

Are Poured in Place Playground Surfaces Safe?

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The State of California Integrated Waste Management Board encourages the use of California recycled tires by promoting the development of recycled-content products derived from waste tires products and by providing grants to promote use of the products. They provide two grant programs for playgrounds and related recreational surfacing. One grant is for Park accessibility and the other is for Playground Safety. The grants are available to public entities, private schools and Community Housing Development Organizations.

After several years of providing these grants, the California Integrated Waste Management Board commissioned a study called the **Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products**. The report was published in January of 2007. Playground surfaces that had been funded by CIWMB were evaluated for the release of chemicals that could cause health concerns in children using the surfaces, the potential of the product to impact the local environment and for the impact attenuation values.

All existing literature that measured the release of chemicals by recycled tires in laboratory settings and field studies was studied: 49 chemicals were identified. Using the highest published levels of chemicals found, the non cancer health effects were calculated for a one time ingestion of ten grams of tire shreds by a three year old child and it was determined that it was unlikely to produce any adverse health effects. There were 7 chemicals that could be considered carcinogens but the concentration level was far below the level of one part per million that is generally considered an acceptable risk.

The Office of Environmental Health Hazard Assessment also conducted gastric digestion experiments in which 22 chemicals were found to be released by tire shreds incubated for 21 hours at 37 deg C to mimic the gastric environment. Assuming a child ingested 10 grams of tire shreds, all exposures were below the screening values. If the released chemicals were ingested as a one time event and averaged over a lifetime the cancer risk would be 3.7 in one hundred million.

Wipe samples of in-use playground surfacing containing recycled tire rubber. Zinc and four chemicals were measured that were at least three times background levels. Assuming playground use from one through 12 years of age the increased cancer risk was calculated to be 2.9 in one million which is generally considered to be an acceptable risk.

Since children commonly contact playground surfacing with their hands and body parts and since natural rubber contains the proven skin sensitizer latex; skin sensitization testing was performed. No skin sensitization was observed suggesting that contact with the surfacing materials would not cause sensitization in children and would not cause skin reaction in children already sensitized to latex.

Following a playground fire in Sonoma County, soil samples indicated that the levels of toxins were at or below the background levels. The U.S EPA judged the air above the site not to pose a health risk to the clean up workers and the soil and rubber mixture removed from the site was judged not to be hazardous waste.

Ground water that came in contact with tire shreds were found to contain elevated levels of chemicals but published studies indicate that it is unlikely that the use of shredded tires in outdoor settings such as playgrounds would result in leaching at high enough concentrations to have any effects.

The health effects and environmental impacts of poured in place surfacing appears to be well within safety standards but I have concerns about the impact attenuation portion of the study.

Playground surfaces that the Integrated Waste management Board had funded through its grant programs were tested using the Triax 2000 and 69% of the surfaces tested failed the HIC standard. For comparison purposes several Engineered Wood Fiber surfaces were tested and 100% passed. Only 32 sites with poured in place surfacing and five sites with Engineered Wood Fiber were included in this test.

I have several concerns about how this study was conducted. The report only investigated a sampling of the projects that had been funded. The report did not include any measurements of the thickness or the Critical Height requirement of the poured in place surfacing and did not identify the thickness of the material that was specified. Did the client specify the correct thickness of material or critical height and did the installer install what was specified? The critical height charts for different suppliers vary based on the specific composition of the products so specifying by thickness is not an accurate method of specifying. If the critical height requirement is specified by the client the thickness of the surfacing will vary depending on the supplier and it will be up to the client to determine that they have received the proper impact value. There were no core samples taken of the surfacing tested so there is no assurance that the products tested had the required combination of materials necessary to comply with the manufacturer's specification. Poured in place is a combination of rubber and binder but the percentage of each varies by supplier. If the correct ratio is not maintained throughout the process the impact values and the durability can be impacted. The specific products were not identified and the installers were not identified. The report simply says 69% of poured in place surfaces tested fail to comply with ASTM F 1292 but it did not identify the various reasons that could cause the failures.

One thing that the report did identify of value was the fact that the HIC values are affected by temperature. At one test site, the HIC values increased approximately 20% as the surface temperature rose from 52 degrees in the morning to 114 degrees in the afternoon. The surface became harder as it warmed and softer as it cooled. The test data indicates that impact testing should be done on warmer days rather than cool days to help assure the surface is compliant throughout the year.

Poured in Place products can not be visually inspected for compliance with ASTM F 1292 and certificates of compliance from the manufacturer only indicate that the products will

comply if installed as recommended and only if the correct product is specified. The owner of the project has the obligation to assure that a product with the required critical height is specified but the only way to assure that the proper impact attenuation surfacing is installed is to conduct field impact attenuation testing.

The most important thing that came out of this study was the fact that the purchaser of the product should require certification by field impact testing before final acceptance of the project. The cost of the poured in place surfacing is significant because it is usually higher than the cost of new play equipment. The added cost of field testing is the best insurance for your investment and for the safety of the children using the play area.