

Date: October 29, 2008

To: Honorable Minneapolis City Council Member Scott Benson
From: Public Health Advisory Committee (PHAC)
RE: Recommendation on Use of Crumb Rubber Applications

With the assistance of local environmental health and landscape architect professionals, PHAC members reviewed four applications of rubber products utilized within Minneapolis parks and playgrounds. It is important to note that these products do not have the same origin, same formulation (i.e. solid form, chipped, painted, etc.), nor exposure to hazards.

They include:

- Rubber chips
- Poured in place recycled crumb rubber
- Rubber molded tiles/rubber mats
- Crumb rubber/Field Turf product

Potential health and safety considerations to consider/explore specific to each product include:

- heat stress
- injury
- infection
- latex allergy
- chemical exposure (indoor vs. outdoor use)

After a series of discussions, PHAC members have developed three key recommendations regarding future use of these rubber products in Minneapolis:

- 1) PHAC recommends monitoring related research and studies as they become available.
- 2) PHAC recommends application of the **precautionary principle**¹ before utilizing additional rubber product in Minneapolis parks and playgrounds.
 - The precautionary principle is a tool for policy- and decision-making designed to ensure that people or entities bear political responsibility for taking action to prevent damage to health and ecosystems in the face of uncertain scientific information about health and ecosystem risks.
 - Application of the precautionary principle is especially appropriate for the protection of children's health because:
 - the science underlying the impacts of environmental stressors on children (from the stage of the fetus to the age of 18) is more complex, less researched and less understood than that of such impacts on adults;
 - the likelihood of serious harm to children from such impacts can be greater than for adults because of their different and changing stages of biological development, their behavior and their greater exposure in relation to body weight;
 - children are involuntarily exposed to a greater proportion of the risks caused by society's activities than adults, yet they have less power to avoid them;
 - the risks and the benefits of avoided risks have more time to impact on children and society than on adults;
- 3) PHAC recommends entities considering the use of rubber products in parks and playgrounds seek/investigate alternative products which may be safer for children (i.e. flexsand, corn husk, cork, etc.)

¹ Dealing with uncertainty – how can the precautionary principle help protect the future of our children? World Health Organization Europe. Fourth Ministerial Conference on Environment and Health. Budapest, Hungary, June 2004.

Date: December 11, 2008

To: Honorable Minneapolis City Council Member Scott Benson

From: Citizen's Environmental Advisory Committee (CEAC)

RE: Recommendation on Use of Crumb Rubber Applications

Based on the information provided in this memo, members of CEAC recommend:

- 1) The City Council support 2008 Kahn/Wagenius legislation studying the potential health risks of crumb rubber use as infill for turf and on playgrounds and urges such legislation include a comparative analysis of alternatives,
- 2) Before the City Council approves use of crumb rubber or other artificial turf applications, an applicant must demonstrate its environmental and health safety as compared to the alternatives,
- 3) The City Council consider developing an ordinance addressing appropriate applications citywide once the studies have been completed and the Public Health Advisory Committee has reviewed them, and
- 4) The City should evaluate existing applications of crumb rubber with in the City, including children's exposure.

At your request, we reviewed concerns raised by state agencies, public health officials and environmental groups about potential adverse health and environmental effects that may result from the use of crumb rubber in synthetic turf, used on high school athletic fields, and as crumb rubber on playgrounds. We reviewed readily available literature and determined there is adequate support for concerns raised about health risks to children exposed to recycled tire crumb. However, much of the literature also concluded that there is insufficient data to establish if those concerns can be validated.

The concerns raised relate to use of a loose, crumbled product made from used tires and incorporated in synthetic turf as well as crumb rubber placed in playgrounds. Synthetic turf is made in layers of synthetic materials including green plastic blades that are attached to a backing and small particles called fill, often referred to as crumb rubber, that secure the blades. Children playing on tire crumb in play grounds under outdoor play structures as an alternative to sand or wood chips could potentially be exposed to toxic substances.

Health concerns are generally focused on crumb rubber because it is made from recycled tires containing chemicals that can cause cancer and other health problems if exposure occurs. There are three possible ways that children might be exposed: Accidentally ingesting small amounts of material from residue left on hands after playing on the fields,

breathing in dust and/or direct skin contact with the crumb rubber. Stormwater runoff is also a concern. As runoff from the now impervious surface is directed towards storm water systems, these chemicals could end up in surface water resources and cause adverse potential effects to aquatic wildlife.

Other issues of concern raised by the Sierra Club and others include additional health concerns: the need to water the synthetic turf because it gets so hot in the summer, enough to cause burns, water quality: potential environmental impacts of artificial turf located near rivers, lakes and aquifers from storm water systems or as ground water seepage and global warming: replacing living surfaces with non-living surfaces makes cities warmer than rural areas. Synthetic turf has been well documented to become significantly hotter than natural grass and even asphalt.

Thank you for taking the time to carefully consider the issues associated with the potential health and environmental effects related to the use of crumb rubber. Some available literature is informative about potential dangers and other literature suggested that the risk associated with the use of crumb rubber was very low; therefore, we believe the previously stated recommendations are appropriate.



MINNEAPOLIS
PUBLIC SCHOOLS

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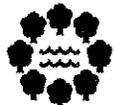
Facilities Department
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Minneapolis Public Schools Playground Mulch Summary and Projected Cost

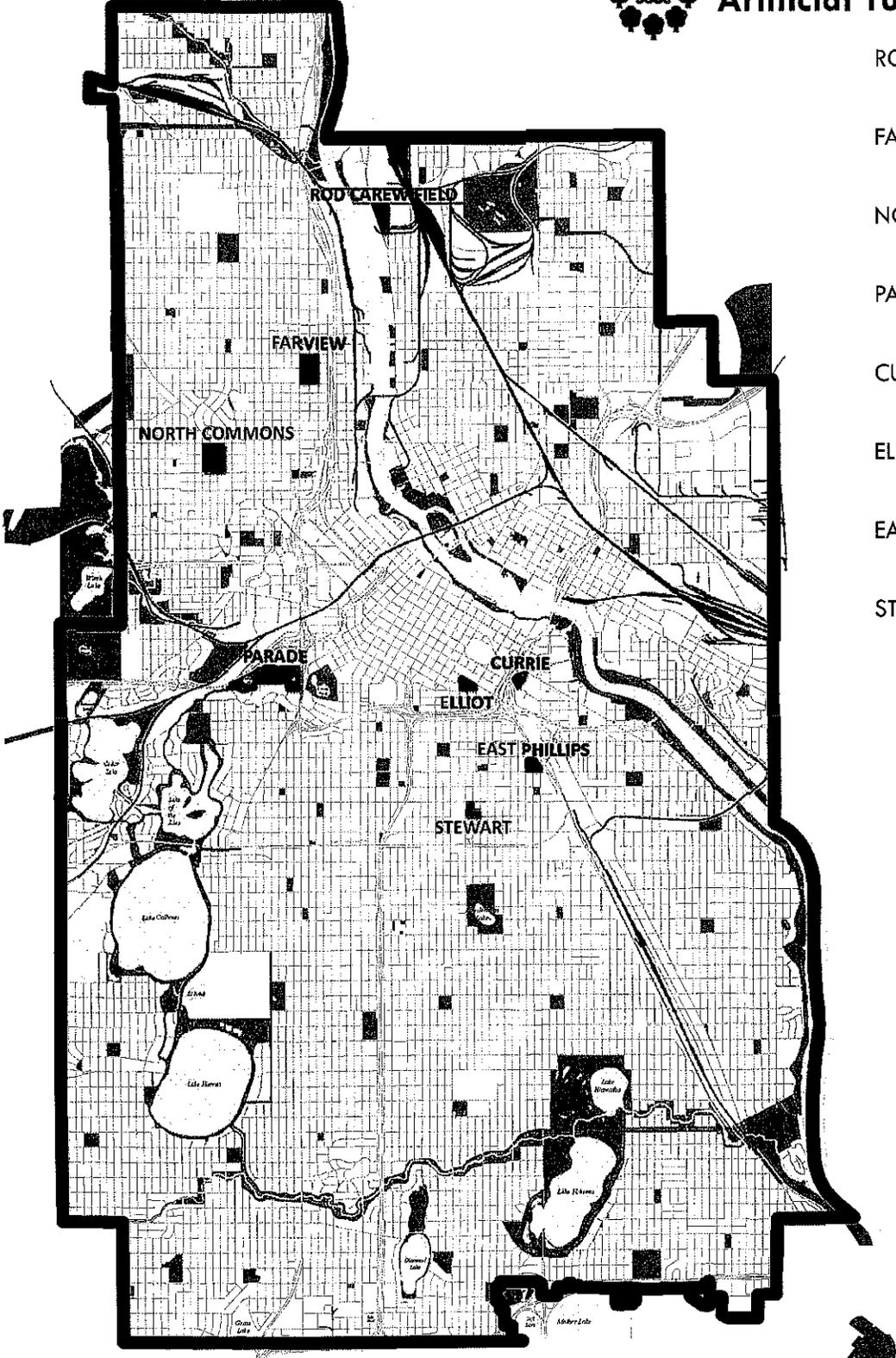
- 66 separate playground areas
- 47 currently have engineered rubber mulch covering 204,170 Square Feet
- 8 currently have engineered wood mulch covering 33,145 Square Feet
- 10 currently have sand covering 20,678 Square Feet (Tot-Lots)
- 1 currently has Poured In Place (Dowling new Adaptive playground in courtyard)
- Cost estimate to convert all 47 rubber mulch play areas to engineered wood fiber: \$1,143,352 (cost likely to increase with needed border changes & improved drainage).
- Annual maintenance cost to replenish engineered wood mulch/sand at 65 play areas: \$194,245 (This is based on the need to replenish every 1 to 2 years)
- Annual maintenance cost to replenish rubber mulch at 66 play areas: \$35,000 (This is based on the need to replenish every 5 to 7 years)
- One synthetic turf field with crumb rubber at Washburn High School. All other ball fields are grass. We do not have any immediate plans to add more.

MPS is temporarily on hold with the conversion of the last 8 engineered wood mulch playgrounds to engineered rubber mulch. MPS is doing this to allow time for government studies on the use of engineered rubber mulch so that we can make an informed decision. We are continuing to perform maintenance on existing engineered rubber mulch playgrounds i.e. adding material as needed to maintain required depth.

Thank you!



Artificial Turf Field Locations



- ROD CAREW FIELD
Full Size Softball Field
- FARVIEW PARK
Football/Baseball Field
- NORTH COMMONS PARK
Full Size Softball Field
- PARADE STADIUM
Full Size Soccer Field
- CURRIE PARK
Half Size Soccer Field
- ELLIOT PARK
Full Size Soccer Field
- EAST PHILLIPS PARK
(2) Half Size Soccer Fields
- STEWART PARK
Half Size Soccer Field



Public Playground Safety Handbook



U.S. Consumer Product Safety Commission
Saving Lives and Keeping Families Safe

- Watching and stopping dangerous horseplay, such as children throwing protective surfacing materials, jumping from heights, etc.
- Watching for and stopping children from wandering away from the play area.

2.3 Selecting Equipment

When selecting playground equipment, it is important to know the age range of the children who will be using the playground. Children at different ages and stages of development have different needs and abilities. Playgrounds should be designed to stimulate children and encourage them to develop new skills, but should be in scale with their sizes, abilities, and developmental levels. Consideration should also be given to providing play equipment that is accessible to children with disabilities and encourages integration within the playground.

Table 1 shows the appropriate age range for various pieces of playground equipment. This is not an all-comprehensive list and, therefore, should not limit inclusion of current or newly designed equipment that is not specifically mentioned. For equipment listed in more than one group, there may be some modifications or restrictions based on age, so consult the specific recommendations in §5.3.

2.3.1 Equipment not recommended

Some playground equipment is not recommended for use on public playgrounds, including:

- Trampolines
- Swinging gates
- Giant strides
- Climbing ropes that are not secured at both ends.
- Heavy metal swings (e.g., animal figures) – These are not recommended because their heavy rigid metal framework presents a risk of impact injury.
- Multiple occupancy swings – With the exception of tire swings, swings that are intended for more than one user are not recommended because their greater mass, as compared to single occupancy swings, presents a risk of impact injury.
- Rope swings – Free-swinging ropes that may fray or otherwise form a loop are not recommended because they present a potential strangulation hazard.

- Swinging dual exercise rings and trapeze bars – These are rings and trapeze bars on long chains that are generally considered to be items of athletic equipment and are not recommended for public playgrounds. *NOTE: The recommendation against the use of exercise rings does not apply to overhead hanging rings such as those used in a ring trek or ring ladder (see Figure 7).*



2.4 Surfacing

The surfacing under and around playground equipment is one of the most important factors in reducing the likelihood of life-threatening head injuries. A fall onto a shock absorbing surface is less likely to cause a

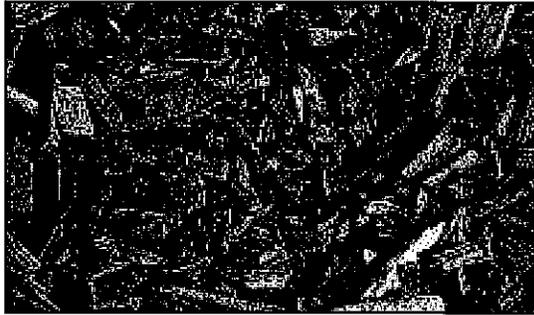
serious head injury than a fall onto a hard surface. However, some injuries from falls, including broken limbs, may occur no matter what playground surfacing material is used.

The most widely used test method for evaluating the shock absorbing properties of a playground surfacing material is to drop an instrumented metal headform onto a sample of the material and record the acceleration/time pulse during the impact. Field and laboratory test methods are described in *ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment*.

Testing using the methods described in ASTM F1292 will provide a “critical height” rating of the surface. This height can be considered as an approximation of the fall height below which a life-threatening head injury would not be expected to occur. Manufacturers and installers of playground protective surfacing should provide the critical height rating of their materials. This rating should be greater than or equal to the fall height of the highest piece of equipment on the playground. The fall height of a piece of equipment is the distance between the highest designated play surface on a piece of equipment and the protective surface beneath it. Details for determining the highest designated play surface and fall height on some types of equipment are included in §5 Parts of the Playground.

2.4.1 Equipment not covered by protective surfacing recommendations

The recommendations for protective surfacing do not apply to equipment that requires a child to be standing or sitting at *ground level*. Examples of such equipment are:



Appropriate Surfacing

- Any material tested to ASTM F1292, including unitary surfaces, engineered wood fiber, etc.
- Pea gravel
- Sand
- Shredded/recycled rubber mulch
- Wood mulch (not CCA-treated)
- Wood chips



Inappropriate Surfacing

- Asphalt
- Carpet not tested to ASTM F1292
- Concrete
- Dirt
- Grass
- CCA treated wood mulch

- Sand boxes
- Activity walls at ground level
- Play houses
- Any other equipment that children use when their feet remain in contact with the ground surface

2.4.2 Selecting a surfacing material

There are two options available for surfacing public playgrounds: unitary and loose-fill materials. A playground should never be installed without protective surfacing of some type. Concrete, asphalt, or other hard surfaces should never be directly under playground equipment. Grass and dirt are not considered protective surfacing because wear and environmental factors can reduce their shock absorbing effectiveness. Carpeting and mats are also not appropriate unless they are tested to and comply with ASTM F1292. Loose-fill should be avoided for playgrounds intended for toddlers.

2.4.2.1 Unitary surfacing materials

Unitary materials are generally rubber mats and tiles or a combination of energy-absorbing materials held in place by a

binder that may be poured in place at the playground site and then cured to form a unitary shock absorbing surface. Unitary materials are available from a number of different manufacturers, many of whom have a range of materials with differing shock absorbing properties. New surfacing materials, such as bonded wood fiber and combinations of loose-fill and unitary, are being developed that may also be tested to ASTM F1292 and fall into the unitary materials category. When deciding on the best surfacing materials keep in mind that some dark colored surfacing materials exposed to the intense sun have caused blistering on bare feet. Check with the manufacturer if light colored materials are available or provide shading to reduce direct sun exposure.

Persons wishing to install a unitary material as a playground surface should request ASTM F1292 test data from the manufacturer identifying the critical height rating of the desired surface. In addition, site requirements should be obtained from the manufacturer because some unitary materials require installation over a hard surface while others do not. Manufacturer's instructions should be followed closely, as some unitary systems require professional installation. Testing should be conducted in accordance with the ASTM F1292 standard.

2.4.2.2 Loose-fill surfacing materials

Engineered wood fiber (EWF) is a wood product that may look similar in appearance to landscaping mulch, but EWF products are designed specifically for use as a playground safety surface under and around playground equipment. EWF products should meet the specifications in ASTM F2075: *Standard Specification for Engineered Wood Fiber* and be tested to and comply with ASTM F1292.

There are also rubber mulch products that are designed specifically for use as playground surfacing. Make sure they have been tested to and comply with ASTM F1292.

When installing these products, tips 1-9 listed below should be followed. Each manufacturer of engineered wood fiber and rubber mulch should provide maintenance requirements for and test data on:

- Critical height based on ASTM F1292 impact attenuation testing.
- Minimum fill-depth data.
- Toxicity.
- ADA/ABA accessibility guidelines for firmness and stability based on ASTM F1951.

Other loose-fill materials are generally landscaping-type materials that can be layered to a certain depth and resist compacting. Some examples include wood mulch, wood chips, sand, pea gravel, and shredded/recycled rubber mulch.

Important tips when considering loose-fill materials:

1. Loose-fill materials will compress at least 25% over time due to use and weathering. This must be considered when planning the playground. For example, if the playground will require 9 inches of wood chips, then the initial fill level should be 12 inches. See Table 2 below.
2. Loose-fill surfacing requires frequent maintenance to ensure surfacing levels never drop below the minimum depth. Areas under swings and at slide exits are more susceptible to displacement; special attention must be paid to maintenance in these areas. Additionally, wear mats can be installed in these areas to reduce displacement.
3. The perimeter of the playground should provide a method of containing the loose-fill materials.
4. Consider marking equipment supports with a minimum fill level to aid in maintaining the original depth of material.

5. Good drainage is essential to maintaining loose-fill surfacing. Standing water with surfacing material reduces effectiveness and leads to material compaction and decomposition.
6. Critical height may be reduced during winter in areas where the ground freezes.
7. Never use less than 9 inches of loose-fill material except for shredded/recycled rubber (6 inches recommended). Shallower depths are too easily displaced and compacted.
8. Some loose-fill materials may not meet ADA/ABA accessibility guidelines. For more information, contact the Access Board (see §1.6) or refer to ASTM F1951.
9. Wood mulch containing chromated copper arsenate (CCA)-treated wood products should not be used; mulch where the CCA-content is unknown should be avoided (see §2.5.5.1).

Table 2 shows the minimum required depths of loose-fill material needed based on material type and fall height. The depths shown assume the materials have been compressed due to use and weathering and are properly maintained to the given level.

2.4.2.3 Installing loose-fill over hard surface

CPSC staff strongly recommends against installing playgrounds over hard surfaces, such as asphalt, concrete, or hard packed earth, unless the installation adds the following layers of protection. Immediately over the hard surface there should be a 3- to 6-inch base layer of loose-fill (e.g., gravel for drainage). The next layer should be a Geotextile cloth. On top of that should be a loose-fill layer meeting the specifications addressed in §2.4.2.2 and Table 2. Embedded in the loose-fill layer should be impact attenuating mats under high traffic areas, such as under swings, at slide exits, and other places where displacement is likely. Figure 1 provides a visual representation of this information. Older playgrounds that still exist on hard surfacing should be modified to provide appropriate surfacing.

2.5 Equipment Materials

2.5.1 Durability and finish

- Use equipment that is manufactured and constructed only of materials that have a demonstrated record of durability in a playground or similar setting.

Crumb Rubber in Athletic Fields

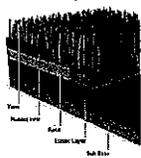
QUESTIONS REGARDING POTENTIAL HEALTH EFFECTS FROM THE USE OF CRUMB RUBBER IN ATHLETIC FIELDS.

What is Crumb Rubber?

Crumb rubber is created by reducing scrap tires or other rubber into small, uniform pellets. Tires are broken up by either grinding or by freezing and then breaking. The steel and other fibers in scrap tires are almost entirely removed in the manufacturing process.¹ Using scrap tires can provide a community and environmental benefit by removing mosquito breeding grounds and reducing fire hazards.



How is it used?



Because crumb rubber is used in a wide variety of products, it comes in a range of sizes. One common use for crumb rubber is as a filler in synthetic turf fields. The crumb rubber helps support the artificial blades of "grass" to give the field a more natural texture and feel. It is also used in floor mats, carpet padding, as foundation for roads and railroads, and as filler in packaging.²

Are there health concerns?

Tires contain a number of materials that can be harmful to health if significant exposure (swallowing, breathing, or

through the skin) occurs, including metals (zinc, lead), volatile organic compounds (methyl isobutyl ketone), semi-volatile organic compounds (benzothiazole, PAHs), and particulates (carbon black).³ Studies done by states (CA, NY) have shown that exposure to chemicals in crumb rubber is likely to be small and unlikely to increase the risk for any health effect. However, recent news reports and comments from the public continue to raise questions about exposure to crumb rubber. A study from Connecticut urged caution until additional information is gathered.

What is being done?

Two major studies are currently underway examining potential health effects from crumb rubber and synthetic turf. One is being led by the federal Environmental Protection Agency; a draft status report is expected in late 2016. Additional federal research may result from these findings.⁴ The second is by the California Office of Health Hazard Assessment and will run through 2018. The California study will be very comprehensive and include a review of current knowledge, public input, exposure assessment, and estimated health outcomes.⁵ The Minnesota Department of Health is tracking each of these studies and will consider their results in any future recommendations regarding the use of crumb rubber in synthetic turf fields.