



**RUBBER BARK™**

## Safety of Rubber Bark™ Products

Many studies have been done to determine whether there are any health and safety concerns associated with the use of recycled tire derived products, such as Rubber Bark™. The following information summarizes these concerns and offers research findings that confirm the safety of Rubber Bark™ for use in playground and landscaping applications. Full copies of most of these reports are available on the Rubber Bark™ website.

Research Findings	Source
<b>Overall Safety</b>	
<i>Are there any potential health or environmental risks in using rubber mulch?</i>	
<p>Extensive research has pointed to the conclusion that these fields result in little, if any, exposure to toxic substances. A review of existing literature points to the relative safety of crumb rubber fill playground and athletic field surfaces. Generally, these surfaces, though containing numerous elements potentially toxic to humans, do not provide the opportunity in ordinary circumstances for exposure at levels that are actually dangerous. Numerous studies have been carried out on this material and have addressed numerous different aspects of the issue. For the most part, the studies have vindicated defenders of crumb rubber, identifying it as a safe, cost-effective, and responsible use for tire rubber.</p>	<p>University of California, Berkeley - Laboratory for Manufacturing and Sustainability, 2010</p>
<p>Based on the data from New York Studies, OEHHA found that “Both reports concluded that these fields did not constitute a serious public health concern, since cancer or non-cancer health effects were unlikely to result from these low-level exposures.”</p>	<p>New York Office of Environmental Health Hazard Assessment (OEHHA), 2009</p>
<p>No adverse human health or ecological health effects are likely to result from these beneficial reuses of tire materials.</p>	<p>Rubber Manufacturers Association</p>

Research Findings	Source
<p>This study included a thorough review of the literature related to chemical leaching from tire material and other relevant studies; an analysis of exposure and risk associated with oral ingestion of ground rubber; an analysis of exposure via hand-to-mouth activity; an analysis of the potential for skin sensitization through dermal contact; ecotoxicity associated with recycled tire uses; and evaluation of head injuries related to different playground surfaces. The conclusions of this study indicate that there is little risk associated with exposure to recycled tire materials used in playgrounds or tracks.</p>	<p>California Office of Environmental Health Hazard Assessment (OEHHA), 2007</p>
<p>After reviewing the information available, with the possible exception of allergic reactions among individuals sensitized to latex, rubber and related products, there was no obvious toxicological concern raised that crumb rubber in its intended outdoor use on playgrounds and playing fields would cause adverse health effects in the normal population.</p>	<p>New Jersey Department of Environmental Protection, 2007</p>
<p>Based upon the current evidence, a public health risk appears unlikely.</p>	<p>Connecticut Department of Public Health, 2007</p>

## Inhalation Exposure

### *Are volatile organic chemicals (VOC) or particulate matter (PM) emitted into the air causing a health hazard when inhaled?*

<p>All VOCs were measured at extremely low concentrations which is typical of ambient air concentrations. All PM air concentrations were well below the National Ambient Air Quality Standards (NAAQS) for PM (150 micrograms per cubic meter). All air concentrations for lead were well below the NAAQS for lead (150 nanograms per cubic meter).</p>	<p>U.S. Environmental Protection Agency (EPA)</p>
<p>This study concluded that emissions of hazardous substances from rubber infill material do not pose a risk, based on a review of available literature. They supported this conclusion with their own analysis of the rubber infill, which identified only very limited amounts of volatile chemicals.</p>	<p>Hofstra University, 2007</p>
<p>The study concludes that the VOCs and PAHs picked up in the samples are similar to the emissions generated by traffic in the zone of influence and the values do not exceed any maximum value established by European legislation.</p>	<p>IBV 2006</p>
<p>Small quantities of nitrosamines emitted, but not detectable in air, nitrosamine related health effects not likely.</p>	<p>Norwegian Institute of Public Health, (NIPH), 2007</p>
<p>Neither study detected the presence of PAHs in ambient air...</p>	<p>J.C. Broderick &amp; Associates, 2007a, 2007b</p>
<p>Most of the chemicals emitted from the rubber granules are quite common in urban and suburban air. Other sources for these chemicals are also quite common including car exhaust, furnaces, consumer products, flooring and foods.</p>	<p>Connecticut Department of Public Health, 2007</p>
<p>The combination of frequently raised temperatures and long-term use would serve to eliminate most volatile gases from the material.</p>	<p>University of California, Berkeley - Laboratory for Manufacturing and Sustainability, 2010</p>

Research Findings	Source
<b>Ingestion Exposure</b>	
<i>Is there a health risk from ingesting crumb rubber dust through hand-to mouth contact or from leakage into drinking water?</i>	
Ingestion of material through dust or hand-to mouth contact does not exceed chronic levels of lead.	University of California, Berkeley - Laboratory for Manufacturing and Sustainability, 2010
While not advocating the deliberate ingestion of crumb rubber there are no indications from the data available at this time that the accidental ingestion of up to 50 to 200 mg/day (the mass of dirt assumed to be ingested in the standard exposure scenario for contaminated sites) of crumb rubber would be the cause of adverse health effects.	New Jersey Department of Environmental Protection, 2007
The evaluation of chronic hand-to-mouth activity showed that exposures were below potential non-cancer adverse health effect levels.	California Environmental Protection Agency (Cal EPA) , 2007
The study concluded that there was no elevated health risks associated with oral exposure to chemicals in recycled rubber granulates.	Norwegian Institute of Public Health (NIPH), 2006
There was no evidence that the presence of tire shreds altered the concentrations of the substances from the naturally occurring background levels. There was no evidence that tire shreds increased the levels of aluminum, zinc, chloride or sulfate, which have secondary (aesthetic) drinking water standards	New Jersey Department of Environmental Protection, 2007
Although there are no standards for lead in recycled tire material or synthetic turf, average concentrations were well below the EPA standard for lead in soil (400 part per million).	U.S. Environmental Protection Agency (EPA)
<b>Dermal Exposure</b>	
<i>Is there exposure to harmful chemicals by direct skin contact with rubber mulch?</i>	
Calculated doses were compared with the available lowest no observed adverse effect (NOAEL) values for the most relevant biological end points (e.g. cancer, reproductive damage, organ damage).The authors concluded that there was no health risk from dermal contact to these chemicals.	Danish Technological Institute (DTI), 2005
No sensitization induced by the test materials was observed based on the test conducted. The authors also concluded that these surfaces would not cause skin reactions in children already sensitized to latex.	California Environmental Protection Agency (Cal EPA), 2007
The resulting chemical doses available for skin uptake (by chemical class) ranged from 0.7 ng/kg/day for PCBs to 26.1 ng/kg/day for phthalates. These doses were deemed too low to result in any adverse health effect (NIPH 2006).	Norwegian Institute of Public Health (NIPH), 2006
<p>... cancer risks resulting from dermal contact and through incidental ingestion of tire crumb were all several orders of magnitudes below the EPA risk threshold level of 1 in 1,000,000 and non cancer risks were all less than the EPA threshold of 1.0.</p> <p>Funded in part by a grant from CalRecycle</p>	Johns, 2008