



# Synthetic Turf<sup>SM</sup>

## C O U N C I L

### **Independent, Science-Based Research Confirming No Elevated Human Health or Environmental Risk from Synthetic Turf with Crumb Rubber Infill 1998 – 2014**

1. [Tabor Academy – Synthetic Turf Athletic Field Evaluation](#)  
CDM Smith, March 13, 2014
  2. [Artificial turf football fields: environmental and mutagenicity assessment](#)  
Schilirò, T1, et al., Arch Environ Contam Toxicol, 2013
  3. [Bioaccessibility and Risk of Exposure to Metals and SVOCs in Artificial Turf Field Fill Materials and Fibers](#)  
Environmental and Occupational Health Sciences Institute, Robert Wood Johnson Medical School, 170 Frelinghuysen Road, Piscataway, NJ, 2013
  4. [Review of the Human Health & Ecological Safety of Exposure to Recycled Tire Rubber found at Playgrounds and Synthetic Turf Fields](#)  
Prepared for Rubber Manufacturers Association by Cardno ChemRisk, Inc., an independent global scientific consulting firm, August 1, 2013
  5. [Artificial turf football fields: environmental and mutagenicity assessment](#)  
Department of Public Health and Microbiology, University of Torino, Italy, 2012
  6. [Crumb Infill and Turf Characterization for Trace Elements and Organic Materials](#)  
Dr. Paul J. Lioy and Dr. Clifford Weisel, Environmental and Occupational Health Sciences Institute, Robert Wood Johnson Medical School, October 31, 2011
  7. [An Evaluation of the Health and Environmental Impacts Associated with Synthetic Turf Playing Fields University of Connecticut Health Center](#)  
Connecticut Agricultural Experiment Station, Department of Public Health, Connecticut Department of Environmental Protection, July 2010
- [Artificial Turf Field Investigation in Connecticut Final Report](#)  
Nancy Simcox, Anne Bracker, John Meyer, Section of Occupational and Environmental Medicine, University of Connecticut Health Center, July 2010

- [DEP Artificial Turf Stormwater Study](#)  
University of Connecticut Health Center, The Connecticut Agricultural Experiment Station, the Department of Public Health and DEP, July 2010
  - [Human Health Risk Assessment of Artificial Turf Fields Based upon Results from Five Fields in Connecticut](#)  
Connecticut Department of Public Health, Program in Environmental and Occupational Health Assessment, July 2010
  - [Peer Review of an Evaluation of the Health and Environmental Impacts Associated with Synthetic Turf Playing Fields](#)  
Connecticut Academy of Science and Engineering, June 2010
  - [2009 Study of Crumb Rubber Derived from Recycled Tires Final Report](#)  
Xiaolin Li, William Berger, Craig Musante, MaryJane Incorvia Mattina, Connecticut Agricultural Experiment Station, Department of Analytical Chemistry, May 2010
13. [Hydroxypyrene in urine of football players after playing on artificial sports field with tire crumb infill](#)  
Joost G. M. van Rooij  $\text{\AA}$ , Frans J. Jongeneelen, International Archives of Occupational and Environmental Health, (2010) 83:105–110
  14. [Review of the Impacts of Crumb Rubber in Artificial Turf Applications](#)  
Simon, Rachel, University of California, Berkeley, Laboratory for Manufacturing and Sustainability, February 2010 Prepared for: The Corporation for Manufacturing Excellence (Manex)
  15. [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](#)  
Office of Environmental Health and Hazard Assessment, Department of Resources Recycling and Recovery, Editor. 2010, State of California
  16. [A Scoping-Level Field Monitoring Study of Synthetic Turf Fields and Playgrounds](#)  
National Exposure Research Laboratory Office of Research and Development U.S. Environmental Protection Agency, 2009
  17. [Air Quality Survey of Synthetic Turf Fields Containing Crumb Rubber Infill](#)  
New York City Department of Health and Mental Hygiene, 2009
  18. [An Assessment of Chemical Leaching, Releases to Air and Temperature at Crumb-Rubber Infilled Synthetic Turf Fields](#)  
Lim, L. and R. Walker, New York State Department of Environmental Conservation and Department of Health, Editor, 2009

19. [Zinc in Drainage Water Under Artificial Turf Fields with SBR](#)  
Hofstra, U., INTRON, March 2009
20. [Chemicals in Outdoor Artificial Turf: A health risk for users?](#)  
Beausoleil, Monique et. al, Public Health Branch, Montreal Health and Social Services Agency, June 2009
21. [A Review of the Potential Health and Safety Risks from Synthetic Turf Fields Containing Crumb Rubber Infill](#)  
Elizabeth Denly, Katarina Rutkowski, Karen M. Vetrano, Ph.D., TRC, Prepared for NYC Department of Health and Mental Hygiene, May 2008
22. [CPSC Staff Finds Synthetic Turf Fields OK to Install, OK to Play On](#)  
U.S. Consumer Product Safety Commission, NEWS from CPSC, July 30, 2008
23. [Evaluation of Potential Environmental Risks Associated with Installing Synthetic Turf Fields on Bainbridge Island](#)  
D. Michael Johns, Ph.D., Windward Environmental LLC, Seattle, WA, February 2008
24. [Evaluation of Playing Surface Characteristics of Various In-Filled Systems](#)  
McNitt, A.S., 2008 April 9, 2008
25. [Evaluation of the Environmental Effects of Synthetic Turf Athletic Fields](#)  
Bristol, S.G. and V.C. McDermott, Milone & MacBroom, Inc., December 2008
26. [Fact Sheet: Crumb-Rubber Infilled Synthetic Turf Athletic Fields](#)  
New York City Department of Health, August 2008
27. [Follow-up Study of the Environmental Aspects of Rubber Infill](#)  
Hofstra, U., INTRON, 2008
28. [Initial Evaluation of Potential Human Health Risks Associated with Playing on Synthetic Turf Fields on Bainbridge Island](#)  
D. Michael Johns, Ph.D., Windward Environmental LLC, Seattle, WA, January 2008
29. [Hazardous Chemicals in Synthetic Turf Materials and Their Bioaccessibility in Digestive Fluids](#)  
Zhang JJ, Han IK, Zhang L, Crain W. et al, 2008
30. [Rubber Crumb Health Risk Evaluation](#)  
Lamie, P. Memorandum to: Richard Reine, Director Concord Public Works, April 24. 2007
31. [Synthetic Playfields Task Force Findings and Department Recommendations](#)  
San Francisco Recreation and Park Department, 2008

32. [Environmental and health assessment of the use of elastomer granulates \(virgin and from used tyres\) as infill in third-generation artificial turf](#)  
Dr. Robert Moretto, ADEME / ALIAPUR / FIELDTURF TARKETT, 2007
33. [Environmental and Health Risks of Rubber Infill: Rubber crumb from car tyres as infill on artificial turf](#)  
Hofstra, U., INTRON, January 2007
34. [Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products](#)  
California Integrated Waste Management Board, 2007, Integrated Waste Management Board: Sacramento, CA
35. [Evaluation of health risks caused by skin contact with rubber granules used in synthetic turf pitches](#)  
Dr. Christa Hametner, Vienna, Dr. Hans Theodor Grunder, Berlin, 2007
36. [Leaching of zinc from rubber infill on artificial turf \(football pitches\)](#)  
Laboratory for Ecological Risk Assessment, 2007
37. [Nitrosamines released from rubber crumb](#)  
van Bruggen, M., E.M. van Putten, and P.C.J.M. Janssen, 2007, RIVM: Bilthoven, the Netherlands
38. [Preliminary Assessment of the Toxicity from Exposure to Crumb Rubber: its use in Playgrounds and Artificial Turf Playing Fields](#)  
Thomas Ledoux, Ph.D., New Jersey Department of Environmental Protection, June 2007
39. [Re: Ambient Air Sampling for PAH's, Schreiber High School Football Field \(101 Campus Dr., Port Washington, NY 11050; Sampling Date: October 17, 2007\)](#)  
Broderick, J.C., E. Vonderhorst, Editor, J.C. Broderick & Associates, Inc.: Port Washington, NY., 2007
40. [Artificial turf pitches – An assessment of the health risks for football players](#)  
Norwegian Institute of Public Health and the Radium Hospital, 2006, Oslo. p. 1-3
41. [An Open Letter concerning the potential cancer risk from certain granulate infills from artificial turf](#)  
FIFA, Prof. Dr. Jiri Dvorak, July 2006
42. [Synthetic Turf from a Chemical Perspective - A status report](#)  
The Swedish Chemicals Inspectorate (Kemi), KEMIKALIENIMSPEKTIONEN Sundbyberg. p. 1-31, 2006

43. [Measurement of non-exhaust particulate matter](#)  
Luhana, L., et al., 2004, Deliverable 8 of European Commission DG TrEn 5th Framework PARTICULATES Project
44. [Environmental Risk Assessment of Artificial Turf Systems](#)  
Kallqvist, T., Norwegian Institute for Water Research: Oslo. p. 1-19, 2005
45. [Potential health and environmental effects linked to artificial turf systems – final report](#)  
Plessner, Thale S.W., Lund, J. Ole, Norwegian Building Research Institute, September 2004
46. [Toxicological Evaluation for the Hazard Assessment of Tire Crumb for Use in Public Playgrounds](#)  
Birkholz, D.A., K.L. Belton, and T.L. Guidotti, J. Air & Waste Management Association, July 2003
47. [Child-Specific Exposure Factors Handbook](#)  
U.S. EPA, National Center for Environmental Assessment–Washington Office, September 2002
48. [Five Year Study of the Water Quality Effects of Tire Shreds Placed Above the Water Table](#)  
Humphrey, D.N. and E.K. Lynn, Department of Civil and Environmental Engineering, University of Maine, March 2001
49. [Emission Characteristics of VOCs from Athletic Tracks](#)  
Chang, F.H., et al., J Hazard Mater, 1999. 70(1-2): p. 1-20
50. [Environmental Impacts of Recycled Rubber in Light-Fill Applications](#)  
Liu, Helen S., et. al., Department of Plastics Engineering, University of Massachusetts Lowell, August 1998