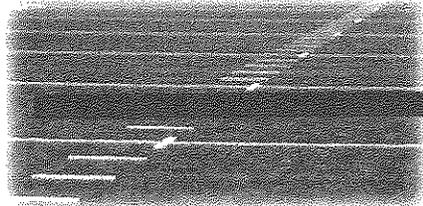


PENNSTATE

College of
Agricultural
Sciences

Center for Sports Surface Research

Synthetic Turf



SYNTHETIC TURF

Health and Environmental Impacts

Health and Environmental Impacts

Penn State Studies

Year	Authors	Title	Link
2012	McNitt and Petrunak	Evaluation of the efficacy of Ultraviolet-C light to eliminate <i>Staphylococcus aureus</i> from infilled synthetic turf surfaces	Read It Here
2011	Serensits et al.	Human health issues on synthetic turf in the USA	Read It Here
2009	McNitt et al.	Survival of <i>Staphylococcus aureus</i> on synthetic turf	Read It Here
2008	McNitt et al.	A Survey for the Presence of <i>Staphylococcus aureus</i> in the Infill Media of Synthetic Turf	Read It Here

Scientific Journal Articles

Year	Authors	Title	Link
2014	Cheng et al.	Environmental and health impacts of artificial turf: a review	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/24467230]
2013	Kruger et al.	New approach to the ecotoxicological risk assessment of artificial outdoor sporting grounds	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/23337354]
2013	Pavlonis et al.	Bioaccessibility and risk exposure to metals and SVOCs in artificial turf field fill materials and fibers	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/23758133]
2013	Schiliro et al.	Artificial turf football fields: environmental and mutagenicity assessment	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/23007896]
2013	Ruffino et al.	Environmental-sanitary risk analysis procedure applied to artificial turf sports fields	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/23329128]
2011	Ginsberg et al.	Benzothiazole toxicity assessment in support of synthetic turf field human health risk assessment	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/21797770]
2011	Menichini et al.	Artificial-turf playing fields: contents of metals, PAHs, PCBs, PCDDs and PCDFs, inhalation exposure to PAHs and related preliminary risk assessment	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/21907387]
2011	Ginsberg et al.	Human health risk assessment of synthetic turf fields based upon	Read It Here [http://www.tandfonline.com/doi/abs/10.1080/15287394.2011.586942]

		investigation of five fields in Connecticut	
2011	Simcox et al.	Synthetic turf field investigation in Connecticut	Read It Here [http://www.tandfonline.com/doi/abs/10.1080/15287394.2011.586941]
2010	Van Rooij and Jongeneelen	Hydroxypyrene in urine of football players after playing on artificial sports fields with tire crumb infill	Read It Here [http://www.springerlink.com/content/53q86p8u536586lh/]
2009	Bocca et al.	Metals contained and leached from rubber granulates used in synthetic turf areas	Read It Here [http://www.sciencedirect.com/science/article/pii/S0048969708012904]
2008	Zhang et al.	Hazardous chemicals in synthetic turf materials and their bioaccessibility in digestive fluids	Read It Here [http://www.nature.com/jes/journal/v18/n6/abs/jes200855a.html]
2003	Birkholz et al.	Toxicological evaluation for the hazard assessment of tire crumb for use in public playgrounds	Read It Here [http://www.ncbi.nlm.nih.gov/pubmed/12880077]

U.S. Consumer Products Safety Commission

Year	Authors	Title	Link
2008	CPSC	CPSC staff analysis and assessment of synthetic turf "grass blades"	Read It Here [http://www.epsc.gov/library/foia/foia08/os/turfassessment.pdf]

U.S. Environmental Protection Agency

Year	Authors	Title	Link
2009	EPA	A scoping-level field monitoring study of synthetic turf fields and playgrounds	Read It Here [http://www.epa.gov/nerl/download_files/documents/tire_crumbs.pdf]

Connecticut Studies

Year	Authors	Title	Link
2010	Connecticut Department of Public Health	FACT SHEET - The CT DPH risk assessment of artificial turf fields	Read It Here [http://www.ct.gov/dph/lib/dph/environmental_health/eoha/pdf/artificial_turf_fs_2010.pdf]
2010	Department of Energy and Environmental Protection	Result of state artificial turf field study: no elevated health risk	Read It Here [http://www.ct.gov/dep/cwp/view.asp?a=3847&q=463832&depNav_GID=1511]
2010	The Connecticut Academy of Science and Engineering	Committee report: peer review of an evaluation of the health and environmental impacts associated with synthetic turf playing fields	Read It Here [http://www.ct.gov/deep/lib/deep/artificialturf/case_artificial_turf_review_report.pdf]
2010	The Connecticut Agricultural Experiment Station	2009 study of crumb rubber derived from recycled tires – final report	Read It Here [http://www.ct.gov/deep/lib/deep/artificialturf/caes_artificial_turf_report.pdf]
2010	The Connecticut Department of	Artificial turf study - leachate and stormwater	Read It Here [http://www.ct.gov/deep/lib/deep/artificialturf/dep_artificial_turf_report.pdf]

	Environmental Protection	characteristics - final report	
2010	The Connecticut Department of Public Health	Human health risk assessment of artificial turf fields based upon results from five fields in Connecticut	Read It Here [http://www.ct.gov/deep/lib/deep/artificialturf/dph_artificial_turf_report.pdf]
2010	University of Connecticut Health Center	Artificial turf field investigation in Connecticut - final report	Read It Here [http://www.ct.gov/deep/lib/deep/artificialturf/uchc_artificial_turf_report.pdf]

New York Studies

Year	Authors	Title	Link
2009	New York City Department of Health and Mental Hygiene	Air quality survey of synthetic turf fields containing crumb rubber infill	Read It Here [http://www.nyc.gov/html/doh/downloads/pdf/eode/turf_aqs_report0409.pdf]
2009	New York Department of Environmental Conservation	An assessment of chemical leaching, releases to air, and temperature at crumb rubber infilled synthetic turf fields	Read It Here [http://www.dec.ny.gov/docs/materials_minerals_pdf/crumbrubfr.pdf]
2008	New York City Department of Health and Mental Hygiene	A review of the potential health and safety risks from synthetic turf fields containing crumb rubber infill	Read It Here [http://www.nyc.gov/html/doh/downloads/pdf/eode/turf_report_05-08.pdf]
2008	New York State Department of Health	FACT SHEET: Crumb-Rubber Infilled Synthetic Turf Athletic Fields	Read It Here [http://www.health.state.ny.us/environmental/outdoors/synthetic_turf/crumb-rubber_infilled/fact_sheet.htm]

California Studies

Year	Authors	Title	Link
2010	California Department of Resources Recycling and Recovery	Safety study of artificial turf containing crumb rubber infill made from recycled tires: measurements of chemicals and particulates in the air, bacteria in the turf, and skin abrasions caused by contact with the surface	Read It Here [http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1360]
2009	California Office of Environmental Health Hazard Assessment	Chemicals and particulates in the air above the new generation of artificial turf playing fields, and artificial turf as a risk factor for infection by methicillin-resistant Staphylococcus Aureus (MRSA). Literature review and data gap analysis	Read It Here [http://www.calrecycle.ca.gov/tires/Products/Health/TurfStudy/LitReview.htm]
2007	California Office of Environmental Health Hazard Assessment	Evaluation of health effects of recycled waste tires in playground and track products	Read It Here [http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1206]

New Jersey Studies

Year	Authors	Title	Link

Year	Authors	Title	Link
2011	UMDNJ-EOHSI	Crumb infill characterization for trace elements and organic materials	Read It Here [http://www.nj.gov/dep/dsr/publications/turf-crumb-infill-study.pdf]
2008	State of New Jersey Department of Health and Senior Services	Update: New Jersey investigation of artificial turf and human health concerns	Read It Here [http://www.state.nj.us/health/artificialturf/index.shtml]
2007	New Jersey Department of Environmental Protection	Preliminary assessment of the toxicity from exposure to crumb rubber: its uses in playgrounds and artificial turf playing fields	Read It Here [http://www.state.nj.us/dep/dsr/research/whitepaper-rubber.pdf]

International Studies

Year	Authors	Title	Link
2007	Intron	Environmental and health risks of rubber infill. Rubber crumb from car tyres as infill on synthetic turf	Read It Here [http://www.turftrackandcourt.com/pdf/Summary%20Environmental%20and%20health%20risks%20of%20rubber%20infill%2010-01-2007.pdf]
2006	Norwegian Pollution Control Authority	Measurement of air pollution in indoor artificial turf halls	Read It Here [http://www.iss.de/conferences/Dresden2006/Technical/NILU_Engelsk.pdf]
2006	IBV	Study of incidence of recycled rubber from tyres in environment and human health	Read It Here [http://www.iss-sportsurfacescience.org/downloads/documents/MUW7LMT0WH_IBV.pdf]
2006	Norwegian Institute of Public Health and the Radium Hospital	Artificial turf pitches – an assessment of the human health risks for football players	Read It Here [http://www.iss.de/conferences/Dresden2006/Technical/FHI_Engelsk.pdf]
2006	Norwegian Building Research Institute	Potential health and environmental effects linked to artificial turf systems – Final Report	Read It Here [http://www.iss.de/conferences/Dresden2006/Technical/NBI_Engelsk.pdf]