April 25, 2025

Pesticide and Environmental Toxicology Branch
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California Environmental Protection Agency
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Attention: Synthetic Turf Study

Email to: SyntheticTurf@oehha.ca.gov

Subject: Comment on OEHHA draft report on the potential health risks synthetic turf fields regarding Heat, specifically Temperature Data in Appendix D.5.2 and D.5.3

Dear OEHHA Staff,

Your report seeks to address two issues, the public health risk to athletes and bystanders from

1. Chemicals released or generated by tire crumb rubber infill in synthetic turf athletic fields
2. Heat generated by synthetic turf in sunlight

In this letter It is the treatment and analysis of the second issue, heat generated by synthetic turf, that concerns me:

Regarding possible heat stress during athletic activity on a hot day, the OEHHA analysis of collected temperature data found in Appendix D renders the mildest, and somewhat misleading, interpretation due to **the lack of due consideration for surface temperature.**

The temperature graphs shown on pages D-171 through D-174, **measure averaged temperatures across fields, above the surface, ignoring surface temperatures. Synthetic turf surfaces are known to heat well over ambient temperature in direct sunlight.**

Oddly though surface temperatures "were continuously recorded," they are not presented in graphs for sections D.5.2 Ambient Temperature on the field or D.5.3 Synthetic Surface Temperatures**.**

Instead surface temperatures are reported in section D.5.3 tables, from pages D-175 through D-177, **which concern crumb rubber and whether fields are old or new. Thus, regarding heat stress, the report appears to be burying the lead.**

While you report extensively on heat at various levels above the surface, **with synthetic turf, heat is more likely to injure at ground level than above the ground. In fact that may be where it causes the most damage and injury.**

An important National Aeronautics and Space Administration (NASA) research paper set the "safe" threshold for bare skin contact with a hot surface at 45°C (113°F). Above that threshold, a person will feel more of an impact as time or temperature increase. For example a person may safely touch a surface with a temperature of at 50°C (118°F) up to 10 seconds. Your data shows us that this risk is very present. Take, for example, page D-177, Table D-4.

Table D-4. Average Temperature[a] and Standard Deviation, in degrees Fahrenheit, at Different Depths Below the Surface of the Fields and Average Ambient Temperature at 45 Inches above the Fields Studied

Field Category[b], Temperature	Deep	Shallow	Surface	Ambient Temp. at 45"
Newer Fields (20), Average Temperature	87.4	96.1	100	78.3
Newer Fields Standard Deviation	18.9	22.5	21.3	14.3
Older Fields (15), Average Temperature	88.4	95.1	99.2	75.9
Older Fields Standard Deviation	24.8	25.2	23.5	12.2

[a] The value used for each depth was the average of average temperature for each field measured for the five hours during the study and the standard deviation, although on some fields the temperatures were not measured for the full five hours.

[b] Newer Fields are < 9 years old and Older Fields are ≥ 9 years old. Numbers in parentheses are the number of fields studied in each region.

This shows a surface temperature for new fields of 100°F with a standard deviation of 21.3. Using NASA's criterion of 113°F as a threshold for safe contact, 27% of the time the surface is above that level. That is, 27% of the time it exceeds what NASA deems safe. For older fields it is 28% of the time! These are found for days where the average ambient temperature at 45 inches above the surface is in the mid to upper 70°F's, relatively mild days. Many days are much hotter as shown in your Table D-5, page D-177.

Table D-5. Average Temperature[a], in degrees Fahrenheit, at Different Depths in the Crumb Rubber and the Surface of the Fields for Different Average Ambient Field Temperature Ranges at 45 Inches above the Fields Studied

Temperature Range[b], Temperature	Deep	Shallow	Surface	Ambient Temp. at 45"
≥100 (2), Average Temperature	88.8	98.9	116	105
≥90 <100 (4), Average Temperature	94.8	110	116	92.6
≥80 <90 (7), Average Temperature	104	118	116	83.1
≥70 <80 (14), Average Temperature	91.8	94.0	109	76.0
≥60 <70 (5), Average Temperature	74.5	81.5	79.1	65.4
<60 (3), Average Temperature	43.9	54.2	59.2	50.8

[a] The value used for each depth was the average of average temperature for each field measured for the five hours during the study and the standard deviation, although on some fields the temperatures were not measured for the full five hours.
[b] Numbers in parentheses is number of fields in that temperature range.

Athletes fall down and slide on synthetic turf where the turf can easily burn them. Recognition of this risk is absent from your analysis, though it is there in your data. People need to be made aware of this especially since **our world is warming.** Earth's 10 hottest years are the last 10, with 2024 being "more than 1.5°C [2.7°F] above the pre-industrial era … [and] the warmest year in the 175-year observational record." Before 2024, 2023 was the hottest year on record and, as of March 12, 2025, this year, 2025, has a 38% chance of being warmer than either.

Another issue I have is that specific named locations for data collection are not discussed. When Appendix D references "location," it merely describes sport-field specific collection sites, for example at yardline 50 or in an endzone (e.g., page D-22 Figure D-2). While there are hints for where specific fields sit, e.g. there's an entry field for "Nearest Weather Station" or "nearest hospital," a reader must switch between the main document and Appendix D to understand geographical areas discussed in Appendix D.

For location, return to the main draft document and search for "Climate Regions." Pages 2-6 through 2-8 explain that **"16 climate zones" are consolidated into 5 climate regions "based on the mean temperatures" for the months "from May to October"** and, thankfully, on page 2-8, there is a map and a table describing the broad areas. **But, more accurately, there are 3 better sampled climate regions, for the 2 coastal areas (north and south) and then for the Central Valley**, as there are 233 to 376 fields represented in each, while the two remaining climate regions together have a total of 26. In fact **throughout Appendix D, the other 2 climate regions, representing the deserts and the mountains, are lumped together as Region 4/5** (see page D-170 section D.5.2.2 Results).

However micro-climates are a feature of California, where in one place "it might be drizzly and misty all day long, even while a mile or two away the sun is shining." **In California specific locations matter, and specific climate and temperature profiles differ often in areas that are close.** It is a mistake to characterize heat stress by averaging temperature

readings based on locations across broad swaths of our state. Heat stress occurs at specific temperatures and immediate climate, not at averages or means.

In summary, there is a higher risk of athlete and bystander heat stress from synthetic turf surfaces than is suggested in the OEHHA draft report on synthetic turf field health risk.

I strongly urge the authors to report more directly on the collected data in order to reflect heat stress risks with greater accuracy and with more clarity. Also, please make the data available to the public.

Sincerely,

Susan Hinton