



*of the Anacostia  
River*

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May 13, 2011

Dear Chairman Berliner and members of the Transportation, Infrastructure, Energy and Environment Committee:

Thank you for requesting a comparison of the health, environmental, and fiscal impacts of natural versus artificial turf athletic playing fields in Montgomery County. I am writing at the direction of the Board of Directors of the Neighbors of the Northwest Branch, a citizen-based nonprofit watershed protection group dedicated to restoring the health of the Northwest Branch. Because we are a citizen group, however, our interest extends beyond runoff into the Northwest Branch. We are also concerned for the health of our children who play on the athletic fields Montgomery County and for the wise use of our tax dollars. These comments have been approved by our Board of Directors.

The background section of the report in which the numbers and types of fields in the county are listed is helpful. However, the remainder of the report does not seem to us to be the fair comparison you requested. The report appears to be written from the point of view of justifying artificial turf. We strongly urge that you not rely on the recommendations of this report for your decisions about how to spend scarce county revenues on athletic fields because the report leaves too many questions unaddressed and unanswered.

The Health and Environmental Impacts sections are sadly inadequate. The absence of active participation on the part of the departments of Health and Human Services (DHHS) and Environmental Protection may have contributed to this deficiency.<sup>1</sup> However, members of the public did send the work group published study reports on health and environmental impacts of the materials used in synthetic fields, none of which appear to have been considered.

Below are some of the many important questions yet unaddressed and unanswered.

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<sup>1</sup> In its statement submitted for this report, DHHS indicated that a meta-analysis by an entity with proven topic expertise and track record “would be the recommended approach by DHHS to determine the level of health risk posed by each material type,” whereas this report was “limited to ... materials...easily accessible to the group” (p. 30).

## On health comparison:

- **What are the impacts on the brain, nervous system, and lungs of breathing nanoparticles and nanotubes from the carbon black that constitutes from 30 to 68% of tires by weight?** None of the studies cited in this report addressed carbon black, which is linked to brain and lung damage. (See appended studies page.) The natural nanoparticles comprising carbon black are so small they can pass through to the brain. In addition, engineered nanotubes now added to strengthen tires may act in the body like the asbestos fibers they resemble. Pulverizing tires makes the nanoparticles all the more accessible, as indicated by the black that often coats players. Children, whose bodies are rapidly forming from the materials they take in, are already exposed to vehicle exhaust and tire dust. Playing on tire crumbs adds to their exposure. Further, no study has yet examined personal (as opposed to ambient) exposure to ultrafine particles on these fields.
- **What are the interactive health effects of ingesting/inhaling the soup of contaminants, which include known carcinogens, endocrine disruptors, metals, and volatile organic compounds?** The cited studies address only some of the many toxins and address them individually, not in combination. As explained by the President's Cancer Panel, chemicals may be even more dangerous together than separately.<sup>2</sup> If the safety of these combinations is not known, why would we expose our children to them?
- **Since Field Turf itself does not know what is in its fields--it is suing its manufacturer over defective plastic of unknown composition right now--how can we be sure that the fields it has installed do not contain lead or other toxins in the plastic blades?**<sup>3</sup> No Material Safety Data Sheets are even included in the report, despite a request by a group of citizens. These are essential for any product to which children are exposed.
- **Is it reasonable to expect that coaches, expecting to field their team regardless of the weather—the major selling point for artificial turf—will voluntarily cancel because the field is very hot?** Experience has shown they do not.<sup>4</sup> The report cites temperature as high as 200 degrees on a Brigham Young University synthetic field (p. 37); we have measured 160 degrees on the Blair field with air temperature in the 80s. Even putting guidelines into the permit (p. 40) regarding extreme heat on the fields may not protect the players from heat-related illness or death, or the county from lawsuits.<sup>5</sup>

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<sup>2</sup> President's Cancer Panel, 2008–2009 Annual Report, p. 2.

[http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP\\_Report\\_08-09\\_508.pdf](http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf)

<sup>3</sup> “The suit alleges defects in products that for the most part were supplied to FieldTurf by a company, Mattex Leisure Industries (Dubai), during several years before TenCate acquired certain assets of the Mattex business in early 2007.” Reuters, Hugin Press release, April 4, 2011. <http://finance.bnet.com/bnet/news/read?GUID=18067975>.

<sup>4</sup> “How long until someone dies of heatstroke on a synthetic turf field?” by Chris Hummer, 8/31/2010. <http://www.potomacsoccerwire.com/news/5322/12633>.

<sup>5</sup> Rick Doyle, President of the Synthetic Turf Council, recommends: “Just as coaches have to reschedule games due to rain when they play on grass fields, so too they need to reschedule or consider an alternative surface to play on when it's hot and sunny.” <http://www.npr.org/templates/story/story.php?storyId=93364750>.

### On environmental comparison:

- **Where are the environmental benefits of grass on healthy soil shown?** These include oxygen production, cooling, and water infiltration. These benefits are most certainly part of the equation. On the other side of the scale are two-acre plots that have no life and *increase the heat island effect* we are trying so hard to decrease. The validity of the argument that the additional heat is relatively small (p. 45) decreases as the number of synthetic turf fields increases.
- **Why was the runoff from our existing fields not tested for zinc,** present at high concentration in tires, shown to readily leach out, and widely recognized as toxic to soil organisms, plants, and aquatic life? The cost figure of between one and four thousand dollars seems excessively high for simply testing leachate from our installed fields. A simple test such as the one designed by grade schooler Claire Dworsky (see references) could be used. Results would be applicable only to the fields tested, but that is what we need. Dilution is not the solution to pollution because wherever the zinc goes, in soil or water, it can accumulate and cause damage.
- **Why mention TMDLs?** The statement (p. 43) that artificial turf should not affect TMDLs is irrelevant since we have no TMDL for zinc at this time. Europe, however, does have standards for zinc in tire crumb used for athletic fields. (See references below.)
- **When the county is encouraging conservation landscaping on private land**—replacing lawn with native ground covers, shrubs, and trees, reducing or eliminating synthetic fertilizer, herbicides, and pesticides—it is ironic that the highly successful and heavily used organically maintained athletic fields in Branford, CT, and at St. Mary’s College in southern Maryland are summarily dismissed for want of hourly usage logs. We question whether looking only at “stadium” fields, which are fenced as defined in this report, is appropriate. High use unfenced fields such as in Branford and at St. Mary’s College could perform even better if usage were as tightly controlled as it is here.

### On cost comparison:

- **Will Field Turf apply a *third* carpet to the original base,** or will the base need to be renovated before a warranty will be issued? Such renovation to the underlying rocks, which we understand is the industry standard, would raise the 20-year cost considerably (cost tables, pp. 27-28).
- **Why are only positive aspects of sand base fields listed, and only negative attributes of native soil fields?** Could this be so that the “good” grass alternative can be more easily shot down on account of price? Why was an amended soil field not considered? From consultation with organic turf grass growers, an amended native soil field aerated 5 or 6 times annually and renewed with compost is more durable and less expensive than a sand base field.

- **Based on costs elsewhere and expert consultation, we believe the cost estimates for maintenance of synthetic turf are too low and those for natural turf are too high.** We also question the number of billable hours for synthetic turf fields on which the cost comparison is built and request inclusion in the report of hourly documentation of use and revenue obtained from the existing artificial turf fields. With these data in hand, experts in field installation and management can effectively evaluate the assumptions.

**In conclusion,** we find that the draft “Review of Benefits and Issues Associated with Natural and Artificial Turf Rectangular Stadium Field,” while certainly representing quite of bit of work, does not provide the comparison information you need and requested in order to make a fully informed decision about whether to install more artificial fields or good natural grass fields.

We ask that our comments be made part of the public record and expect to submit additional comments as the process unfolds.

Sincerely,



Anne Ambler, Outreach Chair

cc: TurfReportResponse@yahoo.com

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## **Selected References Relevant to the Health and Environment Questions Posed by the Neighbors of the Northwest Branch**

### **On Carbon Black, Nanoparticles, and Nanotubes:**

Carbon Black (CB) is a manufactured form of soot used as filler in rubber compounds, primarily in automobile tires. **Nanoparticles in tires may take the form of natural or engineered nanoparticles.** The largest potential source of natural nanoparticles in tires is carbon black. Carbon black is one of the two main components of tires and tire crumb infill (30-68% by weight according to manufacturers) for artificial turf. Engineered nanoparticles vary by type, but it is known that carbon nanotubes are also being added to tires.

- Carbon Black has been listed by The American Cancer Society and three Federal agencies as a potential cause of cancer that needs further investigation.  
<http://www.reuters.com/article/idUSTRE66E5AS20100715?feedType=RSS&feedName=topNews>

- Various studies reported in Environmental Health Perspectives on carbon black and nanoparticles can be found at [http://www.google.com/search?q=Environmental+health+perspectives+carbon+black&sourceid=ie7&rls=com.microsoft:en-US&ie=utf8&oe=utf8&rlz=1I7GGIE\\_en](http://www.google.com/search?q=Environmental+health+perspectives+carbon+black&sourceid=ie7&rls=com.microsoft:en-US&ie=utf8&oe=utf8&rlz=1I7GGIE_en)
- Nanosafety consortium- carbon black toxicology articles <http://www.nanosafetyconsortium.com/invivotoxbibliography.html>

### Carbon Black and the Brain

- “Association of Black Carbon with Cognition among Children in a Prospective Birth Cohort Study,” Am. J. Epidemiol. (2008) 167 (3): 280-286. HARVARD SCHOOL OF PUBLIC HEALTH <http://aje.oxfordjournals.org/content/167/3/280.full>

"While studies show that ultrafine and fine particles can be translocated from the lungs to the central nervous system, the possible neurodegenerative effect of air pollution remains largely unexplored. The authors examined the relation between black carbon, a marker for traffic particles, and cognition among 202 Boston, Massachusetts, children...In summary, this is the first study to have found a consistent relation between exposure to black carbon and reduced neurocognitive functioning across a number of domains in urban, community-dwelling school-aged children. More studies are needed to explore the potentially neurotoxic effects of particulate matter, both to determine the possible impact on cognitive development among children and cognitive decline across the life cycle and to determine the potential contribution of air pollutants to the development and exacerbation of neurodegenerative diseases (i.e., Parkinson's disease, Alzheimer's disease)."

- “Destination Brain: Inhaled Pollutants May Inflamm More than the Lungs,” Janet Raloff, Science News 177(11):16-20 (22 May 2010). Work in both dogs and humans: <http://onlinelibrary.wiley.com/doi/10.1002/scin.5591771120/abstract> <http://dukeandthedoctor.com/2010/01/air-pollution-may-damage-brain-heart/>

### Carbon Black and Lungs

- Final Report: Comparison of the Carcinogenicity of Diesel Exhaust and Carbon Black in Rat Lungs, EPA Grant Number: R828112C068I [http://cfpub.epa.gov/ncer\\_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/2339/report/F](http://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract/2339/report/F) .

EPA Summary: "The results of this carefully conducted study demonstrate that prolonged exposure to diesel engine exhaust and carbon black particles produces nearly identical carcinogenic and noncarcinogenic effects in this strain of rats. No significant differences were noted between the two exposure materials in the resulting incidence, number, or types of lung tumors. These results may be considered surprising because, compared with diesel soot, the carbon black particles were relatively free of mutagenic organic compounds. Both exposures

caused injury to lung tissue, including inflammation, cell proliferation, and fibrosis. These lesions progressed in number and size as the dose of particles increased. At both exposure concentrations, diesel soot and carbon black accumulated in the rat lungs and, after three months of exposure, normal particle clearance mechanisms were impaired."

### Carbon Black, Chromosomes, and Aging

- "Annual Ambient Black Carbon Associated with Shorter Telomeres in Elderly Men: Veterans Affairs Normative Aging Study," Environ Health Perspectives 118:1564-1570. <http://ehp03.niehs.nih.gov/article/fetchArticle.action?articleURI=info%3Adoi%2F10.1289%2Fehp.0901831>

"Conclusions: Telomere attrition, linked to biological aging, is associated with long-term exposures to airborne particles, particularly those rich in carbon black and may contribute to the cardiotoxic effects."

### Nanoparticles and Engineered Nanotubes

- "Study Says Carbon Nanotubes as Dangerous as Asbestos: New research shows that long, needle-thin carbon nanotubes [now added to tires to increase strength] could lead to lung cancer," By Larry Greenemeier | Tuesday, May 20, 2008, <http://www.scientificamerican.com/article.cfm?id=carbon-nanotube-danger>

"Inhaling carbon nanotubes could be as harmful as breathing in asbestos, and its use should be regulated lest it lead to the same cancer and breathing problems that prompted a ban on the use of asbestos as insulation in buildings, according a study in Nature Nanotechnology.

During the study, led by the Queen's Medical Research Institute at the University of Edinburgh/MRC Center for Inflammation Research (CIR) in Scotland, scientists observed that long, thin carbon nanotubes look and behave like asbestos fibers, which have been shown to cause mesothelioma, a deadly cancer of the membrane lining the body's internal organs (in particular the lungs) that can take 30 to 40 years to appear following exposure. ... The researchers reached their conclusions after they exposed lab mice to needle-thin nanotubes: The inside lining of the animals' body cavities became inflamed and formed lesions."

- Interview with Dr. Peter Gehr, the tissue effects of nanoparticles. <http://www.bafu.admin.ch/dokumentation/umwelt/10649/10659/index.html?lang=en>

"Summary: Synthetic nanoparticles can penetrate tissue and cells, and spread throughout the body - even to the brain. Professor Peter Gehr of the University of Bern, an internationally renowned tissue specialist, is astonished that potential health risks are barely acknowledged outside the scientific world and government agencies."

- "Toxic Potential of Materials at the Nanolevel", Science 3 February 2006: Vol. 311 no. 5761 pp. 622-627. Authors: Andre Nel,<sup>1,2\*</sup> Tian Xia,<sup>1</sup> Lutz Mädler,<sup>3</sup> Ning Li<sup>1</sup>.

<http://www.sciencemag.org/cgi/content/full/311/5761/622?ijkey=2eB0nrqZwskKs&key>  
(need to be a member to access)

“Engineered nanomaterials (NM) are already being used in sporting goods, tires.....It is possible that the release of nanotubes from an intended commercial use products such as car tires could become airborne.....Nanomaterials are engineered structures with at least one dimension of 100 nanometers or less. .... Possible undesirable results of these capabilities are harmful interactions with biological systems and the environment, with the potential to generate toxicity.”

- [http://wn.com/Nanoparticles\\_Linked\\_to\\_Deaths\\_at\\_Chinese\\_Factory](http://wn.com/Nanoparticles_Linked_to_Deaths_at_Chinese_Factory). Nanoparticles manufactured in certain paints and tires led to deaths of 7 Chinese workers when nanoparticles entered their lungs.

### On Leachate (Zinc and other toxins):

- “Runoff Water from Grass and Artificial Turf Soccer Fields,” poster presented by Claire Dworsky and Adina Payton at the 2009 American Geophysical Union meeting.  
<http://dig.abclocal.go.com/kgo/PDF/2009%20AGU%20Poster%20-20Claire%20Dworsky-final.pdf>

“Synthetic turf water samples had zinc levels of 1000s of ppb and copper levels typically above 20ppb. These samples always exceeded the Monterey Bay Basin Plan Water Quality Objective for copper (< 30 ppb) and zinc (<200 ppb) and at times the EPA drinking water levels as well. Cadmium and cobalt were also higher in the artificial turf runoff than in grass runoff and levels exceed runoff targets in some samples but not all. Within 24 hours about 80% of the *Daphnia* died in synthetic turf water; within 36 hours all of the turf-exposed *Daphnia* were dead. The *Daphnia* in the grass field runoff and the spring water all lived over 36 hours.”

- From the Plastics industry website under the heading: Banning of harmful chemicals will play an important role in the plastic industry.  
<http://www.plastemart.com/upload/Literature/Banning-harmful-chemicals-play-important-role-in%C2%AC-plastic-industry.asp>.

“In 1995, zinc and zinc derivatives were included in a priority list of rubber chemicals compiled by the Swedish Environmental Protection Agency, which should be replaced or used restrictively. In 1995, zinc and zinc oxide were placed on the second European list of priority substances in the EU Risk Assessment Programme.

In June 2002 the German Standard DIN 18035-7 "Sports Grounds, Part 7" "Artificial Turf Areas" was published. According to this standard, two leaching tests are required for post-consumer tyre rubber granulates used as infill material for artificial turf and the following limits are set in leachates:

- 0.5 mg/l after leaching with deionized water (DIN 38414-4)
- 3 mg/l after leaching with water saturated with CO<sub>2</sub>

Between 1998 and 2004, draft Assessments were produced and responses put forward by the zinc chemical and rubber industries. Since 29 April 2004 (see Council Directive 2004/73/EC, relating to the classification, packaging and labelling of dangerous substances) zinc oxide is officially classified as "Dangerous for the Environment" with the risk phrase "Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment", and with the safety advice "This material and its container must be disposed of as hazardous waste" and "Avoid release to the environment. Refer to special safety instructions/safety data sheets". Rubber compounds containing more than 2,5 % in total of zinc chemicals or other chemicals classified as R50/63 (such as IPPD) are classified as "Toxic to aquatic organisms, may cause long-term effects in the aquatic environment".

## **A Final Word**

- The Coastal Marine Resource Center Policy Project: The Effects of Crumb Rubber on Water Quality, September, 2008. [http://www.synturf.org/images/Crumb\\_Rubber\\_Final.pdf](http://www.synturf.org/images/Crumb_Rubber_Final.pdf)

“Conclusion: The quandary that this situation poses is such that on the one hand, crumb-rubber is a means for using some of the many waste tires crowding our landfills. However, if and when synthetic fields are retired and the crumb rubber is disposed of, the synthetic fields will have served as a temporary stopover for used tires in crumb form, eventually destined for landfills. Crumb rubber is not a solution to tire waste if the outcome leads to a degraded environment.”