FieldShield, Inc.

Play it safe!

THE PROBLEM WITH COATED SAND

A very real problem has been ignored or hidden concerning respirable particulate material (PM) associated with polyolefin coated sand (ActionFlexSand™ and Durafill), when used as artificial turf infill. This problem not only concerns a significant health-hazard but it also may be a political landmine for any public purchasing authority.

FlexSand is **89 to 94% crystalline silica** (quartz). Crystalline silica is classified as a Group 1 (carcinogenic to humans) by IARC (Int'l Agency for Research on Cancer)

The federal government (OSHA) mandates a **warning label** be affixed to all containers holding sand with a crystalline silica (quartz) content exceeding 0.1% by weight or volume or respirable portion, (HSC) 29 CFR 1910.1200. (Sample label attached). Obviously, FlexSand significantly exceeds these mandated thresholds by almost 1000/1. **The label warns that breathing silica dust can cause severe and permanent lung damage, silicosis, cancer, csleroderma, and that breathing silica dust may not cause noticeable injury or illness, even though permanent lung damage may be occurring.**
Under the MA Toxic Use Reduction Act, crystalline silica, of a respirable size under 10 microns, is listed as toxic. It is also listed as a carcinogen under the CA Clean Air and Water Act (Prop 65).

The Health-Hazard: In its occupational use during transportation, handling and installation, respirable particles in concentrations above the TLV (Threshold Limit Value) of .1 mg/M^3 are likely produced. More concerning, normal maintenance (sweeping/brushing) and athletic use will likely produce respirable particles (< 3.5 microns) above the TLV. (Please note that the warning label specifically prohibits the dry sweeping of the product, which is such a necessary part of normal maintenance and grooming). **This respirable particulate hazard is exacerbated with regard to athletic fields because young lungs and lungs weakened by asthma are significantly more vulnerable to the danger of respirable particulate, especially given the exaggerated, deep respiration triggered by competitive athletic activity.**

FlexSand, Durafill and other coated sands rely on the coating to encapsulate the silica dust and hold respirable silica particulate below established safe limits. Given the high concentration of crystalline silica in FlexSand, the coating is the only component that can prevent break-down of the crystalline silica and the resulting release of respirable particulate.

The coating requires thickness, adhesive and cohesive strength to act structurally. It also requires completeness and consistency of coating. Unfortunately, the purveyors of the products have established no specification for coating thickness (micron); no specification for coating coverage; no specification for adhesive, cohesive, or tensile strength: no specification for coating durability and, therefore, no way to incorporate such criteria into a project specification. Obviously, this means there is no way to predict or control coating integrity, and therefore, health-safety performance.

The FlexSand product technical data does reveal an Ultimate G-Max test (TSI 128), without stating the tested base type. Nonetheless, the rise in G-max noted in the test results is indicative of a break-down in particulate gradation of new, virgin material. The real question is – how will the exposure to oxidation; UV; temperature cycling; acid rain; elevated heat; use abrasion and compaction, affect the coating integrity, **over multiple years of exposure.**

A comprehensive study by the San Francisco Recreation and Park Department (http://www.asgi.us/publicdownloads/SFParks_Playfields_8.21.08.pdf) clearly identifies the respirable particulate matter problem associated with the rubber dust as resulting from the size and concentration of the particulate matter (less so, the mass or chemical composition) as it enters the gas-exchange areas of the lungs. The SF Parks study did not specifically consider sand, only rubber, but the science is the same and that science is the genesis of the warning label requirements for silica sand. The .1% threshold is considered a predictor of the downstream availability of respirable particles (< 3.5 microns) at a level of unacceptable risk.

The SF Parks study also addressed the problem of “kick-up” (we call it fly-out) and determined that larger particles carry micro-particulate with them when kicked-up by players. These respirable particles (< 3.5 micron) can remain suspended in the breathing zone for 83 minutes. Finer particles can potentially remain suspended for days.

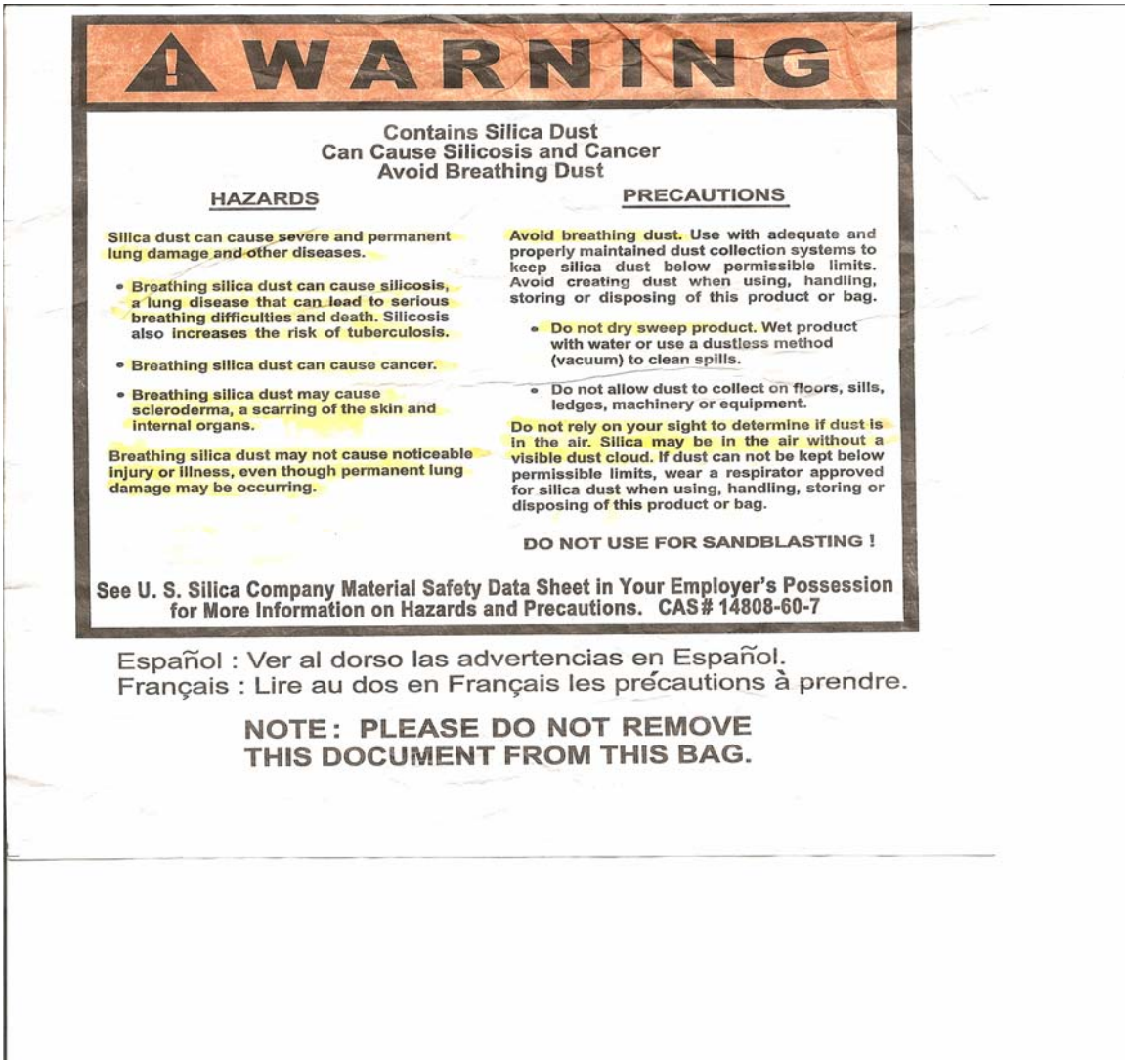
So, the crystalline silica in FlexSand and Durafill is a carcinogen, when in respirable form, and is considered toxic by the state of MA and CA. If the coating integrity is broken or inconsistent, normal maintenance and athletic use of the artificial turf field with sand and rubber infill will very likely produce suspension of respirable particles in the breathing zone, which is a significant health-hazard. (The risks for children under 12 years old are markedly greater.)

If safer infill alternatives are rejected, criteria must be written into job specifications setting acceptable limits for respirable silica sand particulate during installation and use. Likewise, physical parameters for the coating must be established and specified in order to maintain long-term structural integrity of the coating sufficient to eliminate the health-hazard. Furthermore, monitoring of adherence to set limits during the useful life of the turf must also be incorporated into the project specifications and such testing should be performed regularly, immediately after use or maintenance (and when infill is dry). Given the

information now available, failure to set, monitor and enforce such limits should be considered negligent and carry commensurate liability.

Respectfully submitted,
Philip Christiansen, PE, MS

TYPICAL FEDERALLY MANDATED WARNING LABEL



WARNING

Contains Silica Dust
Can Cause Silicosis and Cancer
Avoid Breathing Dust

HAZARDS

Silica dust can cause severe and permanent lung damage and other diseases.

- Breathing silica dust can cause silicosis, a lung disease that can lead to serious breathing difficulties and death. Silicosis also increases the risk of tuberculosis.
- Breathing silica dust can cause cancer.
- Breathing silica dust may cause scleroderma, a scarring of the skin and internal organs.

Breathing silica dust may not cause noticeable injury or illness, even though permanent lung damage may be occurring.

PRECAUTIONS

Avoid breathing dust. Use with adequate and properly maintained dust collection systems to keep silica dust below permissible limits. Avoid creating dust when using, handling, storing or disposing of this product or bag.

- Do not dry sweep product. Wet product with water or use a dustless method (vacuum) to clean spills.
- Do not allow dust to collect on floors, sills, ledges, machinery or equipment.

Do not rely on your sight to determine if dust is in the air. Silica may be in the air without a visible dust cloud. If dust can not be kept below permissible limits, wear a respirator approved for silica dust when using, handling, storing or disposing of this product or bag.

DO NOT USE FOR SANDBLASTING !

See U. S. Silica Company Material Safety Data Sheet in Your Employer's Possession for More Information on Hazards and Precautions. CAS# 14808-60-7

Español : Ver al dorso las advertencias en Español.
Français : Lire au dos en Français les précautions à prendre.

NOTE: PLEASE DO NOT REMOVE THIS DOCUMENT FROM THIS BAG.