

SYNTHETIC TURF:

The Science Behind the Safety

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PRESENTED BY

Dr. David Black, Ph.D., Forensic Toxicology

Dr. Davis Lee, Ph.D., Synthetic Organic Chemistry

Dr. James Coughlin, Ph. D., Agricultural & Environmental Chemistry

Dr. C. Ralph Buncher, Sc. D., BioStatistics & Epidemiology



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Dr. Davis Lee

Ph.D, Synthetic Organic Chemistry

Academic Background:

- Bachelor's Degree, Chemistry, Georgia College and State University.
- Ph.D., Synthetic Organic Chemistry, Emory University.

Industrial/Professional Experience:

- Dr. Lee has over 25 years of experience in new product and business development. He is currently Principal Consultant with InnovaNet Consulting. He is also Executive in Residence at the Georgia Institute of Technology School of Polymer, Textile, and Fiber Engineering.
- Before working as a consultant for InnovaNet Consulting, he spent time as the Director of R&D and Quality Management at SI Corporation and Propex Fabrics, Inc. where he was responsible for designing, developing and directing new product development.
- He has authored multiple publications and holds several patents and is a member of several professional organizations including:
 - External Advisory Board for the Georgia Tech School of Polymer, Textile, and Fiber Engineering
 - External Advisory Board for the Southern Polytechnic School of Engineering Textile School
 - Carpet Technical Committee of the Consortium for Competitiveness in the Apparel, Carpet, and Textile Industries of Georgia (CCTI)
 - Past member of the Technical Advisory Council of the National Textile Committee
 - Member of the Georgia Traditional Manufacturers Association



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Dr. David Black Ph.D, Forensic Toxicology

Academic Background:

- Bachelor's Degree, Biology, Loyola College.
- Ph..D., Forensic Toxicology (Legal Medicine), University of Maryland School of Medicine

Industrial/Professional Experience:

- Dr. Black is a Diplomate of the American Board of Forensic Toxicology (D-ABFT), Diplomate of the American Board of Clinical Chemistry (D-ABCC) and a Fellow of the American Institute of Chemists (FAIC). He was Toxicology Department Head and Director of Toxicology for Maryland Medical Laboratory, Inc. from 1982-1986. Dr. Black joined Vanderbilt University in 1986 as Assistant Professor with appointments in Pathology and Pharmacology.
- Dr. Black founded Aegis Sciences Corporation where he serves as Chairman, President and CEO. Aegis is a forensic chemical and drug testing laboratory specializing in Zero-Tolerance Drug Testing[®] (proprietary process), employee drug testing, professional and amateur athlete drug testing (Doping Control), pain management compliance testing (PainComp[®]), crime scene evidence analysis, driving under the influence of drugs and alcohol, post-mortem evaluations (CRIMES[®]) and expert witness consulting and testimony services (FACTS[®]).
- Dr. Black is holds numerous licensures and certification in addition to being a member of many distinguished associations including:
 - Tennessee State License Medical Director-Chemistry
 - American Board of Bioanalysts Clinical Laboratory Director
 - Diplomat, American Board of Forensic Toxicology
 - Fellow, American Institute of Chemists, December 1985 – Present
 - Fellow, American Institute of Chemists
 - Member, American Chemical Society
 - Member, American Association for Clinical Chemistry
 - Member, The American Academy of Forensic Sciences
 - Member, The International Association of Forensic Toxicologists



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Dr. James Coughlin

Ph. D. Agricultural and Environmental Chemistry

Academic Background:

- Bachelor's Degree, Chemistry, Siena College, Loudonville, New York.
- Master's Degree, Food Science and Technology, University of California, Davis.
- Ph.D., Agricultural and Environmental Chemistry, University of California, Davis.
- Postdoctoral Fellowship, Environmental Toxicology, University of California, Davis.

Industrial/Professional Experience:

- Dr. Coughlin has over 30 years experience in food/nutrition science and regulatory affairs; food, chemical and environmental toxicology and safety; chemical risk assessment; GRAS safety evaluations; and scientific risk communications. He provides strategic scientific, toxicologic, nutritional, communications and regulatory counsel to many food, functional food, dietary supplement, chemical, and consumer products companies and their trade associations, law firms and public relations firms.
- Before undertaking his current role as an independent consultant in 1991, he spent ten years at General Foods Corp. and Kraft General Foods Inc. managing external toxicology, safety and regulatory affairs, including several years as Director of International Scientific Relations. Health and regulatory issues surrounding coffee/caffeine, processed meats and beverages, food additives/contaminants and environmental toxicants were among his areas of expertise.
- He has been elected three times as Chair of the Toxicology and Safety Evaluation Division of the Institute of Food Technologists (serving again this year) and helped establish the IFT's International Division. He has been serving for six years on the IFT Expert Panel assisting the FDA in assessing food bioterrorism defense and is also the IFT's Codex Alimentarius Subject Expert on food contaminants.
- Dr. Coughlin has also served as Vice President of the International Society for Trace Element Research in Humans, an organization focused on both essential and toxic elements, with particular emphasis on guiding a 12-year scientific effort on boron's nutritional essentiality and on risk assessment of essential trace elements.

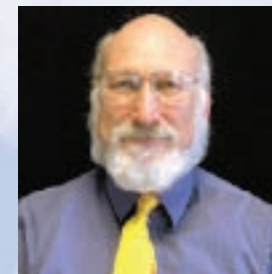


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Dr. C. Ralph Buncher Sc.D., BioStatistics and Epidemiology



Academic Background:

- Bachelor's Degree, Mathematics, Massachusetts Institute of Technology.
- Master's Degree, Biostatistics and Epidemiology, Harvard University.
- Sc.D., Biostatistics and Epidemiology, Harvard University.

Industrial/Professional Experience:

- Dr. Buncher's research covers many aspects of biostatistics and epidemiology. This includes the subareas of these fields related to environmental and occupational studies such as the effects of exposure to lead, clinical trials especially of pharmaceutical products, evaluating imaging systems, cancer studies especially with relation to Cincinnati and Ohio, and studies of the effects of radiation.
- Since 1973, Dr. Buncher has been a professor of biostatistics and epidemiology at the University of Cincinnati. From 1973-1996, he was Director of the Division of Biostatistics and Epidemiology at the University of Cincinnati Medical Center.
- He has received numerous awards and honors for his work, including:
 - Tau Beta Pi (Engineering Honorary)
 - Delta Omega (Public Health Honorary)
 - University wide A. B. (Dolly) Cohen Award for Excellence in Teaching 1988
 - Fellow, American Statistical Association
 - Fellow, American College of Epidemiology
 - Richard Akesson Excellence in Graduate Teaching Award (Col of Medicine, 2003)



Scientific References:

- Federal Agencies
- Testing Laboratories and Consultants
- Peer-Reviewed Scientific Literature



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Seven Conclusions

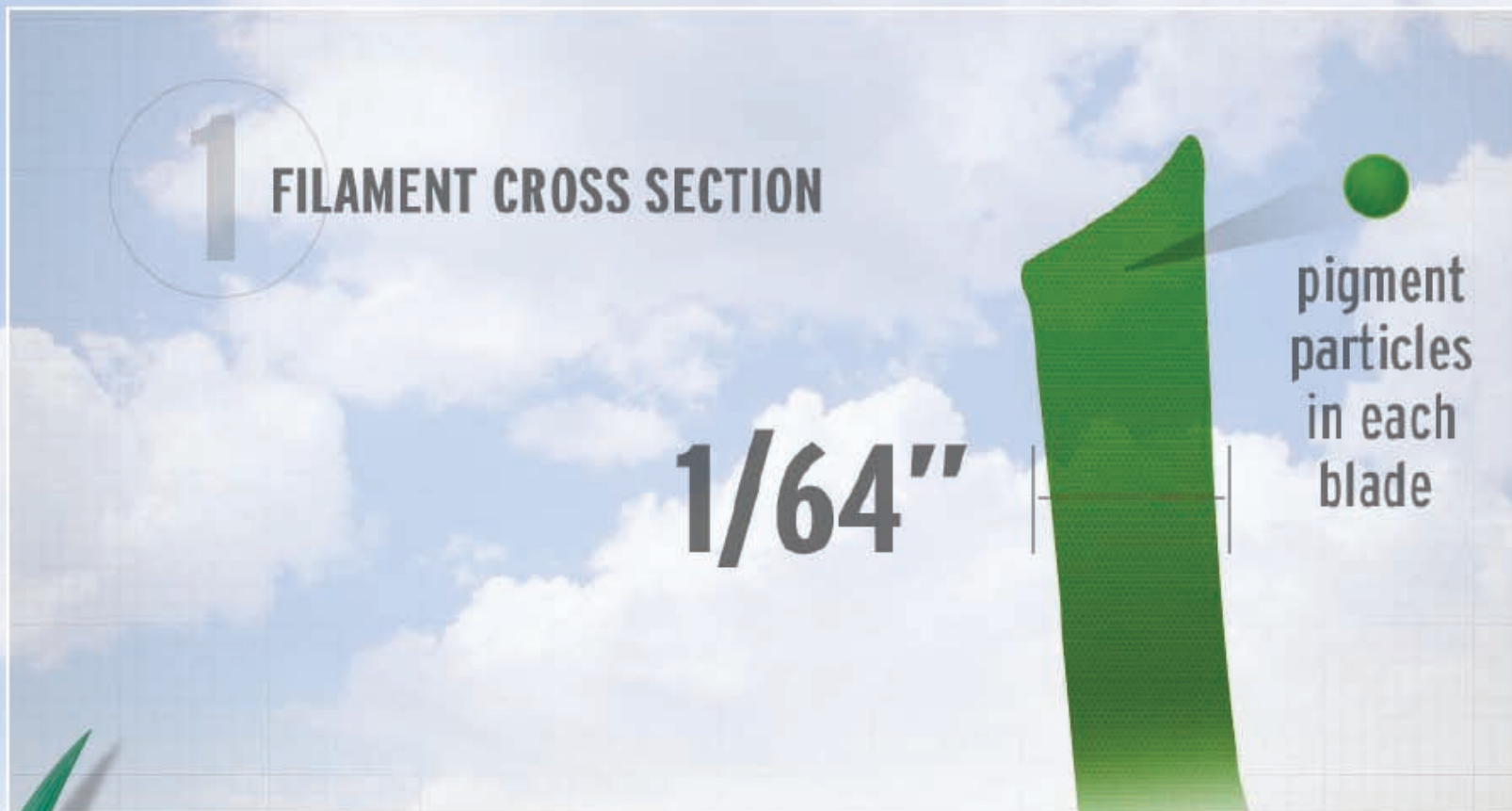
1. CDC Lead Prevention Program identifies no risk from Synthetic Turf.
2. Lead does not leach from synthetic turf.
3. Bioavailability of lead from pigment is extremely low.
4. Lead from dust at Ironbound is not an inhalation hazard.
5. Ironbound children with regular exposure test normal for lead.
6. Worker exposed to turf and particles for 30 years tests normal.
7. Even assuming 50% bioavailability, the amount of ingested turf required to pose a risk is absurdly unrealistic.



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Golf Greens
by ForeverLawn

2 THE PIGMENT PARTICLE

Each particle - which is 1/32,000 of an inch - is chemically sealed to encapsulate the pigment.

1/32,000
of an inch



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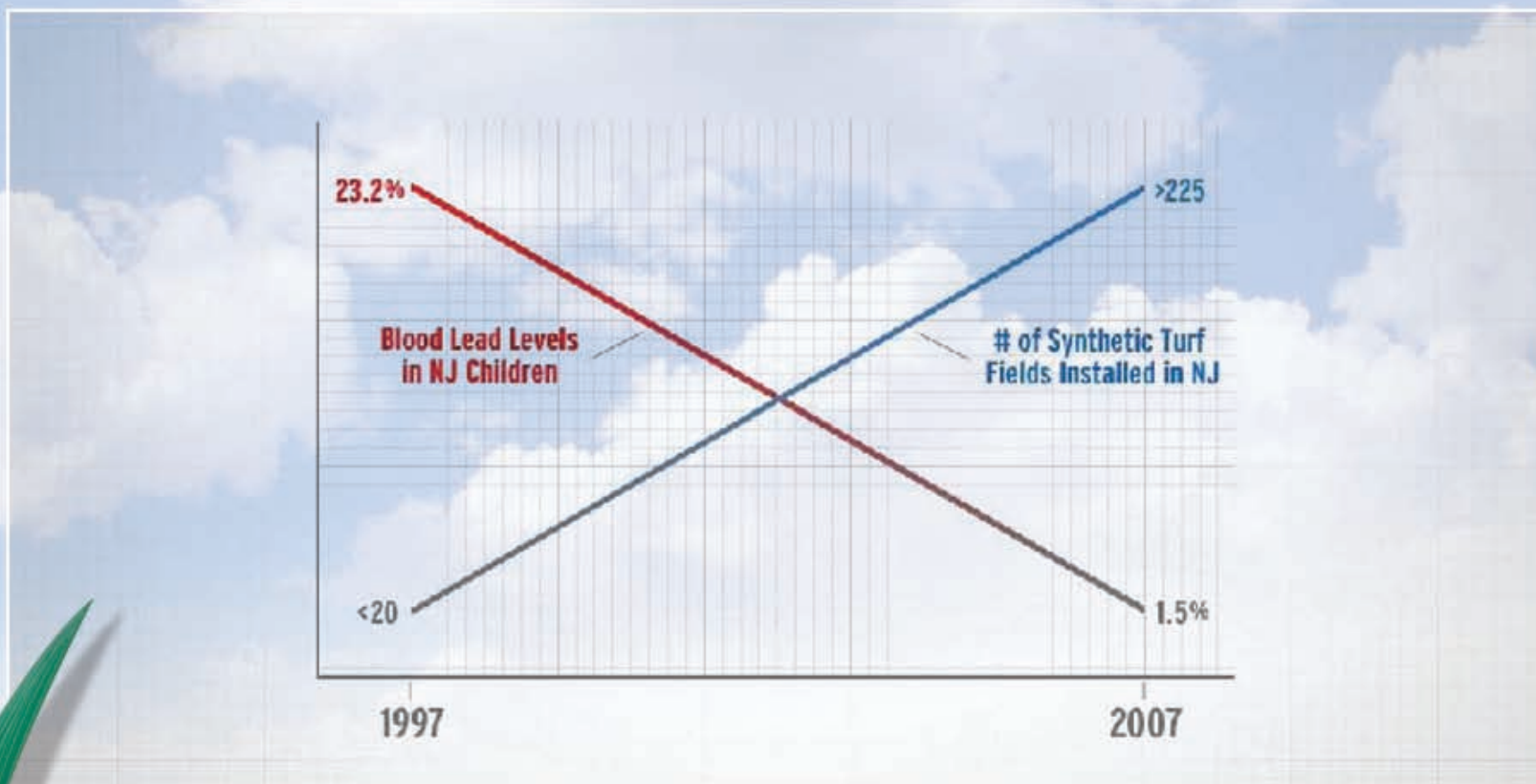


1) CDC Lead Prevention Program identifies no risk from Synthetic Turf

- Ten-year investigation ('97-'06) of 763,216 childhood exposures to lead identified no risks from synthetic turf.
- Of the nearly 40,000 cases of high blood lead concentrations in children reported in 2006, none are attributed to exposure to synthetic turf.
- In 2006, an average of 1.21% of children tested in 48 states had elevated blood lead levels. Among the four states with the greatest density of synthetic turf, all were below the national average with the exception of New Jersey (1.52%).
- During the 10-year investigation, while the number of synthetic fields installed in New Jersey increased over 1000%, the blood lead levels in children tested fell from 23.22% to 1.52%.

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No Correlation between Lead Levels in NJ Children & Synthetic Turf

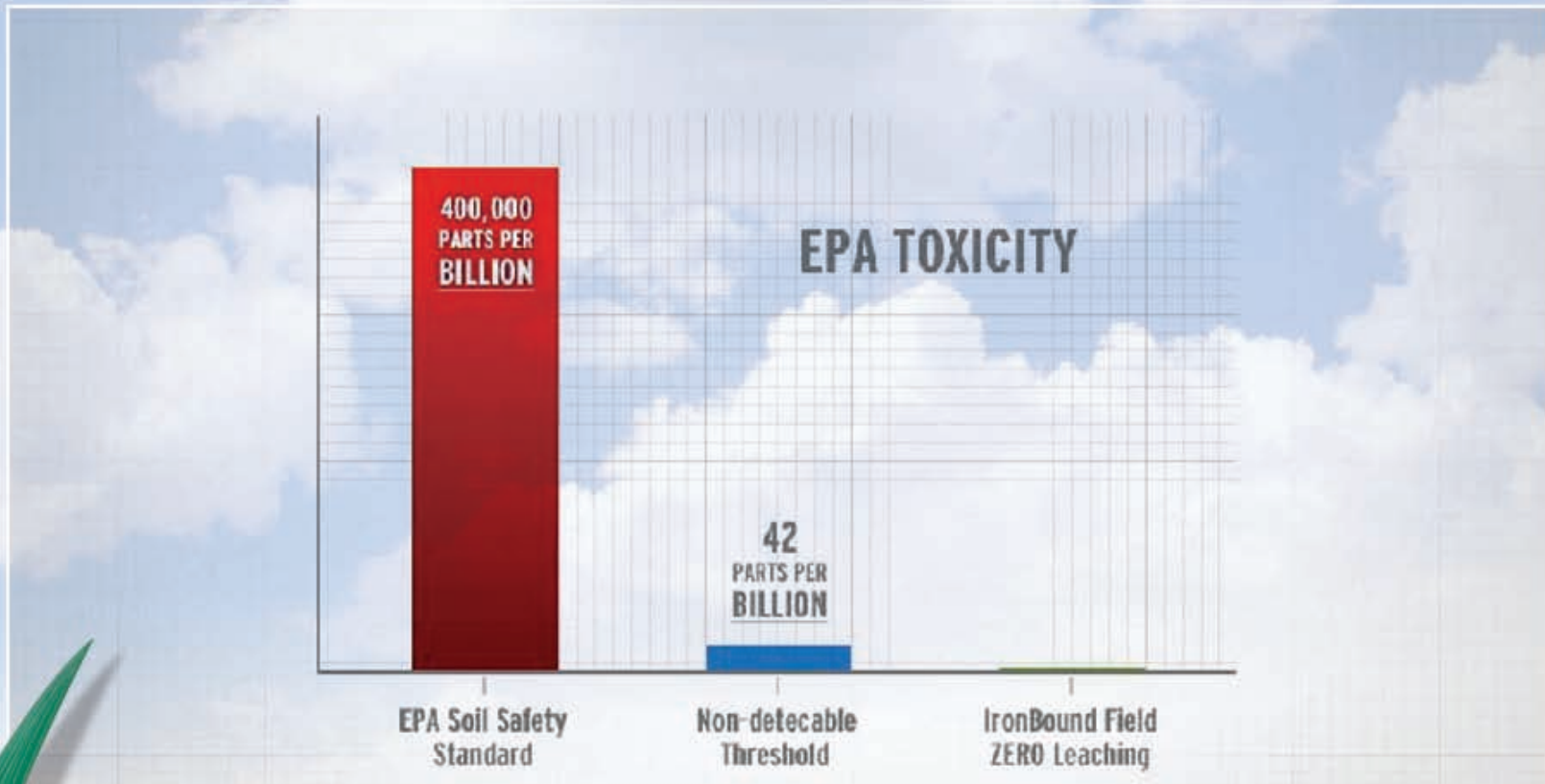


2) Lead does not leach from synthetic turf

- Tests from three different, independent labs using EPA-approved testing protocols have shown that lead chromate does not leach from synthetic turf. Two of these tests were from the old Ironbound turf
- Tests used the EPA Toxicity Characteristic Leaching Procedure.
- The City of Newark conducted one of the tests.
- Testing does not detect lead below 42 parts per billion (ppb). EPA Soil Safety Standard is 400,000 ppb.
- All tests confirmed that lead does not leach from the fibers.

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Lead Does Not Leach from Synthetic Turf Fibers



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3) Bioavailability of lead from pigment is extremely low

- The potential for hazard is determined by several factors, including bioavailability, the proportion of a chemical that is actually absorbed.
- In nylon synthetic turf, pigment particles (lead chromate) are encapsulated to improve performance characteristics and reduce toxicity.
- Tests on laboratory rats fed encapsulated lead chromate showed low blood lead levels similar to the negative control group that was fed baby powder. The positive control group that was fed unencapsulated lead chromate understandably showed much higher lead levels.
- The conclusion is that encapsulated pigment by itself does not represent a risk because of its low bioavailability. This encapsulation, combined with a second encapsulation within the extruded nylon, provides adequate protection to render synthetic turf extremely safe.

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4) Lead from dust at Ironbound is not an inhalation hazard

- The City of Newark hired a hazard assessment firm to evaluate risk from inhalation of dust.
- Workers wore inhalation masks to gather airborne particulate; contents analyzed for lead.
- The process occurred during removal of the field, creating a worst-case scenario for dust.
- Upon inspection, the site was deemed a 'non-hazardous worksite' under OSHA guidelines and workers were informed that no special protective clothing was needed to complete the field removal.
- In conclusion, no lead was detected.

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5) Children with ongoing exposure to the Ironbound field tested normal for lead

- The City of Newark made blood lead testing available to children who played on the field.
- According to State of New Jersey Deputy Commissioner and State Epidemiologist Dr. Eddy Bresnitz, results concluded that the children had blood lead levels equal to or less than those tested in other areas of New Jersey who had not been exposed to other synthetic turf fields.
- Therefore, the Ironbound field did not result in elevated lead levels in the children from the Ironbound neighborhood.

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6) Worker exposed to turf and particles for 30+ years tests normal

- Joyce Eason, a 34-year veteran of synthetic turf factories – who has spent her career working in a factory environment operating and managing a nylon knitting machine - and who worked daily with turf and turf particles, was tested for lead in April 2008.
- Joyce has worked 10 hours per day, 5 days per week since 1974 constantly handling and cutting nylon fibers and knitted nylon, and thus being exposed to particulate matter.
- Joyce's blood lead level registered at 1, a nearly non-detectable level especially when measured against the maximum allowable limit for children of 10.
- Joyce is living proof that daily contact - even over an extended period of time - with nylon fibers is safe.

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7) Amount of ingested turf required to pose a risk is absurdly unrealistic

- The voluntary minimum standard used by the U.S. toy industry for migratory lead (dose) is 90 parts per million (ppm). U.S. government caps the lead limit for paint on children's toys at 600 ppm.
- Based on the concentration of lead in lead chromate and assuming 50% bioavailability, a 50-pound child would have to ingest 10.8 square feet of synthetic turf to get a 90 ppm dose of lead. The same child would have to ingest 71.1 square feet of turf to get a 600 ppm dose, the U.S. federal limit.

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Seven Conclusions

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“The available science clearly supports the safety of synthetic turf, including old and new, and nylon and polyethylene fibers”.



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