling plastic polymer pellets (similar in appearance to tic tacs) with silica inside. Silica is classified as a hazardous material according to Occupational Safety and Health Administration (OSHA) regulations, and the American Academy of Pediatrics specifically recommends avoiding it on playgrounds. The manufacturers and vendors of these products claim that the silica stays inside the plastic coating. However, sunlight and the grinding force from playing on the field breaks down the plastic coating. For that reason, even the product warranty admits that only 70% of the silica will remain encapsulated. The other 30% can be very harmful as children are exposed to it in the invisible dust in the air.

In addition, the Envirofill pellets have been coated with an antibacterial called triclosan. Triclosan is registered as a pesticide with the EPA, and the FDA has banned triclosan from soaps because manufacturers were not able to prove that it is safe for long-term use. Research shows a link to liver and inhalation toxicity and hormone disruption. The manufacturer of Envirofill says that the company no longer uses triclosan, but they provide no scientific evidence that the antibacterial they are now using is any safer than triclosan. Microscopic particles of this synthetic turf infill will be inhaled by children, and visible and invisible particles come off of the field, ending up in shoes, socks, pockets, and hair.

In response to the concerns of educated parents and government officials, other new materials are now being used instead of tire crumb and other very controversial materials. However, all the materials being used (such as volcanic ash, corn husks, and Corkonut) have raised concerns, and none are proven to be as safe or effective as well-designed grass fields.

## Conclusions

There have never been any safety tests required prior to sale that prove that any artificial turf products are safe for children and adolescents who play on them regularly. In many cases, the materials used are not publicly disclosed, making independent research difficult to conduct. None of these products are proven to be as safe as natural grass in well-constructed fields.

I have cited several relevant scientific articles on artificial turf in this letter, and there are numerous studies and growing evidence of the harm caused by these synthetic materials. I would be happy to provide additional information upon request ([dz@center4research.org](mailto:dz@center4research.org)).

I am not paid to write this statement. I am one of the many parents and scientists who are very concerned about the impact of artificial fields on our children. Your decision about artificial turf and playground surfaces can save lives and improve the health of children in your community. You owe it to your community to make sure that you know the risks of artificial turf and do all you can to protect your children from both the known risks and the suspected risks. Your decisions about artificial turf will be cited by other communities, making it even more important that your decision is based on scientific evidence, not on sales pitches by individuals with conflicts of interest.

Officials in communities all over the country have been misled by artificial turf salespeople. They were erroneously told that these products are safe as well as cost-effective. Neither is correct, and I hope you will be more skeptical of those misleading assurances. On the contrary, there is clear scientific evidence that these materials are harmful. The only question is how much exposure is likely to be harmful to which of your children? We should not be willing to take such a risk. Our children deserve better.

Sincerely,



Dr. Diana Zuckerman  
President

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