



IN BRIEF

Prohibits the installation of new turf fields & playground surfaces containing waste tires for two years (Jan 1, 2016 – Jan 1, 2018) while the state conducts a comprehensive study on potential health impacts for frequent users of these play surfaces. Turf fields and playground surfaces made from alternative materials not containing waste tires are not subject to the moratorium. Turf fields and playground surfaces made from waste tires that are already under construction, or where a contract has been signed for installation prior to Jan 1, 2016 are not subject to the moratorium.

THE ISSUE

In 2010, then Attorney General Jerry Brown settled a case with the nation's largest makers and installers of turf fields requiring them to reduce levels of lead in their products. The settlement required companies to reformulate their products to reduce lead levels to negligible amounts and established the nation's first enforceable standards applicable to lead in artificial turf. Brown brought the case in 2008 against these companies for excessive lead levels after testing by the Center for Environmental Health found high concentrations of lead in their products. Brown's office confirmed these findings in independent tests.

In recent years there has been an increased concern about the health impacts on frequent users of turf fields made from waste tires.

In a 2012 study published in *Chemosphere* titled, "Hazardous organic chemicals in rubber recycled tire playgrounds and pavers", the presence of hazardous organic chemicals in surfaces containing recycled rubber tires were investigated. Direct material analyses using solvent extraction, as well as SPME analysis of the vapour phase above the sample, were carried out. Twenty-one rubber mulch samples were collected from nine different playgrounds. All samples were extracted by ultrasound energy, followed by analysis of the extract by GC-MS. The analysis confirmed the presence of a large number of hazardous substances including PAHs, phthalates, antioxidants (e.g. BHT, phenols), benzothiazole and derivatives, among other chemicals. The study evidences the high content of toxic chemicals in these recycled materials. In

addition, SPME studies of the vapour phase above the samples confirm the volatilisation of many of those organic compounds. The study found that "uses of recycled rubber tires, especially those targeting play areas and other facilities for children, should be a matter of regulatory concern."

A report from the Swedish Chemical Agency (KEMI) found that tires contain over 60 different substances—40% is rubber; the rest is carbon black, high aromatic oils, sulfur and various metals. Rubber is elastic polymers. The most common types of synthetic rubber are styrene-butadiene rubber and ethylene propylene rubber. Vulcanizing agents are used in manufacture, and fillers, antioxidants and plasticizers are added for technical properties. A large number of high aromatic oils are added, including polyaromatic hydrocarbons, phthalates that can leach into water, phenols, metals including zinc, and low concentrations of lead. Synthetic turf often contains rubber granules from waste tires, which in turn contain several particularly hazardous substances. The Swedish Chemical Agency recommends that rubber granules from waste tires not be used in synthetic turf.

The 2007 Connecticut Agricultural Experiment Station report found out-gassing and leaching from synthetic turf rubber crumbs under aqueous ambient temperatures. Several compounds were present, but four compounds gave the highest responses on GC/Mass spectrographic analysis. The four compounds conclusively identified with confirmatory tests were: benzothiazole; butylated hydroxyanisole; n-hexadecane; and 4-(t-octyl) phenol. Approximately two dozen other chemicals were indicated at lower levels. These chemicals were released in laboratory conditions that closely approximate ambient conditions. Those chemicals identified with confirmatory analytical studies at the Connecticut Agricultural Experiment Station study have the following reported actions:

Benzothiazole: Skin and eye irritation, harmful if swallowed.

Butylated hydroxyanisole: Recognized carcinogen, suspected endocrine toxicant, gastrointestinal toxicant, immunotoxicant, neurotoxicant, skin and sense-organ toxicant.

n-hexadecane: severe irritant based on human and animal studies.

4-(t-octyl) phenol: corrosive and destructive to mucous membranes.

The study also detected metals that were leached from the tire crumbs. Zinc was the predominant metal, but selenium, lead and cadmium were also identified.

A 2011 study titled, "An Evaluation of Potential Exposures to Lead and Other Metals as the Result of Aerosolized Particulate Matter from Artificial Turf Playing Fields" concluded that: Synthetic turf can deteriorate to form dust containing lead at levels that may pose a risk to children. Given elevated lead levels in turf and dust on recreational fields and in child care settings, it is imperative that a consistent, nationwide approach for sampling, assessment, and action be developed. In the absence of a standardized approach, we offer an interim approach to assess potential lead hazards when evaluating synthetic turf.

The report stated: While it is not possible to draw broad conclusions from this limited sample of fields the results suggest that there is a potential for inhalable lead to be present on turf fields that have significant amounts of lead present as detectable by surface wipes. It also would appear likely from this sample that if the lead is present to any appreciable extent in the wipes it will likely be present in the breathing zone of players who are active on these fields, and that furthermore, these levels potentially exceed ambient EPA standards.

CANCER SURVEY

The University of Washington Women's Soccer Coach, Amy Griffin, has been keeping a list of athletes who developed cancer after playing on turf fields containing waste tires. So far she has identified 126 athletes, 109 of which are soccer players, 10 were football players, and six were field hockey and lacrosse players, who have developed different forms of cancer including lymphomas (51), leukemia (19), brain (10), testicular, (9), sarcoma (9), thyroid (6) and many more.

HEALTH IMPACT STUDY IN SB 47

By July 1, 2017, SB 47 requires the Office of Environmental Health Hazard Assessment, in consultation with the Department of Resources Recycling and Recovery, the State Department of Public Health, and the Department of Toxic Substances Control to submit a report to the legislature analyzing turf containing waste tires for potential adverse health impacts.

The study shall include:

- (1) A hazard analysis of individual, synergistic, and cumulative exposures to the chemicals that may be found in waste tire turf.
- (2) A specific analysis evaluating varying exposure activities, environments, duration of play, ages of different populations who play on waste tire turf, and exposure pathways.
- (3) Biomonitoring or other exposure monitoring of children or adults exposed to synthetic turf to be used to assess their exposure to chemicals found in the waste tire turf.
- (4) An examination of the potential for fields and playgrounds containing waste tires to cause adverse health impacts, including, but not limited to, non-Hodgkin lymphoma, testicular cancer, prostate cancer, sarcoma cancer, and leukemia.
- (5) An examination of the health impacts associated with waste tire turf fields and playgrounds of varying age.
- (6) An evaluation of the differences in health impacts between waste tire turf fields and those turf fields made from non-toxic alternatives.
- (7) A review of current research on the health impacts of synthetic turf done by authoritative bodies from around the country and the world.
- (8) Research to fill any data gaps, such as those data gaps identified by the 2010 report prepared by the Office of Environmental Health Hazard Assessment.

HIGH TEMPERATURES ON CRUMB RUBBER TURF FIELDS

Synthetic turf fields absorb heat, resulting in surface temperatures that are much higher than the temperatures of the surrounding air. In June 2002 at Brigham Young University (BYU) in Utah, the average surface temperature on a synthetic turf field was reported to be 117°F while the average surface temperatures on natural turf was 78°F and asphalt was 110°F. A maximum surface temperature of 200°F on the BYU synthetic turf field was reported.

A turfgrass specialist at the University of Missouri reported measuring an air temperature of 138°F at "head-level" height on the university's synthetic turf field on a sunny 98°F day. The surface temperature of the field was reported to be 178°F.

A study conducted at Penn State University measured surface temperatures on experimental plots of nine different types of infilled turf. Temperature measurements were made on three occasions. The

average air temperatures reported were 79°, 78°, and 85°F. The corresponding average surface temperatures reported for the synthetic turf plots are 120°, 130° and 146°F.

Water can be applied to synthetic turf to reduce the surface temperatures on warm days. A study at BYU found that watering synthetic turf lowered the surface temperature from 174°F to 85°F, but the temperature rose to 120°F in five minutes and to 164°F in twenty minutes.

According to the New York Department of Health, “The surface temperatures reported on synthetic turf fields can get high enough to reach levels of discomfort and may contribute to heat stress among users of the fields. Because of the potential for high temperatures on infilled synthetic turf fields, it is important that people who play or work on the fields be provided with adequate warnings regarding the potential for heat stress. The potential for and frequency of high surface temperatures warrant consideration when making decisions about installing and using a synthetic turf field.”

ALTERNATIVES AVAILABLE

Not all turf fields contain crumb rubber from waste tires. Natural and eco-efficient non-toxic alternatives are available that average 30-40 degrees cooler than turf fields containing waste tires. Turf fields made from alternative materials would not be subject to the moratorium in SB 47.

There are several companies in the U.S. that offer turf field and playground products made from natural materials and non-toxic synthetic materials including:

www.geoturfusa.com/
www.brock-international.com/
www.usgreentech.com/
hwww.hellasconstruction.com/

Contrary to opposition arguments, alternative non-toxic products are price competitive with waste tire fields:

Example 1

A typical new synthetic turf sports field measuring 80,000 sq. ft. can cost a customer between \$800K - \$1.2M. An alternative surface system made from natural materials not containing waste tires would only represent a 3-4% increase in the overall price of a project.

This comparison evaluates the costs for a first surface installation, removal and disposal, and then a second surface installation. This evaluation is critical to understand the true long-term costs of rubber crumb from waste tires as compared to more sustainable solutions. There are actually many landfills that do not accept crumb rubber, which increases the transport costs to move the material to a more distant disposal site.

Landfill disposal costs vary quite a bit across the state of California. This comparison uses a current conservative cost of \$30.00 / ton with compounded inflation / increases of 4% per year. The resulting estimated disposal costs in 2023 will be \$41.00 per ton when today's new fields will begin to be disposed of.

Example 2

Cost comparison between the same turf using SBR waste tire crumb rubber vs. an organic alternative: Turf- 45 oz., 2-1/2" monofilament utilizing 3 pounds of sand per square foot as ballast:

- 5 pounds of SBR per square foot @18 cents/pound= \$0.90 per square foot
- 2 pounds of Organic per square foot @75 cents per pound= \$1.50 per square foot

The up-front cost differential for an 80,000 square foot field is \$48,000:

- SBR- \$0.90 x 80,000= \$72,000
- Organic- \$1.50 x 80,000= \$120,000

This \$48,000 will be offset at the end of life cycle by the average disposal cost of a field with SBR that ranges between \$40,000- \$50,000.

MORATORIUMS IN OTHER JURISDICTIONS

In 2009 the Los Angeles Unified School District and the City of New York banned waste tires from turf fields. LAUSD board member Marlene Canter said, "The health of our students is more important than any other issue. You should never equate economics with health. In no way should we be skimping on something like this that could affect our kids."

In January 2015, the Kentucky Energy and Environment Cabinet began redirecting crumb rubber grant allocations to other uses rather than continue funding applicants that use waste tires on playgrounds and athletic fields.

In February 2015, Montgomery County, Maryland, the most populous county in the state with over 1 million residents, approved a ban on waste tires in turf fields and instead required plant-derived materials for infill in future turf field projects.

FOR MORE INFORMATION

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CA WASTE TIRE RECYCLING

The California Department of Resources Recycling and Recovery runs the Waste Tire Recycling Management Program whose mission is to divert waste tires from stock piles and landfills in favor of alternate uses. According to the 2013 California Waste Tire Report released in July of 2014, waste tires used in turf fields represented 4.8% of the total end use universe for waste tires. The vast majority of waste tire reuse consists of export (29% fuel and used tire reuse), tire derived fuel (19%), domestic reuse (15% retread and used tire reuse), rubberized asphalt (8.4%).

CalRecycle provides millions of dollars every year to schools and local governments to purchase turf fields and playground material made from waste tires [Tire-Derived Product \(TDP\) Grants](#). The state also provides funding to companies that make products from waste tires [Tire Incentive Program](#).

During the two-year moratorium CalRecycle could utilize money from these grant programs to help businesses in California that produce crumb rubber from waste tires find alternate markets other than fields and playgrounds for their product.

SUPPORT

Brock International
California Native Plant Society
Center for Environmental Health
Coalition for San Francisco Neighborhoods
Coalition to Save Ocean Beach / Friends of Sutro Heights Park
Environment and Human Health, Inc.
Francisco Heights Civic Association
Golden Gate Audubon Society
Golden Gate Park Preservation Alliance
Hellas Sports Construction
Limonta Sport USA
Public Employees for Environmental Responsibility
Safe Healthy Playing Fields Coalition
San Francisco Tomorrow
Sierra Club California
SFPARKS
Turf Grass Forum