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## Hazardous Chemicals in Synthetic Turf

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A new generation of synthetic turf is becoming popular in the U.S. Brands such as FieldTurf and A-Turf are springier than the old AstroTurf and feel more like real grass. They also promise low maintenance costs. New York City is so attracted to the new synthetic turf that it is installing it in 79 parks, often substituting it for natural soil and grass. (1)

However, the new artificial grass raises health concerns. In particular, the base of many new brands includes recycled rubber pellets that could contain harmful chemicals. What's more, we have observed that on many New York City fields, the rubber pellets are also present on the surface. When one of us (William Crain) was picking up some pellets by hand, a boy told him that after playing in the park, he finds the pellets in his shoes at home at night. Because the rubber pellets are much more accessible to children and athletes than we had supposed, we decided to analyze a sample for two possible sets of toxicants—polycyclic aromatic hydrocarbons (PAHs) and toxic metals.

We collected our first sample from a new A-Turf surface in Manhattan's Riverside Park in May, 2006. To gain information on the reliability of our results, we gathered a second sample in June, 2006 from a different part of the park.

The PAHs were extracted in a Soxhlet apparatus with organic solvents. The metals were extracted by means of nitric acid with the aid of a high-efficiency microwave oven (Marsx Microwave). Both methods were used to estimate the maximum amounts of the chemicals contained in the bulk material (rubber pellets). The analyses were conducted at the Environmental and Occupational Health Sciences Institute of Rutgers University.

The PAH results for our first sample are listed as Sample 1 in Table 1, below. As the table shows, six PAHs were above the concentration levels that the New York State Department of Environmental Conservation (DEC) considers sufficiently hazardous to public health to require their removal from contaminated soil sites. (2) It is highly likely that all six PAHs are carcinogenic to humans.

The PAH results for Sample 2 are also listed in the table. Although the concentration levels in Samples 1 and 2 varied somewhat, the results for Sample 2 replicated the finding that the concentration levels of the six PAHs are above the DEC's tolerable levels for soil.

Table 1. Concentrations of PAHs (ppm\*)

	Sample 1		Sample 2	DEC
	Turf		Turf	Contaminated
	Rubber Pellets		Rubber Pellets	Soil Limits
Benzo(a)anthracene	1.23	1.26	1.0	
Chrysene	1.32		7.55	1.0
Benzo(b)fluoranthene	3.39	2.19		1.0
Benzo(a)pyrene	8.58		3.56	1.0
Benzo(k)fluoranthene	7.29	1.78	0.8	
Dibenzo(a,h)anthracene	3.52	1.55		0.33

\* ppm = parts per million

The analyses also revealed levels of zinc in both samples that exceed the DEC's tolerable levels. Lead and arsenic also were present, and many scientists believe that these metals should not be introduced into the environment at all.

We want to emphasize that the findings are preliminary. PAHs in rubber might not act the same way as in soil, and we do not yet have information on the ease with which the PAHs in these rubber particles might be absorbed by children or adults—by ingestion, inhalation, or absorption through the skin. However, the findings are worrisome. Until more is known, it wouldn't be prudent to install the synthetic turf in any more parks.

We have informed the New York City Parks Department of our findings, but as far as we know, the Parks Department has not altered its plans to continue the installation of synthetic turf in numerous parks.

#### References

- (1) New Yorkers for Parks. *Synthetic Turf: A New Turf War in New York City Parks, Special Report*, Spring 2006. NY4P.gov.
- (2) 6 NYCRR Part 375, Environmental Remediation Program, Draft Revised June 14, 2006, Department of Environmental Conservation, Table 375-6.8 (a) and (b).

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