



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

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| Name(s) Michael B. Brown-Fiedtkou | Project Number 34075 |
| Project Title The Effect of a Water Based Cooling Membrane on the Radiant Heat Given Off the Surface of Astroturf | |
| Objectives/Goals Objective: The objective was to determine the effect of a water based cooling system/membrane installed underneath Astroturf on the amount of radiant heat given off the surface of the Astroturf. The hypothesis is a water based cooling system/membrane will reduce the amount of radiant heat given off the surface of Astroturf. Abstract Methods/Materials Methods/Materials: Two test sample groups were assembled in separate identical containers layered with equal amounts of soil, sand, rubber, Astroturf. A cooling membrane (frozen water in plastic) was added to one of the two sample groups directly under the top Astroturf layer. A third comparison sample group was assembled in a separate identical container layering soil, sand and natural sod grass. Identical thermometers were affixed to the inside of three identical domes in an identical position and placed over each of the three sample groups. An identical lamp/heat source was positioned on each dome. The temperature inside the dome of each test group was measured and recorded at zero, five and ten minute intervals on three different days. The average/mean temperature of each sample group at each time interval was then calculated, graphed and the results were interpreted. Results Results: The radiant heat in the atmosphere of the Astroturf sample WITHOUT the cooling system/membrane was significantly higher (8 degrees at 10 minutes) than the Astroturf sample WITH the cooling membrane. The Astroturf WITH the cooling membrane averaged similar radiant heat measurements to the natural grass sample at all time intervals-both groups having the ability to hold water. It is interesting to note condensation formed on the dome of the natural grass sample Conclusions/Discussion Conclusion/Discussion: As the graph demonstrates, the addition of a water based cooling system/membrane clearly reduces the radiant heat given off the surface of the Astroturf. This data is critical information which can be used to develop an Astroturf field application which can improve a player's health, safety, ability and performance. In addition, the cooling membrane application will improve spectator comfort/health and reduce surrounding air temperatures which contribute to global warming. | |
| Summary Statement The project addresses the concerning heat generating properties of Astroturf by measuring the effect of a water based cooling system/membrane on the radiant heat given off the surface of Astroturf. | |
| Help Received Teacher Brad Penkala project advisor; Mother paid for supplies, typed and provided consultation. | |