Information for informing the public and press about possible childhood exposure to contaminants resulting from contact with tire crumb and artificial turf

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Background

Tire crumb or crumb rubber is recovered from scrap tires or from the tire retreading process. During the recycling process, steel and fiber is removed leaving tire rubber with a granular consistency. Tire crumb is used in several commercial applications, including road construction, automobile parts and in a number of athletic and recreational applications. Recreational uses include ground cover under playground equipment, landscaping mulch, running track material, and as a filler material used with many synthetic turf sports and playing fields.

The use of tire crumb materials for playground and turf fields provides numerous benefits. First, it cushions falls and reduces sports injuries when compared to other playground or athletic surfaces. Secondly, synthetic turf is seen as a low-maintenance alternative to natural grass because unlike grass fields, there is no need to water and no or minimal need for the use of pesticides. And lastly, re-using expended tires reduces their potential for disease vectors (e.g., mosquitoes) and or disposal in landfills.

Triggering Events

In recent years, there have been reports of parents becoming alarmed when their children returned home with particles and fragments of shredded tire crumb rubber on their socks and clothing picked up from contact with tire crumb surfaced playgrounds. Earlier this year, one of the Agency's Regional offices asked several EPA headquarters offices for help filling some of the data gaps with regard to these uses of crumb rubber. In response, Michael Firestone (firestone.michael@epa.gov or 202-564-2199) from the Office of Children's Health Protection and Environmental Education and Ross Highsmith (highsmith.ross@epa.gov or 919-541-7828) from the Office of Research and Development's National Exposure Research Laboratory formed an ad-hoc workgroup and are chairing this Agency-wide effort which includes both scientific and communications staff from the Office of Prevention, Pesticides and Toxic Substances, the Office of Research and Development, the Office of Children=s Health Protection and Environmental Education and the Office of Solid Waste and Emergency Response, as well as many of the EPA Regional Offices.

This spring, a related issue regarding artificial play surfaces arose. The New Jersey Department of Health and Senior Services (NJDHSS) and the U.S. Agency for Toxic Substances and Disease Registry/National Center for Environmental Health found elevated lead levels at a synthetic turf athletic field when it investigated a nearby contaminated scrap metal facility in Newark, NJ. The NJDHSS investigation revealed that the source of the lead was the artificial turf fibers, not the scrap metal facility. Synthetic turf fiber samples were taken around the state from 12 other fields composed of either polyethylene, nylon, or a mix of polyethylene and nylon. The 10 fields with polyethylene had very low or undetectable levels of lead in the fibers. The two fields with nylon fibers had high levels of lead (as did the field in Newark) with concentrations of 3,400 and 4,100 milligrams of lead per kilogram of fiber (mg/kg), compared with the EPA standard of 400 mg/kg in soil. The NJDHSS noted that lead can be dissolved from artificial turf fibers and turf field dust under conditions that simulate the human digestive process, leaving the lead available for the body to absorb.

When the New Jersey situation came to media attention, questions arose about the extent of possible contamination nationwide. There are presently no field monitoring data available to draw any national conclusions.

What is Known

Internationally, the European Union has prohibited the production of tire rubber with PAHs [polycyclic aromatic hydrocarbons] after 2007. The Swedish Chemicals Inspectorate recommends that recycled tires not be used in synthetic turf because [of] high levels of PAHs such as phthalates and phenols. PAHs are likely found in currently available used tires as well as synthetic turf in the U.S.

In January 2007, the California Office of Environmental Health Hazard Assessment issued a report, *Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products* (http://www.ciwmb.ca.gov/Publications/Tires/62206013.pdf). The report concluded that there appeared to be little long-term risk to human health, however, not all routes of exposure were fully investigated. Another group, Environment and Human Health, Inc., issued the results of their small study and suggested that exposures to some species may elevated (http://www.ehhi.org/turf/).

In August 2007, the Connecticut Agricultural Experiment Station reported the results of a very small study it conducted to evaluate tire crumb. The laboratory concluded that Aunder relatively mild conditions of temperature and leaching solvent, components of crumb rubber produced from tires (i) volatilize into the vapor phase and (ii) are leached into water in contact with the crumbs.@

After a review of the literature, EPA identified a number of compounds that may be found in tires, although not all are contained in every tire, nor are they contained in the same concentration – these include:

acetone
aniline
benzene
chloroethane
halogenated flame retardants
isoprene
methyl ethyl ketone
methyl isobutyl ketone
naphthalene
phenol
polycyclic aromatic hydrocarbons
styrene-butadiene
toluene
trichloroethylene
arsenic
barium
cadmium
chromium
cobalt
copper
lead
manganese
mercury
nickel
zinc
pigments
nylon
polyester
rayon
latex

In June, 2008, the Centers for Disease Control and Prevention (CDC) issued a health advisory titled "Potential Exposure to Lead in Artificial Turf: Public Health Issues, Actions, and Recommendations" (http://www2a.cdc.gov/HAN/ArchiveSys/ViewMsgV.asp?AlertNum=00275). According to the CDC:

- Children less than 6 years old are more likely to be affected by lead than adults because of increased contact with lead sources in the environment, including lead contaminated house dust and soil. Children also absorb lead more easily. Children's developing nervous systems are also more susceptible to the adverse health effects of lead including developmental delay and behavioral problems.

- Concerned parents should talk to their child's pediatrician about potential and known sources of lead in their children's environment and whether their children should have a blood lead test. This is a simple blood test that is paid for by most private insurers and by Medicaid.

On July 30, 2008, CPSC released the results of a study of possible lead exposure from the use of synthetic turf, which concluded that newer fields had no lead or generally had the lowest lead levels. Although small amounts of lead were detected on the surface of some older fields, none of these tested fields released amounts of lead that would be harmful to children.

What=s Being Done

Due to the limited amount of environmental monitoring data, EPA has not reached any scientific conclusions regarding the potential environmental exposure to tire crumb materials used in playgrounds and synthetic turf fields for recreational and athletic purposes. EPA's ad-hoc workgroup briefed the Agency's Science Policy Council in early June about designing and implementing a limited scoping-level field monitoring effort during the summer of 2008. This quick turn-around effort would be expected to generate a limited set of monitoring data that will allow the Agency to begin addressing public concerns about possible toxic contaminant exposure to children from contact with tire crumb and synthetic turf surfaces. The monitoring effort is being designed to:

1. Gain experience conducting multi-route field monitoring of recreational surfaces that contain tire crumb; and

2. Begin generating field monitoring data which will be used by EPA to help the Agency determine whether there is sufficient potential for exposure and risk (based on modeling possible childhood exposure) to merit a more extensive exposure monitoring study necessary to more fully define any potential risks.

The monitoring effort, scheduled to begin in early August, is expected to include four geographical locations located near existing EPA exposure laboratories including Athens, GA, Research Triangle Park, NC, Las Vegas, NV and Cincinnati, OH, with a possible fifth site in Seattle, WA. EPA will monitor for particulate matter (PM), volatile organic compounds (VOCs) and surface residues.

Study strengths and limitations are summarized in the table below:

Study Strengths	Study Limitations
• Consistent collection/analysis of selected species in key media that will provide limited assessment of the range of possible exposures • Identify if there are elevated environmental concentrations, and if so, what contaminants and the most important routes/pathways • Identify if there is a need for future research, and if so, help frame what research is needed, and the associated resources • Evaluated base protocol/methodologies for designing future research	• Variability of tire crumb sources and use by manufacturers • Very small number of playgrounds and synthetic turf athletic fields (up to 8) • Environmental sampling only, no personal monitoring • No current capacity for analysis of semi-volatile organic chemicals (SVOCs) • Limited protocol/method evaluation • Standard methods and best QA practices to be employed • Surface methods adapted from ASTM, but not validated

Any future decision regarding the need for a significantly more comprehensive EPA monitoring study to much more fully examine the wide diversity of recreational surfaces that use tire crumb will also consider the results of efforts focused on examining possible lead contamination of synthetic turf fields that have been or will be conducted by the Consumer Product Safety Commission (CPSC), the Agency for Toxic Substances and Disease Registry (ATSDR), and several states including NJ, CT, and NY during 2008.

Talking points

1. EPA is concerned about possible exposure to children resulting from the recreational use of tire crumb as ground cover under playground equipment, landscaping mulch, running track material, and as a filler material used with many synthetic turf sports and playing fields, as well as from the use of synthetic turf itself.

2. Limited sampling of synthetic turf athletic fields in New Jersey and commercial products found that synthetic turf made of nylon or nylon/polyethylene blend fibers may contain sufficiently high levels of lead that pose a potential public health concern.

3. EPA does not have information on the extent of the use of lead-containing or contaminated synthetic turf or the extent of similar situations outside of New Jersey. Additional research will likely be necessary to determine the extent of the problem.

4. EPA is collaborating with its Federal and State partners to assess this issue, understand the research that has been conducted or planned to date, and determine appropriate next steps.

5. EPA is developing a protocol to conduct a limited scoping-level field monitoring effort during the summer of 2008. The purpose of this limited effort is to begin generating data to help EPA determine whether there is sufficient potential for childhood exposure and risk to merit a more extensive exposure monitoring study to more fully define any potential risks.