

Lead in Turf Risk Factors

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By Monte Hunter

Experience indicates that misinformation and over-reaction associated with environmental contaminants is common (i.e. asbestos, mold, etc.). It seems that only after unnecessary stress, public relations problems, litigation, exploitation, and the expenditure of significant funds does a logical, evidence-based approach to managing an environmental risk evolve. The purpose of this paper is to provide information that can aid school districts and colleges in making prudent, logical decisions regarding managing lead in synthetic turf.

Defining Environmental Contaminant Risk

Establishing the risk associated with an environmental contaminant is an intriguing process. In the early stages, when little empirical data is available, the potential risk and health effects are often sensationalized to promote political positions, promote products, sell services, pass legislation, collect damages, sell media, etc. Parties overstate or understate potential risk, cherry pick scientific studies and use anecdotal evidence to promote their cause. The term "Chicken Little Environmentalists" has been used to describe some that practice sensationalism.

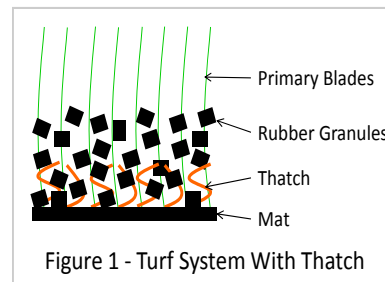
Regulatory entities tend to be conservative in the early stages, which is prudent to protect the public until evidence-based strategies evolve. However, removal of the contaminant is often recommended without a full understanding of risk. Problems caused by unnecessary removal of contaminants are well documented (asbestos, mold, etc.).

As research evolves, evidence-based risk assessment and remediation will be developed. The sensationalists, exploiters, and others often attempt to discredit the evidence-based information, as it may conflict with their positions.

After the development of evidence-based information, regulatory agencies often revise or "re-interpret" standards and laws. At this point standards and laws become more aligned with actual risk. Evidence-based remediation of the contaminant proceeds. This can include removal of the contaminant or management of the contaminant in place until scheduled removal. The sensationalists and exploiters often move on to another contaminant.

Lead in Turf

Lead is a common material that can be found in ceramics, electrical components, batteries, pottery, coatings, and soil. In synthetic turf, lead can be found in the rubber granules and turf fibers. A primary source appears to be lead chromate used to extend the yarn color lifespan⁷. Our research and testing indicates lead is often found in the thatch fibers



(figure 1) and older nylon turf. Thatch and older turf is typically nylon. Many newer generation turf fibers are polyethylene.

Risk Research

There does not appear to be adequate research to establish a consensus of the risk level associated with lead in synthetic turf. Some research claims no risk while other research claims a risk. Much of the research is based on lab simulation rather than actual field testing. It has been found that lab emission levels exceed actual field testing.⁵ Some research was based on faulty assumptions. One study based risk level on a one time exposure to turf. Many studies failed to factor in appropriate variables such as wind, temperature, frequency of exposure, related health issues, surrounding conditions, etc. Few research efforts have considered the impact of the interaction of other contaminants with lead in turf.

Like other environmental contaminants, the risk factors associated with lead in turf will change as research and scientific evidence evolves. It can take decades for a consensus to develop. More well designed scientific research is needed to establish a consensus of risk associated with lead in the synthetic turf systems in use today.

Risk Terms & Considerations

The following are common terms and factors to consider when evaluating the risk of exposure to lead in synthetic turf.

- There have been reports that turf is toxic if it contains lead. Every substance is toxic to humans in some manner, or to some degree. A substance becomes hazardous (toxic) by intensity of dose, length of exposure or the manner in which it is introduced to the body¹. The mere presence of an environmental contaminant in a material or substance does not mean it is hazardous (toxic).
- Bioavailability is the amount of a contaminant that can be absorbed by the body.
- Health effects of lead can be found at www.atsdr.cdc.gov/tfacts13.html. Lead can be more dangerous to children because their growing bodies absorb more lead and they can be more sensitive to the damaging effects of lead³.
- Individuals react differently to contaminants. Factors that can influence a person's risk for adverse health effects from environmental contaminants include age, gender, general health, genetic differences, exposure to other contaminants and lifestyle choices⁶. Contaminant levels that have no effect on one person may effect others.
- It is believed the primary pathway (route of exposure) for lead is ingestion but it can also be absorbed by skin, absorbed in eyes and by inhalation.
- Bioavailability of lead in turf can be monitored by periodically collecting surface wipe samples, air samples and water run-off samples. There are specific procedures for collecting and analyzing such samples.
- A U.S. Consumer Product Safety Commission staff analysis recommends that levels of lead found on wipe samples be divided by 5 to estimate the amount of available lead-containing material that will be actually transferred to person's hands. The CPSC analysis further estimates that 50% of the bioavailable lead can actually be transferred to a person's mouth².
- There is no known regulatory level for lead content in synthetic turf. Some attempt to apply EPA soil lead standards to synthetic turf. The composition and bioavailability of substances in soil and turf are quite different. For these reasons, lead standards for soil may not be appropriate for synthetic turf. The Synthetic Turf council has set a voluntary limit on color pigment lead content of 300 PPM¹⁰.

- There are airborne lead exposure guidelines by regulatory agencies. The EPA recently proposed lowering airborne limits to 0.15 micrograms per cubic meter.
- Temperature gradients and wind generally afford rapid dilution and low concentrations in the breathing zones of turf users⁸. Some suggest that exposure risk may be greater for indoor facilities not properly ventilated.
- Degradation of turf fibers from excessive use, excessive grooming, and UV exposure can increase exposure risk.
- The Synthetic Turf Council indicates lead release from lead chromate used to extend yarn color lifespan is minimized due to encapsulation⁷.
- The location of the turf component in the system should be considered. The primary fibers and granules are exposed to direct contact, grooming and sunlight. Thus, the bioavailability of a contaminant in the primary blades or granules is likely higher than that of the thatch that is typically not exposed to direct contact or sunlight.
- Contaminant levels are often reported as the weight of a particular turf component. For instance, lead content of the thatch layer may be reported as 4,000 parts per million (PPM). When the 4,000 PPM lead in the thatch is considered in a composite context, the lead content is approximately 300 PPM of the composite system.

Component	Weight (milligrams)	% of Total Weight
Mat	1700	14.66%
Thatch	900	7.76%
Primary blades	1000	8.62%
Granules	8000	68.97%
Total Weight	11,600	100.00%

Figure 2
Weights of turf components for 1 sq. inch taken from manufacturer sample.

- Turf systems with lead have been successfully managed in place with no lead release detected.
- Soil professionals & regulatory agencies should be consulted regarding lead leaching in soil or ground water. One helpful review of current research is "Evaluation of Potential Environmental Risks Associated with Installing Synthetic Turf Fields on Bainbridge Island"⁵. It concludes the risk of release of metals in the soil or ground water is minimal.
- There are potential turf contaminants other than lead. It should not be assumed turf is contaminant-free if no lead is identified.

Summary

The identification, research, health risk assessment and management of lead in synthetic turf is in the development stage. Much more well-designed scientific research is needed. Until this research evolves, the debate over the health risk associated with lead in synthetic turf will continue. Those with lead in synthetic turf should be aware of trends associated with environmental contaminants, temper emotional responses with scientific data, and take appropriate measures to minimize health risk.

About the author:

Monte Hunter is an architect, certified indoor environmental consultant, and president of Hunter Corral Associates. HCA has been providing architectural and environmental consulting services to schools and colleges since 1986. HCA has consulted on multiple synthetic turf environmental evaluations.

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