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**To:** -- City Council; [Karen Nau](#); [Chong, Cindy](#); [ParksnRec](#); [Hays, Kevin](#); [Alison Baker](#); [Halter, Drew](#)  
**Subject:** Field of Dread (Philadelphia Inquirer)- Six former Phillies died from the same brain cancer. We tested the Vet's turf and found dangerous chemicals  
**Date:** Tuesday, March 7, 2023 12:11:04 PM

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Date: Tue, Mar 7, 2023 at 10:49 AM

Subject: Field of Dread (Philadelphia Inquirer)

FYI:

<https://www.inquirer.com/news/inq2/astroturf-vet-artificial-turf-pfas-forever-chemicals-glioblastoma-cancer-phillies-1980-20230307.html>

## FIELD OF DREAD

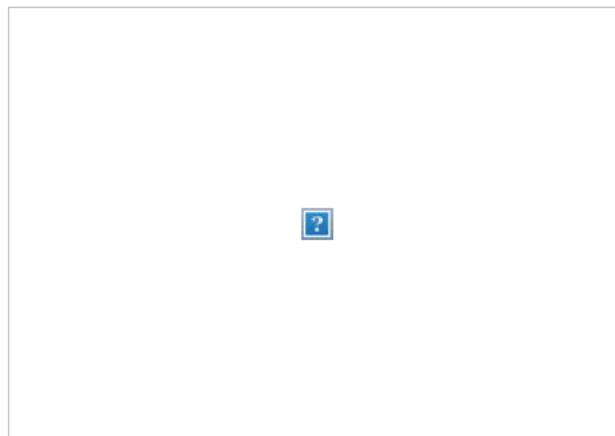
**Six former Phillies died from the same brain cancer. We tested the Vet's turf and found dangerous chemicals.**

### More about this story

- [The tangled timeline of AstroTurf](#)
- [How we tested the turf](#)
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## FIELD OF DREAD

Six former Phillies died from the same brain cancer. We tested the Vet's turf and found dangerous chemicals.



Grounds crew take up the AstroTurf at third base in Veterans Stadium to convert the field

from football to baseball on Aug. 1, 1981. James J. Craig / File photo

- By [Barbara Laker](#) and [David Gambacorta](#)
- Published Mar 7, 2023

As the clock inched toward 11:30 p.m., 65,838 people rose to their feet inside cavernous Veterans Stadium. It was Oct. 21, 1980, and Game 6 of the World Series between the Philadelphia Phillies and Kansas City Royals had reached the bottom of the ninth inning.

All that stood between the Phillies and the franchise's first championship was one strike.

On the mound was closer Tug McGraw, 36 — “Tuggles” to his friends. McGraw, famous for his unshakable optimism, had loaded the bases, jeopardizing the Phillies' 4-1 lead. “This is a helluva show,” he told himself. “I better not ruin it.” Among the anxious faces in the Phillies' dugout was John Vukovich, 33, a light-hitting infielder who was considered one of the team's fiercest competitors.

Across the field, the Royals waited in anticipation, including Ken Brett, 32, a former Phillie who was once the youngest pitcher to appear in a World Series game, and Dan Quisenberry, 27, a witty reliever who dabbled in poetry.

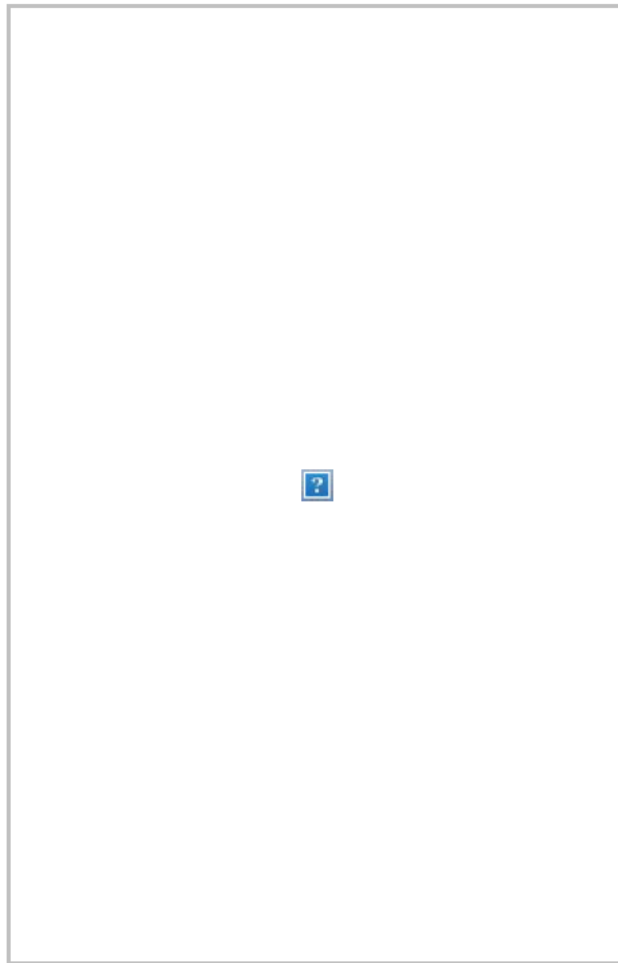
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City officials had fantasized about such a moment nearly a decade earlier, when the Vet first opened. The stadium, built on 74 acres of marshland in South Philly, had been over budget, tainted by a bribery scandal, dogged by construction mishaps and delays. But it did boast a million-dollar, state-of-the-art playing surface: AstroTurf.

McGraw sneaked a fastball past Willie Wilson, a Royals outfielder.

Strike three.

Fans screamed and howled and cried, and Phillies players and coaches celebrated atop blades of artificial grass that had been pioneered by a Missouri chemical company called Monsanto.



Tug McGraw and Mike Schmidt leap for joy as the Phillies close out the 1980 World Series in Game 6 at Veterans Stadium. Brian Horton / AP file photo

The company marketed its turf to professional sports teams, high schools, and colleges as a cheaper, more durable alternative to natural grass.

Decades after the final out of the 1980 World Series was recorded, McGraw, Vukovich, Brett, and Quisenberry had all died from brain cancer.

They weren't the only ones: In all, six former Phillies have reportedly been felled by glioblastoma — a particularly aggressive and deadly form of brain cancer — including former catcher Darren Daulton and former relief pitcher David West, who died in 2022.

The rate of brain cancer among Phillies who played at the Vet between 1971 and 2003 is about three times the average rate among adult men.

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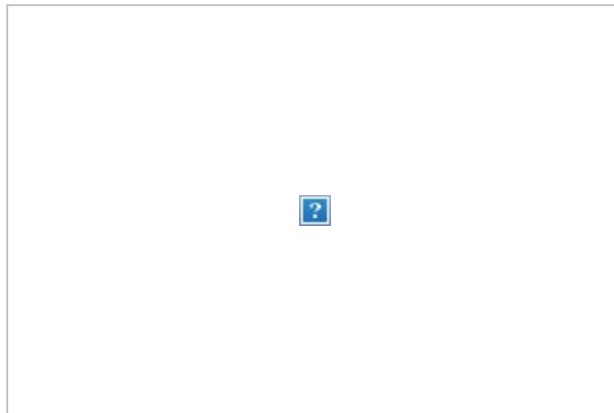
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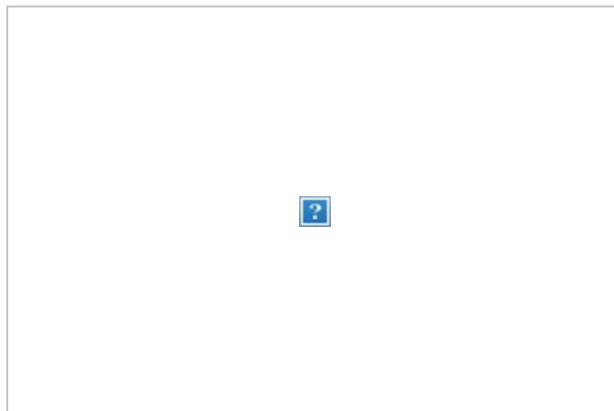
After West's death, at age 57, The Inquirer decided to test the Vet's turf. Athletes had dreaded playing on the surface, which was notorious for causing serious knee and ankle injuries. Through eBay, [the newspaper purchased four souvenir samples](#) of the fake grass that had blanketed the stadium's field from 1977 to 1981. The team gave away the green keepsakes to thousands of fans in 1982, in 4-by-4-inch sealed plastic bags labeled "Official Turf of Champions."

Tests run on two of the samples by Eurofins Lancaster Laboratories Environmental Testing found the turf contained 16 different types of PFAS, or per-and polyfluoroalkyl substances — so-called "forever chemicals," which the EPA has said cause "adverse health effects that can devastate families."

Researchers at the University of Notre Dame tested two other samples, and also found PFAS.



AstroTurf samples from Veterans Stadium submitted by Philadelphia Inquirer reporters at the University of Notre Dame to be tested for PFAS, in Indiana, Feb. 9, 2023. Jessica Griffin / Staff Photographer



Heather Whitehead, a doctoral candidate in chemistry and biochemistry, prepares samples of artificial turf from Veterans Stadium for PFAS testing at the University of Notre Dame. Jessica Griffin / Staff Photographer



Equipment used in testing the AstroTurf for PFAS at the University of Notre Dame. Five different PFAS were identified in the Veterans Stadium turf. Jessica Griffin / Staff Photographer

The lab findings come at a time of rising alarm across the United States about the pervasiveness of forever chemicals in an array of products, from turf and nonstick cookware to firefighting gear and food packaging. Few of the estimated 12,000 PFAS have been extensively studied. Since experts have only been aware since 2019 that PFAS was in artificial turf, no studies have yet been done to determine whether athletes' exposure could be linked to cancer.

## **Methodology**

Eurofins tested the 40-plus-year-old Vet turf for 70 different PFAS compounds. Sixteen were found. Two of those 16 were perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS), the most widely studied of the chemicals and considered the most perilous, and the subject of lawsuits across the country.

Concentrations of PFOS and PFOA in the Vet samples were 5.4 and 12 parts per trillion.

Although these levels of contamination in drinking water would be alarming, less is known about the potential danger of playing on artificial turf where the toxic chemicals are inhaled or transmitted through chronic skin contact. Even so, several toxicologists who are conducting extensive PFAS studies said the Vet turf findings were concerning and problematic.

[Read more here about our methodology for testing the turf samples.](#)

In January, Pennsylvania put limits on two per-and polyfluoroalkyl substances in the state's 3,117 drinking water systems. That action came a few months after Mayor Jim Kenney's administration sued 3M, DuPont, and other chemical companies over PFAS contamination in the city's water supply.

Although the dangers of drinking PFAS-contaminated water has been established, experts say that there isn't sufficient data to fully understand the potential risks of inhaling forever chemicals or getting them on the skin from repeated contact with playing surfaces.

"We don't have a good sense of the amount that was actually ingested, or what amount of exposure is relevant to cancer risk," said Timothy Rebbeck, an epidemiologist who researches the causes of cancer at the Harvard T.H. Chan School of Public Health and a professor of medical oncology at Dana-Farber Cancer Institute.

"We're never going to have a good measure of what the Phillies players were exposed to."

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Still, some experts call the toxins that Eurofins found in the Vet's AstroTurf concerning.

"Once PFAS gets into [a person's] blood, they circulate through all the organs," said Graham Peaslee, a physicist at the University of Notre Dame who has spent years [studying PFAS compounds](#).

"We know that the liver is affected. We know that the kidneys are affected. We know the testicles are affected. But nobody's ever done the study to see if the brain is affected, because glioblastoma is such a rare disease."



Graham Peaslee, professor in the Department of Physics, shown here with the Van de Graaf Accelerator, which is used for testing for PFAS, at the University of Notre Dame, in Indiana. Jessica Griffin / Staff Photographer

Other than some kinds of cancers, the chemicals are also associated with decreased fertility and immunity to fight infections, and increased risks of asthma and thyroid disease.

Philadelphia officials acknowledge that PFAS products “pose grave environmental and human health risks. Professional athletes being exposed to PFAS via AstroTurf is only one example of the risks,” said Joy Huertas, Mayor Kenney’s spokesperson. “Adverse health effects due to PFAS exposure are a concern for everyone.”

The turf industry, meanwhile, insists its products are safe.

“The materials used in synthetic turf have been thoroughly reviewed by both federal and state government agencies and are considered to be nonhazardous,” Melanie Taylor, the president and CEO of the Synthetic Turf Council, wrote in an email.

“Going forward, our members will continue to pay close attention to evolving regulations and standards to ensure the highest safety of our products,” Taylor wrote.

In a statement, the Phillies said the organization shares “the frustration and sadness of losing six members of our baseball family to brain cancer.”

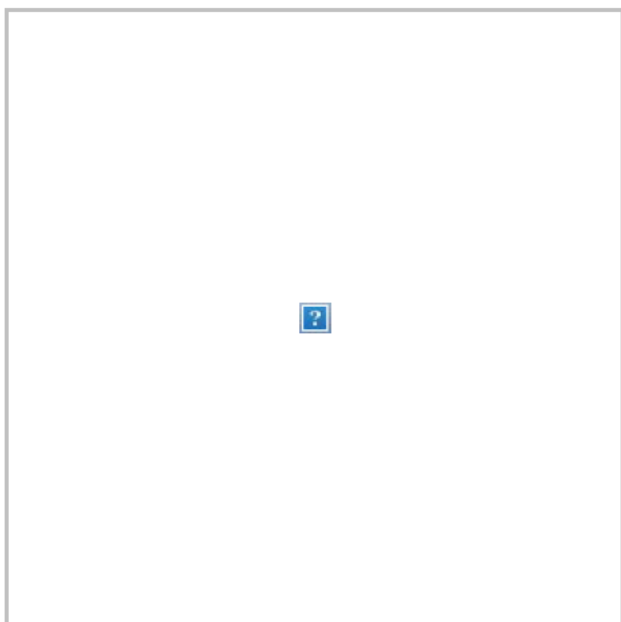
The team said it consulted several brain cancer experts who told the organization that there is no evidence of a link between artificial turf and the disease.

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Other experts, however, referred reporters to recent international studies, including two from researchers in China that [found PFAS chemicals](#) in brain tumor tissue, and another from researchers in Italy who, based on autopsies, found that [PFAS accumulated](#) in the brains of people who drank PFAS-contaminated water.

Some former players are unsure what to think. Larry Bowa was the Phillies’ shortstop in 1980, and throughout the team’s first decade at the Vet. He was close to both Vukovich and McGraw.

“To get that disease at such a young age, you sort of scratch your head, ‘Something might be going on,’ ” said Bowa, now 77, and a Phillies senior adviser.



William Cleary, from Givnish Family Funeral Home, carries a portrait of John Vukovich at the end of his memorial service. Michael Perez / Staff file photo

### **The rise of AstroTurf**

The Monsanto Company was long headquartered in a small city outside of St. Louis, Creve Coeur. In French, the city's name translates to a phrase that might seem fitting, given the waves of illnesses and death that have been connected to the company's products: broken heart.

In the mid-1960s, Monsanto manufactured Agent Orange, which was used by U.S. soldiers to deforest portions of Vietnam. After the war, tens of thousands of veterans believed that chemicals in Agent Orange were to blame for an array of diseases they developed: Parkinson's, lymphoma, bladder and prostate cancers. (As part of a legal settlement, 52,000 veterans began receiving payments in 1988 that would total \$197 million.)

While war raged in Vietnam, the philanthropic Ford Foundation tasked Monsanto and one of its subsidiary companies with creating an artificial surface that children could play on, one that would withstand outdoor elements.

Monsanto developed a product called ChemGrass and installed it at a school in Rhode Island.

In 1966, the Houston Astros became the first professional baseball team to use Monsanto's green carpet, installing it at their year-old stadium, the Astrodome. Monsanto renamed its product AstroTurf — and sensed an enormous opportunity.



One Monsanto official bragged to [the St. Louis Post-Dispatch](#) that the company believed its product could be a fit for 40 professional sports stadiums; 2,000 high schools; 575 universities; 175 municipal facilities; and could even replace the lawns and backyards in people's homes.

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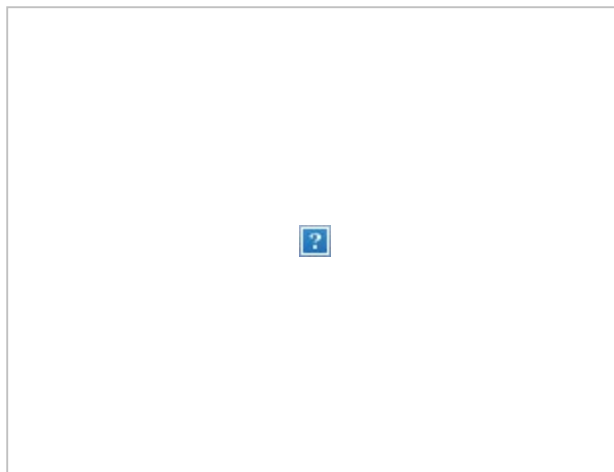
In Philadelphia, city officials and Phillies executives were mired in a yearslong attempt to replace crumbling Connie Mack Stadium in North Philly. The city settled on building a new ballpark in South Philly, on an expanse of marshland that stretched south from Packer Avenue to Pattison Avenue, east from Broad Street to 10th, an area that local residents referred to as "the valley."

From the start, the project was a boondoggle. City officials disagreed over how much the stadium should cost (the budget soared from \$25 million to \$50 million) and what to call it. A grand jury indicted the manager of the project for accepting a \$10,000 bribe from a potential contractor. Cracks were found in concrete panels at the top of the stadium before it even opened.

But the playing field didn't figure to be much of a problem. Phillies and Eagles executives agreed that artificial turf made the most sense, because the field would have to withstand both baseball and football games.

The city awarded Monsanto a \$1.5 million contract to install its AstroTurf on Veterans Stadium's field, along with a drainage system below. The company contended that the turf would save money for the city, which spent at least \$125,000 a year maintaining Connie Mack's grass field.

In April 1971, the Vet finally opened.

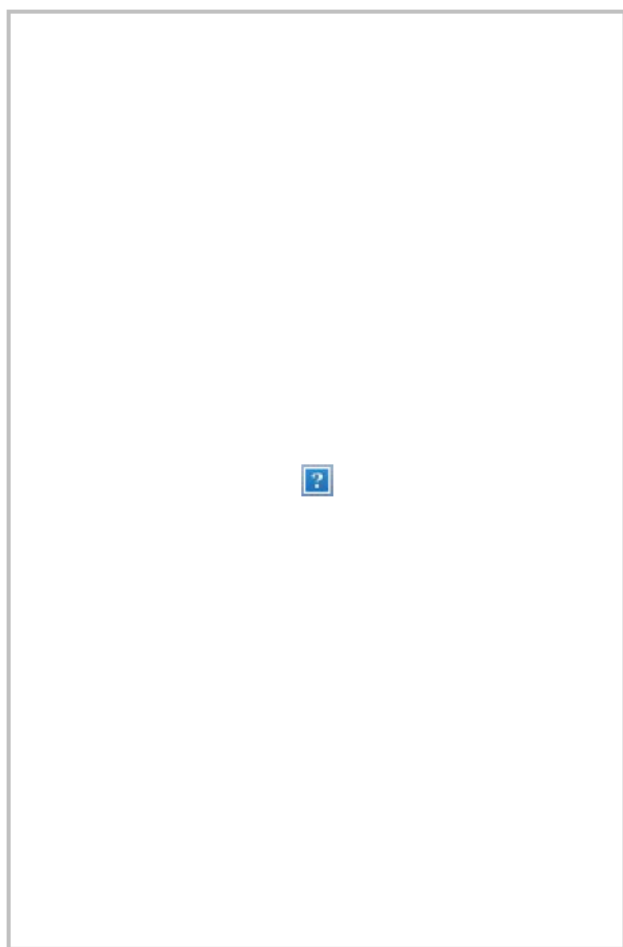


Vet Stadium dedication, April 10, 1971. Philadelphia Inquirer & Daily News archive

The artificial turf presented challenges. When rain fell, enormous puddles gathered on the field and had to be mopped up by a Zamboni. Balls hit into the outfield bounced off the turf and over the walls for ground-rule doubles so often that the Phillies had to raise the fences four feet. Underneath the fake grass was just a thin layer of padding, then blacktop.

"It was like playing on concrete," recalled Bob Boone, a Phillies catcher from 1972 to 1981.

And unlike grass, the artificial carpet trapped heat, especially during summer day games. The blades of plastic grass were practically cooking; temperature gauges recorded figures that regularly soared above 100 degrees, and sometimes reached 165 degrees, releasing toxic vapors that could be inhaled.



This temperature on the field reached around 150 degrees at Veterans Stadium in a game against the San Diego Padres on Aug. 9, 2001. David Maialetti / Staff file photo

As a catcher, Boone spent most of the game crouched over dirt, which was cooler. He remembers outfielders and infielders, though, whose metal cleats burned while they were on the field at the Vet.

“In the dugout, the team put boxes with ice on the stairs leading up to the clubhouse,” Boone said. “I’d come in and see guys standing with their feet in the boxes. I used to spend my day laughing at them: ‘Getting hot out there?’ ”

[Read more](#)

## **Artificial turf was once touted as a ‘magic carpet.’ Here’s the timeline of its tangled past.**

Some scientists are now sounding the alarm because artificial grass typically contains PFAS, nicknamed “forever chemicals.”

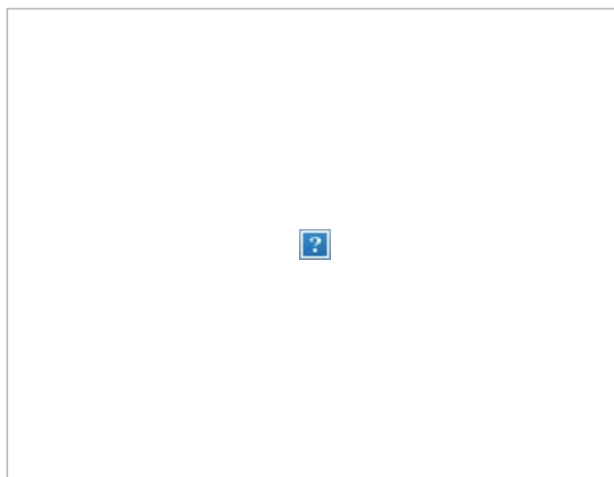
Artificial turf carpeted other multipurpose municipal stadiums, similar to the Vet, that were built in the ‘60s and ‘70s in St. Louis, Cincinnati, and Pittsburgh.

Bowa remembers watching someone crack an egg on the turf in St. Louis’ Busch Memorial Stadium before a Sunday afternoon game in the 1970s.

“The egg,” he said, “fried on the turf.”

“You could see it from the stands, the heat coming off from the turf,” said Bobby Brett, who watched his brothers, George and Ken, play for the Royals in Kansas City’s Kauffman Stadium, which also used artificial turf.

Baseball players, meanwhile, complained of back, knee, and foot injuries that they developed from spending so much time on the unforgiving surface. Some discovered wounds on their arms after they dove for a ball. Turf burns, Bowa called them.



Manager Larry Bowa and coach John Vukovich talk to some of the players before opening day at the Vet with its new turf April 2, 2001. Ron Cortes / Staff file photo

Management of the Vet fell to the city's Department of Recreation. Annual reports from the 1970s, reviewed by The Inquirer, show the department was primarily focused on the stadium's financial performance. No references were made to the publicized complaints by Phillies players and others across the National League about the condition of the field.

The fake grass did not prove to be as cheap or durable as initially advertised. The city spent roughly \$8 million to have the Vet's turf replaced five times during its 33-year history; nearly \$4 million went to Monsanto alone.

In 2018, Bayer, the German pharmaceutical giant, purchased Monsanto for \$63 billion. Bayer did not respond to a request for comment.

### **'Superman doesn't get hurt'**

The headaches first started to bother John Vukovich during spring training in 2001. He was 53, coaching third base for the Phillies, working for Bowa, who was in his first season as the team's manager.



Manager Larry Bowa talks with coach John Vukovich, who is holding a sore shoulder, which knocked him out of the game. George Reynolds / Staff file photo

Vukovich had a reputation for being tough on everyone — players, coaches, himself. He didn't want to take time off to investigate the headaches. But Bowa noticed that Vukovich was struggling.

"You sure you're OK?" Bowa asked one day.

"Yeah, yeah," Vukovich said.

By that May, the ongoing discomfort compelled him to visit Thomas Jefferson University Hospital. Doctors discovered a tumor, 3 centimeters by 4 centimeters, in Vukovich's left occipital lobe, the area of the brain that controls vital cognitive functions like vision, memory, and reading.

A surgeon removed a grape-sized portion of the tumor. Tests would determine if it was cancerous.

Born in Sacramento, Calif., Vukovich had been selected by the Phillies in the 1966 amateur draft. He made his professional debut with the team in 1970. Though just a lifetime .161 hitter, he was considered a critical ingredient in the 1980 club's chemistry, a guy who volunteered to be the emergency catcher and wasn't afraid to confront teammates who didn't play the right way.

"He never told you what you wanted to hear," Bowa said. "He'd tell you the truth. It didn't matter if you were making \$10 million or the bare minimum. He had one goal: to win."



John Vukovich whoops it up after a Phillies home run in the 1980 World Series. Philadelphia Inquirer & Daily News archive

Bowa, a fellow Sacramento native, first met Vukovich on a baseball diamond in California when they were teenagers. "He was running his mouth," Vukovich told the Daily News. "We were about 16 years old and he was chirping."

The two grew up together in the Phillies organization, going to the World Series as players in 1980, and then again as coaches on the Phillies' wild 1993 team.

They often joked about their shared intensity; they could scream at each other at the ballpark one day, then be happy to see each other the next.

"All the guys you play with are your friends," Bowa said, "but he literally was my best

friend.”

The test results on Vukovich’s tumor came back with hopeful news: The tumor was benign. There was a cautious *but* attached to the diagnosis; it could still become cancerous. Phillies players and coaches, emotional over Vukovich’s sudden illness, displayed his No. 18 jersey in their dugout while he spent a month recovering.

“It was devastating,” Bowa said.

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Gus Hoefling, a former Phillies strength and conditioning coach, occasionally hunted deer with Vukovich in South Carolina. Surgery and radiation treatments took a toll on Vukovich.

“He was just moody, sometimes irrational,” Hoefling said. “It changed his personality.”

In 2006, Vukovich’s tumor grew malignant. By March 2007, he’d fallen gravely ill at Jefferson, but forbade his old pals from visiting. Bowa appealed to Vukovich’s wife, Bonnie.

“Can I see him?” Bowa asked.

“Bo,” she said, “he doesn’t want to see anybody.”

Bowa considered sneaking into the hospital, just to peek at his friend one last time, but decided against it. Vukovich, a father of two, died on March 8 at age 59.



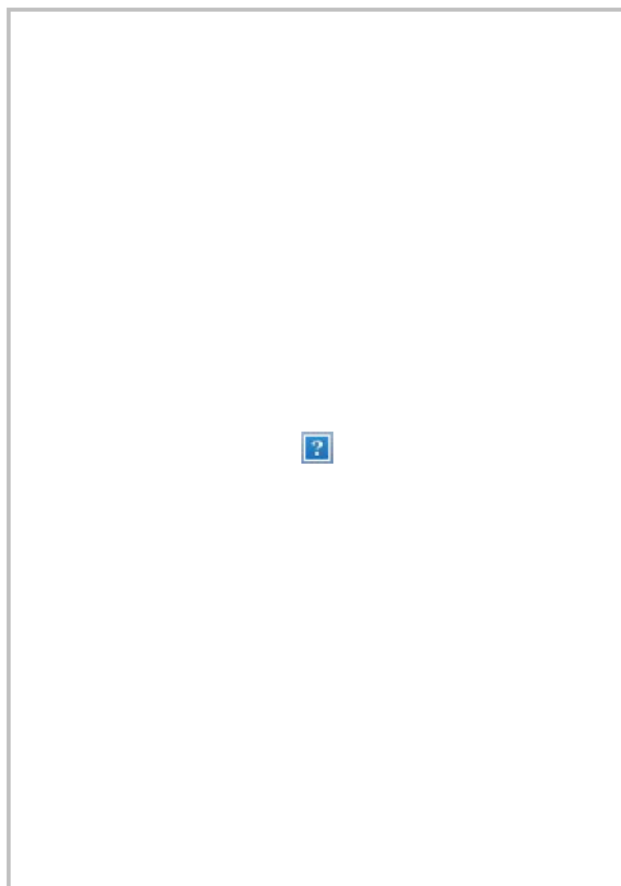
Larry Bowa leaving the memorial service for John Vukovich, who died of a brain tumor. Michael Perez / Staff file photo

In 1999, another former teammate of Bowa's, Ken Brett, noticed that his pinkie finger felt numb when he jogged. A small nuisance, really, especially for a 6-foot former professional ballplayer who'd been known in El Segundo, Calif., as the strongest, most-talented athlete in a brood of four brothers, one of whom — George Brett — ended up in the baseball Hall of Fame.

Ken Brett mentioned the tingling to his doctor. An MRI revealed the problem: a brain tumor.

Brett assured his daughter, Sheridan, and son, Casey, that he would get surgery and fight the disease.

"He was this larger than life person," said Sheridan, 34. "He was always strong. I was 11 when he got sick, and he did whatever he could to make me feel safe."



Former Phillies pitcher Ken Brett, who played for 10 teams during his career, including the Kansas City Royals in 1980. Philadelphia Daily News file photo

Brett was selected by the Boston Red Sox with the fourth overall pick of the 1966 draft; a year later, at age 18, he pitched in the World Series against the St. Louis Cardinals.

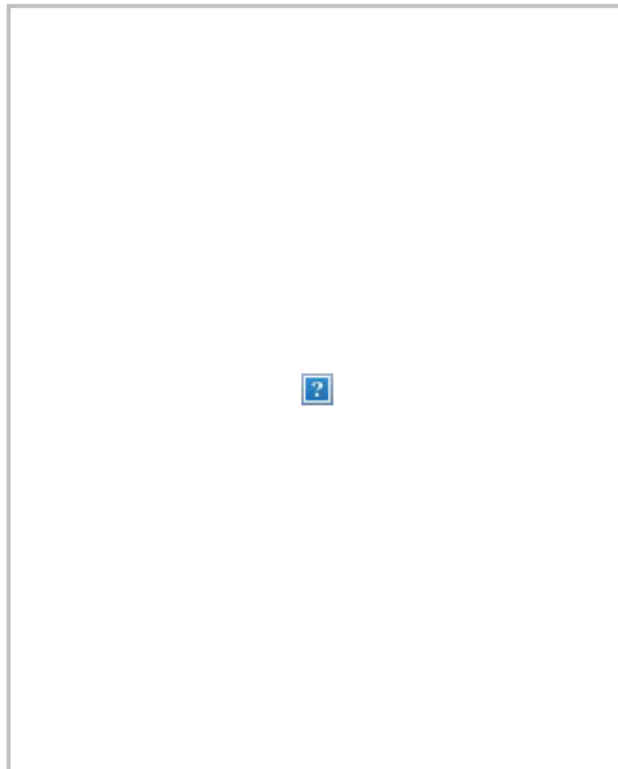
He played for 10 different teams — including the Phillies in 1973 and Royals in 1980 — and then became a professional announcer who competed, in his spare time, in triathlons.

“This guy was like Superman,” said Bobby Brett. “Superman doesn’t get hurt.”

Like Vukovich, Ken Brett endured surgery and cancer treatments, hoping he could beat the disease. “For a while, it seemed like everything was fine,” Bobby said. “Then it came back, more aggressive.”

In November 2003, at age 55, Ken died. He was the third former Royal felled by a brain tumor, joining Quisenberry, who died in 1998, and former manager Dick Howser, who died in 1987.

A year after Brett died, in December 2004, former Texas Rangers manager Johnny Oates died at age 58. He battled glioblastoma, which affects a little more than three in every 100,000 people, according to the National Institutes for Health. That rate has risen in recent years, but researchers aren’t sure why. A onetime major league catcher, Oates played for the Phillies for two seasons in the 1970s.



Former Texas Rangers manager Johnny Oates, who played for the Phillies in 1975 and 1976.AP file photo

Brett’s family began to discuss whether his illness was linked to artificial turf after reading [a New York Times article](#) in 2017 about former baseball players who’d died of



glioblastoma.

“It almost adds an extra layer of pain,” Sheridan said. “These are guys who took care of their bodies. They were physical for a living. Most of them didn’t have health problems before they started dying in their 40s and 50s from brain cancer.”

Sheridan said she thinks the issue is worth further study — “most importantly” for kids who play on artificial turf and might be exposed to PFAS.

“Those chemicals don’t go away,” she said. “Who is in contact with them now?”

The remaining Brett brothers own two minor league baseball teams that are based in Washington, and a third in California. Bobby, the managing partner, said all the teams have natural grass in their home ballparks.

### **The burden of proof**

In the late 1990s and early 2000s, the era of cookie cutter municipal stadiums and their ubiquitous green carpets started to draw to a close. In Philadelphia, the Phillies and Eagles each built new stadiums and emphasized that the fields would be made of natural grass.

Just five of Major League Baseball’s 30 teams still play on artificial turf, along with 16 of the NFL’s 32 teams. FIFA, professional soccer’s international governing body, insists on natural grass fields for World Cup matches. (The Eagles’ Lincoln Financial Field will be a 2026 World Cup site.)

While professional sports teams have moved away from artificial surfaces, the city still maintains five public turf fields in South, North, and Northeast Philly. An additional six artificial turf fields are managed by the School District of Philadelphia.

The city also wants its \$250 million renovation of FDR Park in South Philadelphia to include a dozen new turf fields. Some residents oppose the plan, arguing the chemicals in the fake grass could harm the environment and young athletes.

Huertas, Kenney’s spokesperson, said the city is seeking turf products and infill materials that don’t contain PFAS.

In the United States, the government and industry response to the risk that forever chemicals pose to human health — and what that risk means for products like artificial turf — has been slow and scattered. The chemicals remain largely unregulated.

“The burden of proof is really on the science to demonstrate that there has been harm rather than on the industry to demonstrate that the product is safe,” said Jennifer Jacquet, an associate professor of environmental studies at New York University.

Several towns in Massachusetts and California have, on their own, implemented moratoriums on artificial turf. Massachusetts, Connecticut, and Vermont have bills at the state level to ban fake grass. As of January, Maine prohibited the sale of rugs, carpets, and fabric treatments that contain PFAS. Even chemical giant 3M announced in December it will no longer use PFAS by the end of 2025, citing “accelerating regulatory trends focused on reducing or eliminating the presence of PFAS.”

The EPA soon plans to enforce severe limits on two of the most widely used PFAS chemicals, PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonic acid), in drinking water.

Both of those PFAS were found in the samples of Veterans Stadium turf that were tested by Eurofins, the largest group of PFAS testing labs in the country. The Notre Dame researchers found five different forever chemicals, including PFOS.

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The gradual enforcement efforts in the U.S. stand in stark contrast to many European countries, which have placed the burden on chemical companies to prove their products are safe, rather than waiting for evidence that a toxic material causes even more disease than originally thought.

“In Europe, authorities have accepted that we should be cautious and therefore they are phasing it out,” said Jacob de Boer, an environmental chemist at the Free University of Amsterdam, who has studied toxic substances his entire career.

Told about six Phillies succumbing to brain cancer, he said, “That is such a high number that it is worrying ... In some cases it’s better not to wait for the 100% proof.”

Many environmentalists say PFAS has reached a “contamination crisis.”

[Read more](#)

**From 2003: Twelve employees of Rohm & Haas develop brain tumors**

All worked at the chemical company's old research center in Spring House, Montgomery County.

“We’re running on a toxic treadmill. There are literally thousands of other PFAS that are coming at us,” said Erik Olson, senior strategic director for the Natural Resources Defense Council, an environmental advocacy group. “Until the EPA phases out the whole class, we’re going to be stuck on this treadmill and we’re never going to get a handle on the problem.”

Concerns about these pervasive forever chemicals aren’t limited to athletes playing on artificial turf.

The same chemicals lurk in the turnout gear that firefighters regularly wear, and cancer has emerged as their leading cause of death, making up 75% of active-duty firefighter fatalities in 2019.

In Montgomery and Bucks Counties, the Centers for Disease Control and Prevention is examining the human health effects of PFAS on people who live near two military bases there, part of a national study. The bases used firefighting foam containing PFAS that leached into the water supply.

While the list of health problems linked to PFAS continues to grow, environmental advocates say that it is difficult to establish causation between exposure to forever chemicals and specific illnesses, especially among small numbers of people — like the former Phillies.

“So the question becomes what do you do? Do you say we need more studies? We need 100 more players to get brain cancer before we’ll say maybe there’s a problem?” asked Kyla Bennett, science policy director for Public Employees for Environmental Responsibility.

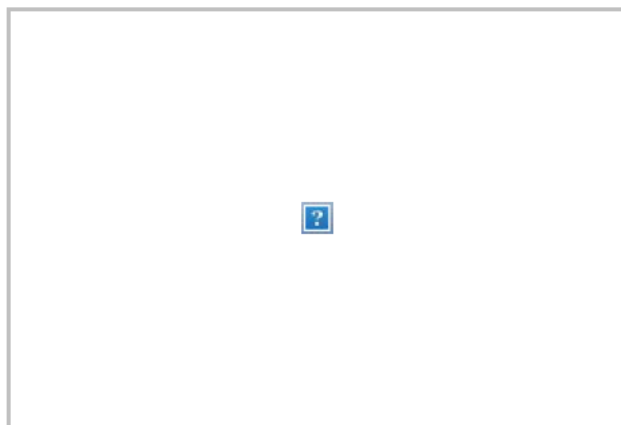
“Or do we use the precautionary principle and say we know these chemicals cause certain types of cancer?”

### **‘Why are all of our teammates dying?’**

The glioblastoma deaths of two more former Phillies — catcher Daulton, in 2017 at age 55, and pitcher West, in 2022 at age 57 — bolstered concerns about a possible connection to Veterans Stadium’s turf.

“It was just sad all the way around to lose all those guys. To lose them that way,” said

former Phillies pitcher Larry Christenson. “Then you start thinking, with Vuke, Darren Daulton — it opened a can of worms: ‘Whoa. Why are all of our teammates dying? Is there something that can narrow it down?’”



Former Phillies catcher Darren Daulton (second from left) gets a hug from 1993 Phillies manager Jim Fregosi as Larry Bowa (left) and John Vukovich (right) watch. Johnny Podres is in the background. The group was reunited for the 10-year anniversary of the 1993 championship season. G.W. Miller III / Staff file photo

The Phillies consulted with Kyle Walsh, a Duke University associate professor in neurosurgery and pathology.

“Having six Phillies develop glioblastoma, on its face, seems higher than you would expect,” Walsh said in a recent interview. “But it’s also within that key demographic of who you’d expect to develop it.”

The disease most often strikes non-Hispanic white men, between the ages of 40 and 70. Walsh, who also serves as the director of Duke’s Division of Neuro-epidemiology, said researchers examine a variety of factors that could contribute to a person’s risk of developing brain cancer, including genetic history and diet.

[Read more](#)

## **Darren Daulton’s brain cancer: Bad luck, or part of a pattern?**

Tug McGraw, John Vukovich, Johnny Oates, and Darren Daulton all developed brain cancer after playing for the Phillies. Here’s what the numbers mean.

He doesn’t believe, however, that PFAS could be a root cause of brain cancer.

“PFAS and other potential toxicants in blood reach the brain at 1000-fold lower levels than they do other organs, like the liver and kidneys,” Walsh said.

In a [January 2023 study](#) published in the Journal of Hazardous Materials, Chinese researchers say there could be a link. “Our findings suggest that exposure to PFAS might increase the probability to develop glioma,” they wrote.

Environmental advocates and scientists had long been concerned about a different aspect of artificial turf: pieces of recycled car tires that manufacturers used to make turf more cushioned and durable. The rubber contained heavy metals, including lead and other carcinogenic compounds like nickel, chromium, benzene, cadmium, and arsenic.

A 2019 EPA report on turf and recycled tire crumb rubber concluded that while the pulverized tires contained harmful chemicals, the risks of human exposure were low. (The agency, however, noted that the report was “not a risk assessment” and is now working on a second report on artificial turf.)

Meanwhile, many turf manufacturers have replaced crumb rubber with cork, sand, and other materials.

On Sept. 28, 2003, the Phillies played their final game at the Vet, a 5-2 loss to the Atlanta Braves. During a postgame ceremony, players from past teams trickled onto the field for a bittersweet reunion.

The last player to join the fray was Tug McGraw, who emerged from a black limousine. “Number 45,” shouted announcer Harry Kalas, “Tug McGrawww!”

McGraw, smiling, decked in his old maroon uniform, knew what he was expected to do.

Earlier that year, McGraw complained to Christenson, a close friend with whom he sometimes lived, that he was experiencing terrible headaches.

Bowa invited McGraw to Clearwater, Fla., to work with the Phillies during spring training. One day, a mutual friend called Christenson and said McGraw had gotten lost — for three hours.

McGraw went to a local hospital, where doctors discovered he had a brain tumor. McGraw endured surgery and months of chemotherapy treatments.

As a young pitcher with the Mets, McGraw coined the phrase, “Ya gotta believe!” and carried a lighthearted spirit throughout his career. Weeks after his cancer surgery, he

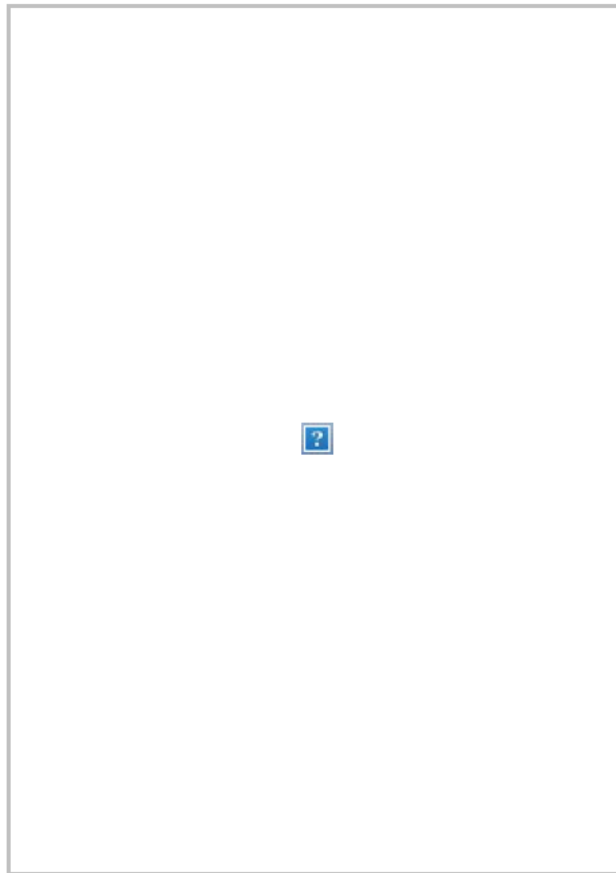
assured reporters: "I'm supposed to be alive for a long time."

But McGraw's prognosis was grim.

"To watch what that disease does to people ..." Christenson said, his voice trailing off.

At the Vet, McGraw tucked his right hand inside a light brown baseball glove and trudged across NeXturf, the final artificial carpet to cover the stadium's field. He stood on the pitcher's mound, just as he had on a late October night in 1980, when his biggest concern was whether he could sneak a fastball past Willie Wilson.

With his once-shaggy mane left short by chemotherapy, McGraw mimed his final World Series pitch and reached to the sky, triumphant.



Tug McGraw reenacts his leap after winning the 1980 World Series during a postgame ceremony after the final game at Veterans Stadium in 2003. It was demolished a few months later. G.W. Miller III / Staff file photo

The stadium filled with thunderous applause, and McGraw beamed. Former teammates in pinstriped jerseys wrapped him in their arms.

It was a moment of fleeting joy.

On Jan. 5, 2004, Tug McGraw died at age 59.

A little more than two months later, 3,000 pounds of explosives that had been planted

inside the Vet's soaring columns were detonated, and the old stadium crumbled in a fog of dust and debris.

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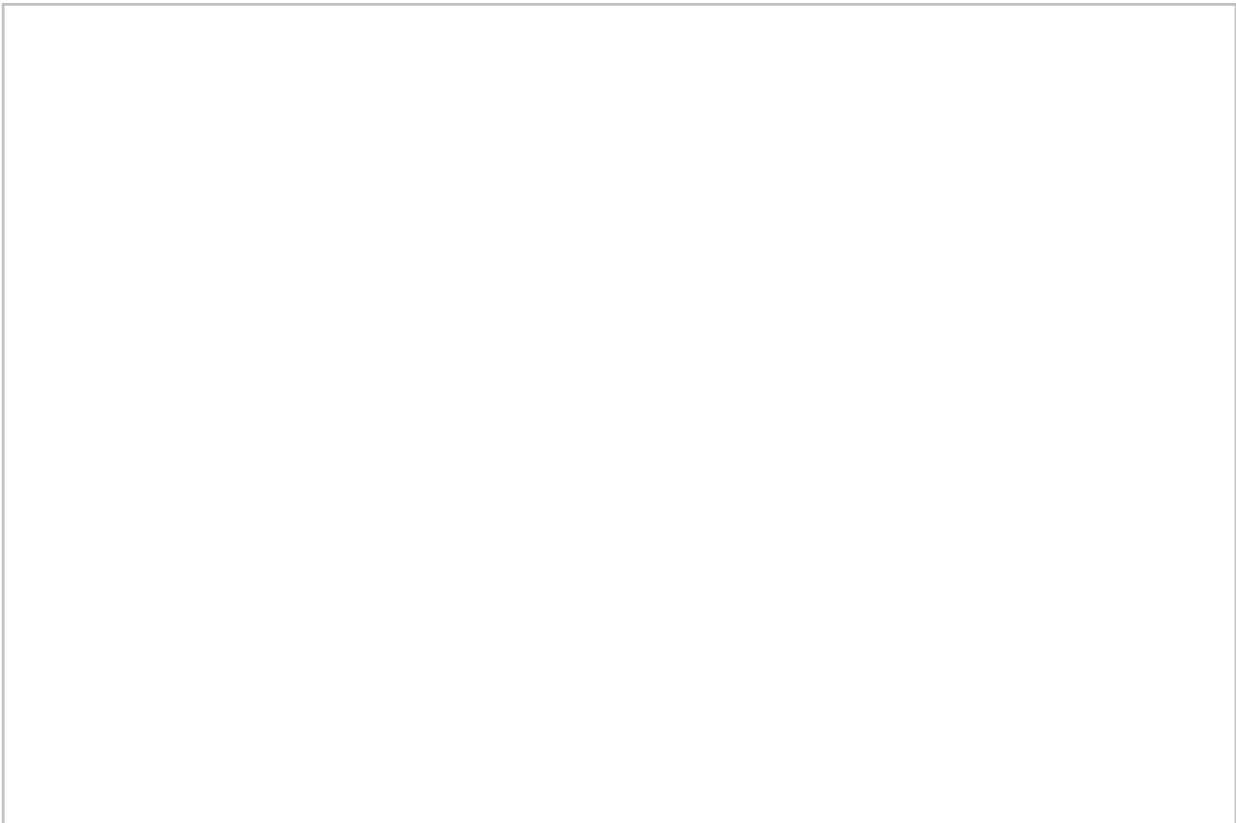
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## **What to know about ‘forever chemicals,’ artificial turf, Phillies cancer deaths, and our story**

Experts say data is lacking to understand the risks of inhaling PFAS or by coming into repeated contact with it on a playing field.





Heather Whitehead, a doctoral candidate in chemistry and biochemistry, works with samples of artificial turf from Veterans Stadium at the University of Notre Dame on Feb. 9. Jessica Griffin / Staff Photographer

by [Barbara Laker](#) and [David Gambacorta](#)

Updated on Mar 7, 2023, 5:00 a.m. ET

Longtime Philadelphia sports fans remember these names: Tug McGraw. Darren Daulton. John Vukovich. John Oates. Ken Brett. David West.

All six played for the Phillies. And all six died of glioblastoma, an aggressive form of brain cancer. All were younger than 60.

And all played at Veterans Stadium on a field that was considered state-of-the-art, a so-called “magic carpet”: artificial turf. But in recent years, environmentalists, scientists and researchers [have expressed growing concern](#) that the chemicals in the turf could possibly be linked to some kinds of cancer and other health problems.

» **READ MORE:** [Six former Phillies died from the same brain cancer. We tested the Vet’s turf and found dangerous chemicals.](#)



Darren Dalton, (left), John Vukovich, Bob Boone, Mike Schmidt, and other Phillies who played at Veterans Stadium, take a final lap around the field after the last game at the stadium Sept. 28, 2003. G.W. Miller III / Staff file photo

### **What chemicals were in the artificial turf at Veterans Stadium?**

Among the chemicals found in AstroTurf are PFAS, or per-and polyfluoroalkyl substances — so-called “forever chemicals,” which the EPA has said cause “adverse health effects that can devastate families.”

They are found in a host of products, from turf and nonstick cookware to firefighting gear and food packaging. Few of the estimated 12,000 PFAS have been extensively studied.

### **Why are they called ‘forever chemicals?’**

They don’t break down in the environment. In the case of artificial turf, PFAS can seep into the soil or wash into the water supply. They stay in the human body for years.

### **How do we know for sure that the turf contained these chemicals?**

The Inquirer [obtained pieces of the turf](#) that was on the field at Veterans Stadium from

1977 to 1981. Tests run on those samples by Eurofins Lancaster Laboratories Environmental Testing found the turf contained 16 different types of PFAS. Researchers at the University of Notre Dame tested additional samples of the Vet's turf, and also found the chemicals.

» **READ MORE:** [How we were able to test artificial turf from Veterans Stadium and what the tests showed](#)

### **Do we know if this caused the Phillies to die of brain cancer?**

Experts say that there isn't sufficient data to fully understand the potential risks of inhaling forever chemicals, or coming in repeated contact with them on a playing surface. Thus far, there have been no studies linking forever chemicals to brain cancer.

Recent international studies have found PFAS chemicals in the human brain, including in tumors. The chemicals have been [linked to kidney and testicular cancer](#), decreased fertility and immunity to fight infections, and increased risks of asthma and thyroid disease. The rate of brain cancer among the 532 Phillies who played at the Vet between 1971 and 2003 is about three times the average rate among adult men. Experts say that could be coincidental, given the small size of the group.

### **How many stadiums still use artificial turf and how many playing fields in Philadelphia are not real grass?**

Just five of Major League Baseball's 30 teams play on artificial turf; 14 of the NFL's 30 stadiums have it. FIFA, professional soccer's governing body, insists on natural grass fields for World Cup matches.

Philadelphia maintains five public turf fields in South, North, and Northeast Philly. An additional six artificial turf fields are managed by the School District of Philadelphia. And the city plans to include a dozen new artificial turf fields as part of its \$250 million renovation of FDR Park in South Philly, despite opposition from some residents and environmentalists.

### **Has artificial turf and other products with PFAS been banned or restricted?**

Yes.

Several towns in Massachusetts and California have put in place moratoriums on artificial turf; Massachusetts, Connecticut and Vermont have bills at the state level to ban fake grass. Maine prohibits the sale of rugs, carpets and fabric treatments that contain PFAS. Even chemical giant 3M announced in December it will no longer use PFAS after 2025.

## What is the EPA doing about this potential hazard?

Last summer, as a preliminary step, the EPA published drinking water health advisory levels for two of the most widely used PFAS chemicals, PFOS and PFOA.

These levels, when the EPA officially adopts them, will require municipalities to essentially eliminate PFAS from their drinking water. The EPA is expected to make the limits enforceable soon. The agency has also published a multi-year plan to study and address PFAS contamination across the country.

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» **READ MORE:** [Artificial turf was once touted as a 'magic carpet.' Here's the timeline of its tangled past.](#)

## Could others be at risk?

Yes.

These same chemicals lurk in the turnout gear that firefighters wear to protect themselves on the job. Cancer has now emerged as their leading cause of occupational death, making up 75% of active-duty firefighter deaths in 2019.

Drinking water contaminated with PFAS is also hazardous. A former Navy base in Warminster and another in Willow Grove used firefighting foam containing PFAS that has [leached into the public water](#) supply. As part of a national study, The Centers for Disease Control and Prevention is examining the human health effects of PFAS on people who live near those two former bases.

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"Never forget that justice is what love looks like in public."  
Cornell West

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