In early 2015, in response to increased public interest in the potential health effects of synthetic turf sports fields with crumb rubber (or recycled rubber) infill, the Synthetic Turf Council (STC) began compiling a list of credible, scientific-based, third-party reports and studies and making them readily accessible to the public. The list includes more than 110 technical studies and reports that have examined various health and human safety questions relating to the use of recycled rubber as an aftermarket product, including its use as infill in synthetic turf sports fields. The majority of the studies were conducted by independent academic, federal and state government organizations, and involved chemical engineers, toxicologists, epidemiologists, chemists, biologists and other medical professionals. They estimated whether toxins are present at any level of concern, whether the human body can access them, and if exposure over time increases risk. All have unequivocally failed to find any link between synthetic turf and cancer, and all have concluded that synthetic turf with crumb rubber infill does not pose a human health risk to people of all ages. At the same time, STC voluntarily added ASTM’s F3188-16 to our industry guidelines for infill, the ASTM toy standard for heavy metals.

EPA Report Background
In 2016, the U.S. Environmental Protection Agency (EPA), Centers for Disease Control and Prevention/Agency for Toxic Substances (ATSDR) and Consumer Product Safety Commission (CPSC) announced a Federal Research Action Plan on Recycled Tire Crumb Used on Playing Fields and Playgrounds to study any health impacts of playing on synthetic turf fields with crumb rubber infill. In July 2019, the EPA released its crumb rubber characterization report, which summarizes results on a range of chemicals, including metals and organic chemicals, that the EPA found in their study of tire crumb rubber. This is the first of a two part multi-agency study into the safety of crumb rubber. The report highlights what we already know about crumb rubber infill in synthetic turf fields: crumb rubber is made of the same components found in everyday consumer products, and hospital and classroom floors. The report reconfirms that the mere presence of a substance does not equate with human exposure, and recognizes substances are also present in natural grass and other types of fields. Furthermore, when the EPA tested for dozens of substances it found low and below-detection limits emissions, which is consistent with previous studies.

EPA Report Summary
- Findings from this study support the premise that while many chemicals are present in the recycled tire crumb rubber, exposure may be limited based on what is released into air or biological fluids.
- While there is concern about chemical exposures resulting from the use of recycled tire and other materials in synthetic fields, it is important to recognize that some of the chemicals are likely to be present in other types of fields, including natural grass fields. For example, metals (including lead) and PAHs (including benzo[a]pyrene) of potential concern at synthetic turf fields with tire crumb rubber infill are also often found in surface soil in the U.S. and may be present at natural grass playing fields.
- The presence of a substance does not directly equate with human exposure. While there are many chemicals associated with recycled tire crumb rubber, the EPA laboratory experiments suggest that the amount of chemicals available for exposure through release into the air and simulated biological fluids is relatively low.

NTP Reports
Also in July 2019, the U.S. National Toxicology Program (NTP) released four reports on potential human exposure to crumb rubber. The reports examined the chemical and physical characterization of crumb rubber, and conducted in vivo and in vitro studies on various routes of exposure from crumb rubber.

Summary of NTP Reports
- There was no evidence of toxicity in mice from ingestion of crumb rubber. Analysis of the animals’ blood and urine showed that internal levels of crumb rubber chemicals were very low. No health problems were observed.
- Data from a combination of analyses demonstrate that volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals constitute a very small fraction of the crumb rubber lot.
- Bioaccessibility studies conducted in vitro to mimic various routes of exposure showed that only a few constituents present in crumb rubber are present in these extracts under the conditions used, regardless of the biofluid or the analytical method used.
- The NTP studies did not assess individual chemicals of crumb rubber, although they did confirm that it contains many substances, such as polycyclic aromatic hydrocarbons (PAHs), metals, plasticizers, such as phthalates, and bisphenol A (BPA). The EPA also noted that other types of fields, including natural grass, contain metals (including lead) and PAHs (including benzo[a]pyrene).
- For tests using human cells, NTP found that crumb rubber, under certain experimental conditions such as high heat, leached chemicals, some of which caused cell death. The NTP used crumb rubber incubated in a culture medium at 60°C for a full 24 hours.

NTP Reports Background
In 2015, the California Office of Environmental Health Hazard Assessment (OEHHA) nominated synthetic turf/crumb rubber to the NTP for short-term in vivo and in vitro studies to generate information and improve understanding of potential health impacts of chemicals released from synthetic turf, with an emphasis on crumb rubber. The NTP research program developed in response to this request used in vitro and in vivo systems to address uncertainties about potential human exposure to hazardous components of crumb rubber. The NTP research approach included both in vivo and in vitro studies and considered the most likely routes of human contact with crumb rubber (e.g., ingestion, dermal contact, and inhalation). The study objective was to investigate which exposure conditions could have biological effects, with a focus on characterizing the bioaccessibility and systemic exposure of crumb rubber constituents.