REPORT AND RECOMMENDATION

of the

DHS Athletics Complex Joint Building Committee

May 21, 2025

Committee Members

City Council	School Board	Community
Fergus Cullen	Michelle Clancy	Ernie Clark
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Consultants

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INTRODUCTION

Dover High School's Dunaway Field and baseball field opened in 1967 are now 58 years old. They served the community well, but are showing their age. Drainage systems failed. Decades of freezing and thawing left surfaces uneven. There are chronic bald patches. Athletes are concerned they will suffer serious injuries due to field surface inconsistencies.

Since the old high school was built in the 1960s, demand for playing time on the fields more than quadrupled. Girls' sports alone doubled the number of young people playing sports in Dover. We added programs – soccer in the 1970s and later, lacrosse. We built the Middle School next door with no fields of its own. Community youth sports boomed. Dover's population grew from 21,000 in 1970 to 33,000 today. Dover High School enrollment increased from about a thousand to 1,400 students.

Among Division I schools in New Hampshire, Dover High's fields are widely regarded as the worst. Dunaway barely holds up for five home football games a year. The track has deteriorated to the point it cannot be used for meets. The baseball dugouts are exposed. Foul balls often land on the Dunaway grandstand or the track while it is in use.

When Dover demolished the 1967 high school a decade ago and built the new one from the ground up, rebuilding Dunaway and the track (with a synthetic infield) was included in the scope of work. Unfortunately, the athletics component was ultimately cut because it was inadequately budgeted.

The need did not go away. Now it is time to revisit the project.

THAT WAS THEN, THIS IS NOW (Old & New DHS)

Construction of the new DHS resulted in a net loss of playing fields

GUIDING PRINCIPLES

1. No net loss of playing fields

   The Dover High School campus is a finite, inflexible parcel, surrounded by a residential area and wetlands. Although we do not have enough playing fields, expansion is not an option. Alternative designs that would have resulted in a net loss of playing fields – such as moving the track across Bellamy Road – were eliminated. Our recommended approach creates a new multi-sport field.

2. Field ready for play Fall of ~~2025~~ 2026

   This project is overdue. Every year of delay equates to higher costs and further deteriorating facilities for our athletes. When the committee formed in January 2024, we aimed to build in 2025. Now we hope to complete the project in 2026.

3. Green field approach

   We looked at the entire 11-acre parcel behind the school as though it were a new, undeveloped site. We optimized the space without being influenced by the existing layout.

4. Do it right

   A community has few chances to build an athletics complex, maybe two times in a century. It should have no regrets about the choices made and the final result.

5. Broad consensus – not unanimity

   A project like this has many stakeholders – athletes, coaches, parents, taxpayers, school administrators, elected officials, and other members of our community. We sought to hear all voices while recognizing unanimity is not realistic. Our recommendations reflect compromise and a balance of competing priorities.

6. Users First

   While we listened to all feedback, more weight was given to the voices of those who use our athletics facilities: players, coaches, parents, and administrators.

EXISTING CONDITIONS

Dunaway Field, with its grandstands and lights, should be the main competition field and the center of our athletics programming. In reality, field conditions allow Dunaway to be used for competition fewer than a dozen times a year – home football games and senior nights for soccer and lacrosse.

- The field often has standing water during and after rain.
- The center of the field has many chronic bare areas.
- Every year the field is closed for the summer to regrow grass for the fall; any success is generally temporary and undone by mid-season.

The track was renovated in 2002 with an all-weather rubberized surface over an asphalt base. Rubber tracks require resurfacing every 10-12 years.

- The track has not been resurfaced in 23 years. Rubber has peeled up or worn down to asphalt in many areas.
- Years of freezing and thawing have left the track uneven in places.
- Dover High has not been able to host meets for several years due to the condition of the track. This year, the track has been closed for middle school meets as well.

Additional problem areas

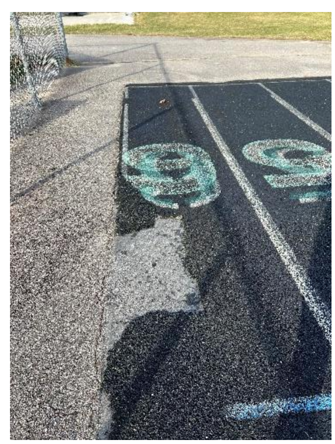
- Grandstands are not ADA-compliant.
    - An accident in 2021 resulted in a $75,000 judgement against the district
- There is no pathway to the visitor grandstand.
- The press box has a hole in the floor.
- No dedicated handicapped parking at the field, just temporary parking on dirt.
- Lights date back to the 1980s. Modern systems are far more energy efficient.
- There is a light tower in baseball's left field, in the field of play.
- Replacement lightbulbs are no longer made for the Dunaway scoreboard.
- Multiple dilapidated sheds and Conex boxes are used for storage.
    - Rodents destroyed high jump pits, requiring the purchase of replacements.
- The district maintenance building dates to 1967.
    - It is significantly undersized for serving the district's five schools,
    - has inadequate heating and ventilation, and
    - a dilapidated bathroom.

Dunaway Field

Mid-season (fall 2024)

Spring

Track



Current Conditions

JAN. 6, 2025 SCHOOL BOARD RESOLUTION

On January 6, 2025, the Dover School Board adopted a constructive resolution identifying its questions, priorities, and guidance. The JBC took this resolution to heart and has attempted to respond to each topic identified by the board in this report
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RESOLUTION

RE: THE DOVER SCHOOL BOARD RECOMMENDATION TO CITY COUNCIL ON THE FUNDING OF THE JOINT BUILDING COMMITTEE ATHLETIC COMPLEX PROJECT

WHEREAS: the City Council has requested the Dover School Board provide a recommendation regarding the funding of the Joint Building Committee (JBC) Athletic Complex project; and

WHEREAS: the School Board is supportive of the Athletic Complex project and acknowledges its potential benefits to the community and student athletes, but seeks to ensure the project is undertaken in the best interest of the community and in a manner that does not adversely impact the funding for core educational needs; and

WHEREAS: the School Board recognizes the recommended project would require a twenty percent (20%) increase in the district's current debt service, and should receive careful consideration and thorough analysis to maintain fiscal responsibility and support for the district's primary educational mission;

NOW, THEREFORE, BE IT RESOLVED THAT:

The School Board recommends deferring a final funding decision for the JBC Athletic Complex project until the Fiscal Year 2026 budget is settled and approved, at which time a line item for the new debt will be included in the school budget.

BE IT FURTHER RESOLVED THAT:

The School Board requests the JBC to continue its efforts during this additional time to address the following outstanding questions and considerations:

- Continue to explore the true needs of the community and the athletic complex, prioritizing safety, accessibility, and the replacement of the bleachers and track.
- Continue to examine options for a phased construction approach or alternative, less expensive options.
- Review scientific data and sources to evaluate the safety of synthetic turf versus natural grass, considering environmental impacts, watershed implications, and the future recycling or disposal of synthetic turf materials.
- Investigate scientific data on sports-related injuries associated with synthetic turf versus natural grass.
- Confirm the actual projected rental revenue to be earned from additional field space.
- Confirm and project the maintenance and replacement costs for the fields at 10-year, 20-year, and 30-year intervals.
- Explore establishing a sub-committee of community volunteers to consider fundraising opportunities to offset project costs, including grant funding, community fundraising, and/or sponsorships.

BE IT FINALLY RESOLVED THAT:

The School Board remains committed to supporting projects that enhance the district's athletic facilities and overall student experience while ensuring prudent financial management and the prioritization of educational needs.

BASE OPTIONS

The committee believes there is consensus in the community that renovating the athletics facility at Dover High School is needed and cannot be put off any longer.

The committee narrowed choices down to two scopes of work: Limiting the project to Dunaway Field and the track, or broadening it to include the baseball field.

Base Option A

Replaces the existing Dunaway Field, track, grandstands, lights, and concessions shacks. It does little more than replace what is there now.

Cost: $11,614,000

Base Option B

Includes everything in Base Option A plus renovating the baseball field, expanding the outfield to create a new multi-sport field. Expanding the baseball field in this manner will require the demolition and replacement of the maintenance building.

Cost: $20,037,000

Alternatives

Each Base Option offers choices that increase or decrease the scope of work and cost. The main alternatives are:

1. Shift Dunaway Field to allow for the rotation and expansion of the baseball field, which would create the second, multi-sport field.
2. Use of synthetic turf or natural grass for playing field surfaces.

RECOMMENDATION

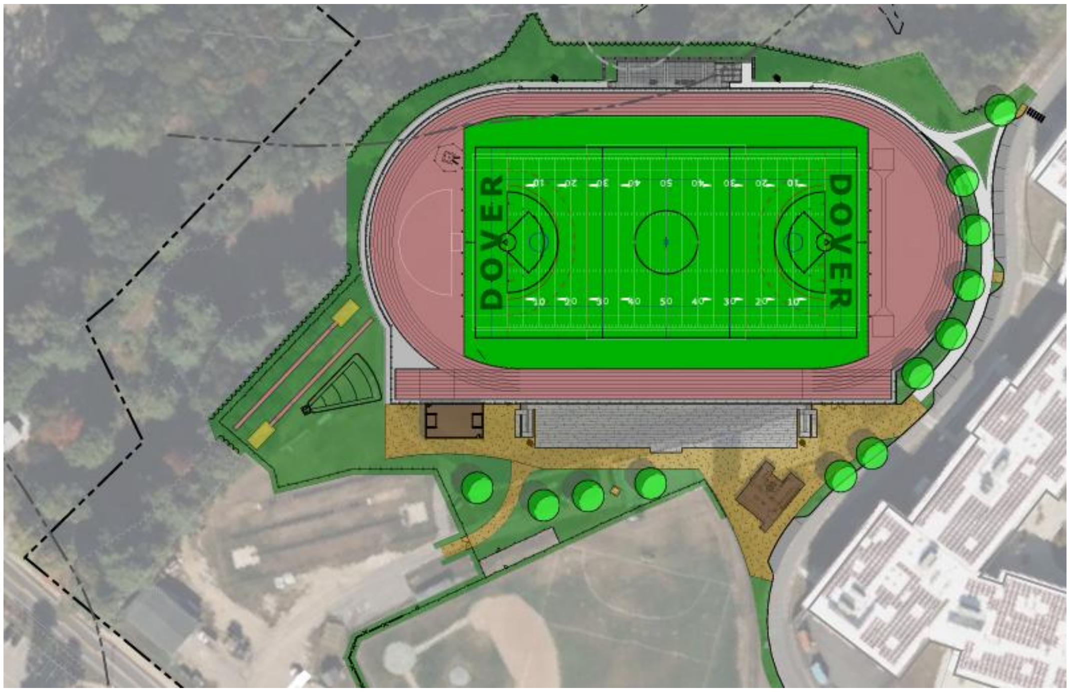
The JBC recommends the full scope of work contained in Base Option B, including the new baseball / multi-sport field and the conversion of both fields to synthetic turf.

The JBC further recommends the School District:

- Create a new capital reserve account for the purpose of saving for eventual field resurfacing
- Consider earmarking any net rental income for capital reserves
- Enter a new, outside maintenance contract for synthetic fields
- Review its existing heat and humidity safety protocols and revise them, if needed, to reflect differences between synthetic and natural grass fields

Feehan High School in Attleboro, Massachusetts is comparable to the JBC's recommended scope of work. It has a main stadium field, and a multi-sport field within its baseball field. Both fields have synthetic turf with lights.

BASE OPTION A: "Just Dunaway" ($11,614,000)



Includes:

- Dunaway Field: Full replacement
  - Widens, shifts, and pivots the field, moving it slightly toward the tree line
  - Rebuilds from the bottom up: all new drainage, all new subgrade materials
  - Lined for soccer, lacrosse, field hockey, and football
  - Converts the playing surface to synthetic turf with a shock pad
- Running Track: Full replacement
  - Six-lane oval with an eight-lane straight
  - Rubberized, all-weather surface over asphalt base
  - Field events spaces for the jumps, throws, and pole vault
- Lights: Full replacement
  - Four, 80-100 foot tall towers (two towers on each long side of the field)
  - No-spill LED lights, 50 footcandles of light.
- Grandstands and Press Box: Full replacement
  - Home: ADA-compliant 1,884 seats (current: about 2,100)
  - Visitor: ADA-compliant 500 seats (current: about 1,700)
- Concessions building: Full replacement
  - Includes ADA-compliant bathrooms
- Athletics equipment storage: New structure replaces sheds and Conex boxes

BASE OPTION B: Dunaway + Multi-Sport Baseball Field + Facilities Building ($20,037,000)

Includes everything in Base Option A, plus:

- Baseball Field: Full replacement
  - Rotates baseball field nearly 180 degrees for better solar alignment
  - Expands the outfield to create a second, multi-sport field
  - Allows two, 60-foot softball or youth baseball fields
  - Synthetic turf, including a synthetic infield
- Lights: New addition
  - Six, 90-100 foot tall towers (two on each foul line, two in the outfield)
  - Right field tower would be shared with Dunaway, with two clusters of lights
  - No-spill LED lights, 50 footcandles of light for the infield and 30 footcandles of light for the outfield
- Maintenance building: Full replacement
  - Relocates building so it is setback more from the road
  - Larger, modern space (5,400 square feet + outdoor storage)
- New 25-car, ADA-compliant parking and a pick-up / drop-off area

SUMMARY OF ALTERNATIVES

"JUST DUNAWAY FIELD"

BASE OPTION A: $11,614,000
"Just Dunaway Field"

INCLUDED
- Synthetic Turf
- 6-Lane Track
- 8-Lane Straightaway
- Musco Lights
- 1,884-Seat Home Stands
- 500-Seat Visitor Stands
- Storage Building
- Concession and Restroom Building

ALT A1: Add $1,924,000
"Renovate Baseball Field"

INCLUDED:
- New subgrade drainage
- Sod and Irrigation
- New backstop
- New infield fence
- Dugout pad
- Material allowance for dugouts

Excluded:
- Outfield fence
- Batting cages
- Seating
- Lights
- Dugouts

ALT A2: Deduct $849,000
"Not Pivoting Dunaway Field"

- Would preclude baseball field reconfiguration and multisport use permanently
- Concessions / Restroom building is reduced to concessions only

ALT A3: Deduct $400,000
"No Synthetic Turf on Dunaway"

Included
- Sod
- Drainage
- Irrigation

“Dunaway Field + Multiuse Baseball Field + Maintenance Building”

BASE OPTION B: $20,037,000

“Dunaway Field + Multiuse Baseball Field + Maintenance Building”

INCLUDED
- Fully replaces and pivots Dunaway Field
- New reconfigured, synthetic turf multisport baseball field with lights
- New maintenance building and 25 space, ADA-compliant parking lot

ALT B1: Deduct $2,407,000

“Maintenance Building & Parking Lot”

INCLUDED:
- 5,400sf Maintenance Building
- 25 Space ADA-compliant parking lot
- Material storage bays
- Gravel Pad for outdoor storage / future Pole Barn
- Dumpster enclosure and pad

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ALT B2: Deduct $585,000

“No Synthetic Turf on Multisport Baseball Field”

Included
- Sod
- Drainage
- Irrigation

ALT B3: Deduct $320,000

“No Lighting on Multisport Baseball Field”

- Light tower foundations and conduit are included for future light towers

ALT B4: Deduct $160,000

“No Lighting Infrastructure on Multisport Baseball Field”

- No light tower foundations or conduit included for future light towers
- Must also select ALT B3

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UNDERSTANDING
KEY DECISION POINTS:

A CLOSER LOOK AT THE ALTERNATIVES

ALT A2: Shifting Dunaway Field

The first major decision point in the project is whether to shift and pivot the existing footprint of Dunaway Field and the track. This allows a full renovation of the baseball field to include a second multi-sport field, now or as part of a future Phase 2.

This image shows the shifted field overlaid on top of the non-shifted field and the existing field.

The shift is subtle, rotating and moving everything closer to the tree line, using space taken up by the existing visitor grandstand. This shift creates space to rotate and expand the baseball field and to create a second multi-sport field. It also improves the solar alignment on Dunaway, reducing the extent to which players have the sun in their eyes.

If we don't shift the field, the home straightaway will stay where it is now.

In both scenarios, the track would be widened to an IAAF-style track, allowing for a larger infield and a wider playing field for soccer. (Of the field sports, a soccer field has the biggest dimensions.)

Not shifting the field precludes the ability to rotate and expand the baseball / multi-sport field *forever*.

The marginal cost of the shift is $849,000 which is driven by the need for a new retaining wall at the back edge of the property.

The JBC recommends shifting the location of Dunaway and the track to allow the rotation and expansion of the baseball field to create a new multi-sport field.

ALT A1: Renovating the Existing Baseball Field on its Existing Footprint

Alternative A1 presents a middle-ground option between Base Option 1 (Just Dunaway) and Base Option 2 (The Whole Project). It recognizes the need to improve the existing baseball field.

This alternative would renovate the existing baseball field on its current footprint and orientation. The field would be dug up to install new subgrade, drainage, and irrigation. It would be leveled and resurfaced with natural grass (sod) and a dirt infield.

Without expanding the baseball field, the outfield cannot be used for much more than baseball. If it can't be used for other sports, the main reason to use synthetic – more field uses – goes away. A renovated grass baseball field, even with much improved drainage, would still be vulnerable to rain-outs and soggy, unplayable conditions, especially in March and April, which is half the season.

The marginal cost of this option is $1,075,000 or $1,924,000. Why two prices? Because if the decision is made to leave the baseball field on its existing footprint, and thereby forever rule out the possibility of rotating and expanding the field to create the second multi-sport field, the $849,000 to reposition Dunaway would not be necessary.

Pros: The school would get a renovated baseball field, and the cost is lower than Base Option B.

Cons: No additional multi-sport field; no additional 60-foot softball / youth baseball fields; the baseball field would continue to have poor solar orientation; and the field would continue to have limited useability early in the season and when wet.

The JBC does not recommend Alt A1. If it is worth renovating the baseball field, the field should be rotated and expanded to create a second multi-sport field. The marginal cost of doing it right is worth the value of getting a second multi-sport field.

Lack of basic safety screening in front of dugouts.

ALT B3 and B4:

Lighting the baseball / multi-sport field

If there is an “extra” in the recommended project, the choice of lighting the new baseball / multi-sport field is it.

Lighting a new baseball / multi-sport field involves six towers: two on each foul line, and two for the outfield / multi-sport field. One of the outfield towers (the one in right field) would be installed with the Dunaway portion of the project. This tower would have two light clusters – one directed at Dunaway, one directed at the baseball outfield.

There is a “middle ground” alternative when it comes to lighting the baseball / multi-sport field. That is to install the foundations and conduit (lighting infrastructure) at the time of construction, and install towers at a later date (and at a higher cost).

Alt B4: Install only infrastructure now: $160,000

Alt B3: Install the towers now as well: $320,000

Deciding to not light the field at all – don’t include Alt B4 or B3 – would thus save $480,000.

The JBC recommends including both Alts B3 and B4. The marginal cost of doing the work now, as part of a of a larger project, is comparatively low while the marginal utility of doing the work is high. It allows evening games and many more field uses. Coming back to install lights at a later date as a separate project would have much higher costs.

Dover’s marching band and color guard also use Dunaway Field.

ALT B2: The Maintenance Building and ADA-Compliant Parking

Base Option B – the whole project – requires us to demolish and replace the existing facilities building. The footprint of the expanded baseball field would take up this space.

The existing facilities building serves the School District's five schools and is only peripherally related to athletics. It dates to the construction of the old high school in the 1960s and long ago ceased to be adequate to serve the School District's needs. It is unsightly, poorly heated and ventilated, lacking in storage space for equipment, and has an appalling bathroom. Many Conex boxes and sheds have grown up around the building over the years, like unwanted weeds, to supplement this building.

The cost of demolishing the existing structure, building a new one, and adding a 25-space parking lot is estimated at $2,407,000 – about 12 percent of the total project. The JBC believes this number can be reduced somewhat through value engineering.

The proposed 25-space parking lot would serve several purposes. First, it would provide dedicated ADA-compliant parking which currently does not exist at Dunaway. Second, it would create a new pick-up / drop-off area for parents, making life easier and safer. The lot could be used for student parking and smaller events such as JV games or a Saturday morning youth baseball game.

The JBC observes replacing the facilities building is a project the School District probably needs to do, irrespective of the athletics project. This expense could be put off if the community limits the project to Base Option 1 ("Just Dunaway"), but the need for a new facilities building capital project does not go away.

ALT A3 and B2:
Synthetic Turf or Natural Sod

The choice of playing surface involves weighing many competing factors. Among these are durability, cost, and environmental concerns.

The JBC unanimously recommends converting our fields to synthetic turf. This is the same conclusion the high school construction JBC reached a decade ago.

1. **Utility:** Synthetic offers far more uses than natural grass. We are a field-poor community in desperate need of more playable hours.
2. **Financially prudent:** While the initial installation cost of synthetic is somewhat higher than rolling out sod, when we factor in maintenance costs over the 10-15 year lifespan of a synthetic field, the cost of synthetic is not much higher than grass, and the cost per use is far lower.
3. **Safety:** Turf fields provide a consistent playing surface throughout the season, reducing the risk of injuries.
4. **Reduced risk of failure:** The risk that a natural grass field would fail within a few years, and leave us right back where we are today with poor quality fields we cannot maintain after spending all this money, is too high.

Most of the subgrade work is the same for installing either synthetic turf or sod. The three most important outcomes of this work are drainage, drainage, and drainage. The existing earth with be excavated to a depth of a couple feet. New materials, including crushed stone, will be spread. Synthetic turf will come with a foam shock pad.

Alt A3 reflects the marginal cost of installing synthetic at Dunaway ($400,000).

Alt B2 reflects the marginal cost of synthetic at a larger baseball / multi-sport field ($585,000). This would include turfing the baseball infield. Turfing the baseball field would also allow for two, 60-foot softball or youth baseball fields, which grass would not.

Thus, the marginal cost of turfing both fields is about $1 million.

The JBC did not consider seeding grass instead of rolling out sod. While less expensive than sod, sod needs one growing season to take root while seeding would require three growing seasons (18 months) before use and comes with an increased risk of failure.

DURABILITY AND USAGE CONSIDERATIONS:

The decisive advantage of synthetic turf is durability and usage. **Synthetic on Dunaway yields 3.5 times as many uses as grass.** The second multi-sport field would add 302 more potential uses. Combined, two synthetic fields would create 766 annual use opportunities – 5.8 times more field uses than one grass Dunaway Field could provide.

Turf fields withstand unlimited use and rainy weather. Their superior drainage means they can be used earlier and later in the year, and immediately after even heavy rainfall. Fewer cancellations of practices and games mean more playing time for athletes and allows sports programs to maintain their schedules.

The chart below calculates the number of expected multi-sport field uses per year (excluding baseball uses) in YELLOW.

Field Uses Per Year				
		10-Year		
GRASS uses per year		Total		
March 18-June 9 (12 weeks), 1 use per day, 6 days per week	72			
August 19 - Nov 10 (12 weeks), 1 use per day, 6 days per week	72			
Additional night uses, annual (6 spring, 6 fall)	12			
Less one rainout per week on average, school seasons	-24			
Total uses:	132	1320		
SYNTHETIC uses per year		Dunaway		Baseball
Feb 26 - March 17 (3 weeks), 1 use per day, 6 days per week	18			
March 18-June 9 (12 weeks), 2 uses per day, 6 days per week	144			
June 10 - Aug 17 (10 weeks), 2 uses per day, 6 days per week	120			120
August 19 - Nov 10 (12 weeks), 2 uses per day, 6 days per week	144			144
Additional night uses (2 per week, school year)	48			48
Nov 11 - Nov 30, 1 use per day, 6 days per week	18			18
Less .5 rainouts per week on average, school seasons	-12			-12
Less heat index days (1 per week for 8 weeks (3 spring, 5 fall)	-16			-16
Total uses:	464	4640		302

Members of the JBC visited scores of grass fields in New Hampshire and nearby states. **We were unable to find a single example of a high-quality natural grass field at a public high school that is used more than a handful of times a year.** One example of a quality grass field is at Plymouth High School. The field is literally roped off and used for 4-6 home football games a year and nothing else. Plymouth football uses a separate field for practices.

Tellingly, **we could not find a single example of a community that installed synthetic turf at a public high school, then went back to natural grass.** Towns that have converted are happy with the results. Portsmouth and Durham are local communities that liked their first synthetic fields so much, they built a second one.

Oyster River liked the synthetic field they built at the high school in 2016 so much, they built a second one at the new middle school that opened in 2022.

COST CONSIDERATIONS

INITIAL INSTALLATION

Most of the cost of building a new field is underground; the field surface is a relatively small part of the overall cost.

Synthetic turf is somewhat more expensive to install than sod. As reflected in Alt A3 and Alt B2, the marginal costs of synthetic for Dunaway is $400,000. For the baseball / multi-sport field, it's $585,000.

	Dunaway			Baseball	
	Turf	Sod		Turf	Sod
Subgrade earth & site work	same	same		same	same
Installation cost	$828,000	$428,000		$1,244,000	$659,000

ANNUAL MAINTENANCE

The JBC concluded **the installation cost savings of sod disappear over the 10-15 year lifespan of a turf field thanks to lower annual maintenance and operating costs.** Turf fields require no mowing, fertilization, aeration, weed control, irrigation, or line striping.

The JBC believes converting to synthetic will keep district annual field maintenance costs about what they are now. Field maintenance costs are rolled into the district's contract with C&W Services; there is not a separate line item tracking this cost precisely. A good faith estimate supplied by C&W Services is that field maintenance costs are about $27,000 a year. The JBC estimates field maintenance costs for synthetic will be about $24,700. These calculations are shown below in GREEN.

However, if sod is selected, the district will need to spend significantly more than it does now to have even a chance of maintaining the grass. Tripling the current maintenance cost for grass brings the annual expense to $81,000**.**

We estimate the true marginal cost of synthetic over 10 years with maintenance costs drops to about $355,000 for both fields. For Dunaway alone, it drops to about $85,000. See below in YELLOW.

The cost-per-use of synthetic is less than one-third of the cost-per-use of grass ($668 vs $208). This calculation is shown below in BLUE.

10-Year Cost Comparsion - Synthetic vs Sod

	Synthetic				Sod		
	Dunaway	Baseball	SUBTOTALS		Dunaway	Baseball	
Sub-grade earth / site work	same	same			same	same	
Installation cost	$828,000	$1,244,000			$428,000	$659,000	
Current annual maintenance[1]					$13,500	$13,500	$27,000
Recommended additional maintenance[2]					$27,000	$27,000	
Continued maintenance costs[3]	$6,750	$6,750					
New contracted maintenance[4]	$5,600	$5,600					
Annual maintenance subtotal:	$12,350	$12,350	$24,700		$40,500	$40,500	
10-Year Maintenance w/2.5% increase	$138,362	$138,362			$453,737	$453,737	
10-year install & maintenance:	$966,362	$1,382,362			$881,737	$1,112,737	
Marginal cost:	$84,625	$269,625	$354,250				
Cost per use (464 vs 132 annual)	$208	$298			$668	$843	

1: Split current costs evenly across both fields
2: Current maintenance inadequate. Recommend tripling investment, from $27,000 to $81,000, if grass is used.
3: Acknowledges school maintenance costs don't go to zero. This reduces current costs in half
4: Bases on initial price quote from one vendor

ENVIRONMENTAL / SUSTAINABILITY CONSIDERATIONS

Opponents of synthetic turf have raised environmental concerns about PFAS, discharges from runoff, and end-of-life disposal, among other objections.

The JBC observes that the concerns raised by some members of the community are not unique to Dover. The same questions have been raised in many communities that have considered converting fields to synthetic turf. These include progressive, environmentally-responsible communities Durham, Portsmouth, and Hanover that all ended up building multiple synthetic fields.

Every college in New Hampshire has at least one synthetic turf field. UNH has five of them. There are more than 40 synthetic fields in New Hampshire. Eleven of Dover's fellow NH Division I high schools play on synthetic fields. Dover athletes play on these fields when they play away games.

All of these communities have considered the same issues and reached the same conclusion as the JBC: The advantages of synthetic turf outweigh any known drawbacks.

Below, we briefly address some of the questions raised in the School Board's resolution. The appendices of this report go into further detail to provide deeper answers.

PFAS: Dover's project can require the manufacturer of a synthetic carpet to certify it is made without any PFAS inputs. That said, PFAS is migratory and everywhere; we are all exposed to it every day. Any field installed in Dover – whether natural grass or synthetic – is likely to test positive for PFAS at some level. After reviewing many studies, the JBC found no conclusive evidence that synthetic turf comes with a heightened risk of PFAS exposure.

Discharges and Watershed: Dover's project will be subject to City of Dover and State of New Hampshire Department of Environmental Services permitting. This process includes comprehensive review of our engineered stormwater management plan. If officials have concerns about discharges or polluted run-off from the field, the project will not get permitted.

Sustainability: The JBC acknowledges that when it is time to resurface a synthetic playing field today, some carpets end up landfilled. This may still be true in the late 2030s, or recycling facilities and markets that are developing now may have matured and be available. The JBC is confident Dover will choose the most sustainable, cost-effective option available at that time.

SUMMARY OF ALTERNATIVES BY COST*

This chart is intended to help the community evaluate the project in terms of *marginal costs*. For example, the difference between Base Option A and Base Option B (without the maintenance building) is about $6 million. Put another way, for 50 percent more, we get a new baseball field and a second multi-sport field.

The Bare Minimum	• Base Option A • Does not shift Dunaway • Does not upgrade to synthetic	$10,365,000
Base Option A	• **Dunaway** • **Track** • **Grandstands & press box** • **Lights** • **Concessions/Bathrooms**	**$11,614,000**
Base Option A + Renovate Baseball - Dunaway shift	• Base Option A • Renovation of baseball field • Does not shift Dunaway • Forever precludes new baseball field with second multi-sport field	$12,689,000
Base Option A + Renovate Baseball + Dunaway shift	• Base Option A • Renovation of baseball field • Shifts Dunaway • Allows new baseball / multi-sport field in a future phase	$13,538,000
Base Option B - Maintenance Building	• Athletics portion only • Maintenance building excluded	$17,630,000
Base Option B	• **Base Option A** • **New baseball / multi-sport field** • **New maintenance building** • **25-car parking lot**	**$20,037,000**

**For clarity and to reduce clutter, the cost impact of baseball lights (up to $480,000) and turf alternatives ($400,000 and $585,000) are not shown.*

HOW ARE WE GOING TO PAY FOR THIS?

Dover has already committed $3.05 million of Capital Improvements Project funding toward the Dover High athletics project:

FY21 – Bleacher project (School District capital reserves)	$350,000
FY23 – design and engineering, adopted CIP budget	$200,000
FY25 – adopted CIP budget	$2,500,000
Total:	$3,050,000

The JBC seeks School Board support for, and City Council approval of, two things:

1. Debt authorization for the balance of the project cost.
2. Amending the School District budget for FY26 to fund debt service.

Three pieces contribute to the total costs of the project:

1. Capital improvements and annual debt service
2. On-going operations and maintenance costs
3. Capital reserves for the field's eventual resurfacing

Debt Service

Base Option 1

Base Option 1						Average	Annual
	11,614,000				Tax Rate	SF Home	Change
Fiscal Yr		Princ Bal	Interest	Total DS	Impact	Impact	Tax Impact
2026		11,614,000	270,026	270,026	0.04	23.23	23.23
2027	580,700	11,033,300	540,051	1,120,751	0.17	98.74	75.51
2028	580,700	10,452,600	513,048	1,093,748	0.17	98.74	0.00
2029	580,700	9,871,900	486,046	1,066,746	0.16	92.93	(5.81)
2030	580,700	9,291,200	459,043	1,039,743	0.16	92.93	0.00
2031	580,700	8,710,500	432,041	1,012,741	0.15	87.12	(5.81)
2032	580,700	8,129,800	405,038	985,738	0.15	87.12	0.00
2033	580,700	7,549,100	378,036	958,736	0.15	87.12	0.00
2034	580,700	6,968,400	351,033	931,733	0.14	81.31	(5.81)
2035	580,700	6,387,700	324,031	904,731	0.14	81.31	0.00
2036	580,700	5,807,000	297,028	877,728	0.13	75.51	(5.81)
2037	580,700	5,226,300	270,026	850,726	0.13	75.51	0.00
2038	580,700	4,645,600	243,023	823,723	0.13	75.51	0.00
2039	580,700	4,064,900	216,020	796,720	0.12	69.70	(5.81)
2040	580,700	3,484,200	189,018	769,718	0.12	69.70	0.00
2041	580,700	2,903,500	162,015	742,715	0.11	63.89	(5.81)
2042	580,700	2,322,800	135,013	715,713	0.11	63.89	0.00
2043	580,700	1,742,100	108,010	688,710	0.10	58.08	(5.81)
2044	580,700	1,161,400	81,008	661,708	0.10	58.08	0.00
2045	580,700	580,700	54,005	634,705	0.10	58.08	0.00
2046	580,700	0	27,003	607,703	0.09	52.27	(5.81)
Totals	11,614,000		5,940,562	17,554,562			

Prepared by City Finance Director Dan Lynch in May, 2025.

Base Option 2

Base Option 2						Average	Annual
	20,037,000				Tax Rate	SF Home	Change
Fiscal Yr	Yr 1	Princ Bal	Interest	Total DS	Impact	Impact	Tax Impact
2026		20,037,000	465,861	465,861	0.07	40.66	40.66
2027	1,001,850	19,035,150	931,721	1,933,571	0.29	168.43	127.78
2028	1,001,850	18,033,300	885,134	1,886,984	0.29	168.43	0.00
2029	1,001,850	17,031,450	838,548	1,840,398	0.28	162.63	(5.81)
2030	1,001,850	16,029,600	791,962	1,793,812	0.27	156.82	(5.81)
2031	1,001,850	15,027,750	745,376	1,747,226	0.27	156.82	0.00
2032	1,001,850	14,025,900	698,790	1,700,640	0.26	151.01	(5.81)
2033	1,001,850	13,024,050	652,204	1,654,054	0.25	145.20	(5.81)
2034	1,001,850	12,022,200	605,618	1,607,468	0.24	139.39	(5.81)
2035	1,001,850	11,020,350	559,032	1,560,882	0.24	139.39	0.00
2036	1,001,850	10,018,500	512,446	1,514,296	0.23	133.59	(5.81)
2037	1,001,850	9,016,650	465,860	1,467,710	0.22	127.78	(5.81)
2038	1,001,850	8,014,800	419,274	1,421,124	0.22	127.78	0.00
2039	1,001,850	7,012,950	372,688	1,374,538	0.21	121.97	(5.81)
2040	1,001,850	6,011,100	326,102	1,327,952	0.20	116.16	(5.81)
2041	1,001,850	5,009,250	279,516	1,281,366	0.19	110.35	(5.81)
2042	1,001,850	4,007,400	232,930	1,234,780	0.19	110.35	0.00
2043	1,001,850	3,005,550	186,344	1,188,194	0.18	104.55	(5.81)
2044	1,001,850	2,003,700	139,758	1,141,608	0.17	98.74	(5.81)
2045	1,001,850	1,001,850	93,172	1,095,022	0.17	98.74	0.00
2046	1,001,850	0	46,586	1,048,436	0.16	92.93	(5.81)
Totals	20,037,000		10,248,922	30,285,922			

Prepared by city Finance Director Dan Lynch in May, 2025.

Annual Operations & Maintenance: Base Options 1 & 2

As discussed above, field maintenance costs are not traceable to a single line-item in the School District budget.

We should be cautious about over-estimating maintenance savings. Synthetic is not maintenance-free. Investing in maintaining the fields is likely to extend the playable lifespan of them. If we can get 2-4 extra years of use, that is a huge return.

Going with synthetic will reduce – but not eliminate – field maintenance costs. There will be lower costs for mowing, painting, aeration, seeding, fertilizing, weed control, and irrigation maintenance. The JBC recommends adding a new, outside field maintenance contract. New equipment costs are expected to roughly off-set.

We believe annual operations and maintenance costs for synthetic will be about $12,350 per field, versus about $40,500 per field for natural grass. With two fields, those costs are expected be about $24,700 and $81,000 respectively. See calculations below in YELLOW.

10-Year Cost Comparsion - Synthetic vs Sod

	Synthetic				Sod		
	Dunaway	Baseball	SUBTOTALS		Dunaway	Baseball	
Sub-grade earth / site work	same	same			same	same	
Installation cost	$828,000	$1,244,000			$428,000	$659,000	
Current annual maintenance[1]					$13,500	$13,500	$27,000
Recommended additional maintenance[2]					$27,000	$27,000	
Continued maintenance costs[3]	$6,750	$6,750					
New contracted maintenance[4]	$5,600	$5,600					
Annual maintenance subtotal:	$12,350	$12,350	$24,700		$40,500	$40,500	$81,000
10-Year Maintenance w/2.5% increase	$138,362	$138,362			$453,737	$453,737	
10-year install & maintenance:	$966,362	$1,382,362			$881,737	$1,112,737	
Marginal cost:	$84,625	$269,625	$354,250				
Cost per use (464 vs 132 annual)	$208	$298			$668	$843	

1: Split current costs evenly across both fields
2: Current maintenance inadequate. Recommend tripling investment, from $27,000 to $81,000, if grass is used.
3: Acknowledges school maintenance costs don't go to zero. This reduces current costs in half
4: Bases on initial price quote from one vendor

Capital Reserves: Base Options 1 & 2

Fields installed in 2025 are better than fields installed just 10 years ago and are expected to last longer. The expected lifespan of synthetic turf is about 10-15 years, dependent on how well the field is maintained. Eventually, replacing the carpet and infill will need to happen. The shock pad is expected to last for two surface replacement cycles.

Current field replacement costs for good quality carpet are about $7.50/sf (no pad). This includes the cost of recycling and/or disposal. That is approximately

- $675,000 for Dunaway Field
- $825,000 for the baseball / multi-sport field

With 2.5 percent annual inflation compounded over 10 years, those costs rise to approximately

- $834,000 for Dunaway
- $1,030,000 for baseball / multi-sport
- Combined as in Base Option 2, that totals $1,864,000.

The JBC recommends the School District place 10 percent of that expense into capital reserves annually for ten years starting the year after the field opens (FY 27). For Base Option 1 and Base Option 2, that would be between approximately $80,000 - $190,000 per year. After Year 10, this number may be adjusted based on actual performance.

The JBC is unable to predict capital expenses beyond about 20 years, or two surface replacement cycles. We are not confident that can be done with enough accuracy to inform policy decisions today.

New Revenue

Rental Income

The JBC reached out to area schools that have synthetic fields; gathered information about rental rates from area private facilities such as those in Epping, Hampton, and the new dome in Somersworth; and communicated with each of Dover's youth programs about field rental budgets.

It is clear that synthetic fields are in demand. The School District will likely generate rental income that can defray maintenance costs or go to capital reserves.

Area School Rates

- St. Thomas Aquinas HS: Charges $125 - $150 per event, more if lights are needed
- Exeter HS: Charges $75 per hour, and a custodial fee of $50 per hour for nonprofit organizations and $100 per hour for for-profit organizations.
- Oyster River HS: Non-profit $120 / hr with a 2-hour minimum and $600 daily rate max; For-profit $225 / hr with a 2-hour minimum and a $1,200 daily rate max; $75 / hr extra for lights; custodial fees of $120-180 minimum.
- Portsmouth HS: Non-profit $50 / hr without lights and $75 with lights; private groups are twice those rates; all uses are subject to a 4-hour minimum (i.e., $200 - $600 per use minimums)
- UNH: A local program pays between $170 - $250 per hour for UNH fields

Dover Youth Programs

- Football: Has a long-term lease for a token amount for the field at the Strafford County complex. The football program has invested in improvements there and is responsible for maintenance. They are unlikely to be more than a special event user of Dunaway.
- Cocheco Lacrosse: Same agreement with Strafford County, but also spends about $4,000 on synthetic field rentals in the early Spring. Some of that use may shift to Dover High.
- Garrison City Football Club (youth soccer): Currently pays $5 per player in registration fees for the use of city fields such as those at Shaw's Lane. This totals $2,000-$3,000 per year. GCFC pays for indoor facilities in Winter and is interested in using new fields at Dover High. However, they currently have effectively no budget for outdoor field rentals.

- Baseball / softball: Building a synthetic baseball field, to include two, 60-foot youth fields, would have a major impact on every level of Dover's baseball programs. Of the youth programs, Dover Baseball is the most interested in leasing significant time at a new baseball field.

City Recreational Programs

To the extent city recreational programs use new School District synthetic fields, it is reasonable for the district to charge the city a fee.

Conclusion

The JBC conservatively estimates the School District may receive between $5,000-$10,000 in annual rental income for the fields, net of custodial fees. The JBC recommends the School District consider transferring all net rental income to capital reserves on an annual basis.

Private Fundraising

The School Board asked the JBC to explore private fundraising opportunities to support the project.

JBC / School Board members Michelle Clancy and Craig Flynn are organizing a group of volunteers who will form a non-profit named "Dover Athletic Fund" (or Foundation) and elect Board Members. DAF is expected to work autonomously to raise short- and long-term funds and donate them to the district earmarked for certain athletic improvements. The School Board may have a liaison to the fundraising group but will not have authority over it.

Though we are fortunate to have many community members committed to this fundraising effort, we should not expect significant funds to come from the DAF during the initial buildout. The timeframe for large scale fundraisers conflicts with the construction timeframe. It is more likely that fundraising could defray the debt service and maintenance costs, and hopefully assist with future upgrades and improvements around Dover, not just at the high school.

Dover Athletic Fund (or Foundation) Mission Statement

"Championing the future of sports in Dover, NH through sustainable funding, responsible stewardship, and community engagement."

APPENDIX

I. TURF FIELDS IN NEW HAMPSHIRE (40+)

Division 1 High Schools:

1. Bedford – has two, one at high school, plus a town field across the street the school uses
2. Pinkerton (Derry) – has two
3. Exeter
4. Goffstown
5. Manchester West
6. Manchester Central (Gill Stadium)
7. Manchester Memorial
8. Nashua – Stellios Stadium (used by Nashua North, Nashua South, and Bishop Guertin)
9. Salem

Division 2 High Schools:

1. Oyster River (Durham) – has two, one at the high school, one at middle school
2. Portsmouth (2010; renovated 2023). Portsmouth has a muni field at Community Campus (2021) and has approved a third turf field
3. Kingswood (Wolfeboro)
4. Hanover
5. Hollis-Brookline
6. Souhegan (Amherst)

Division 3 High Schools:

1. Inter-Lakes (Meredith)
2. Laconia

Salem High School became the most recent Division I high school in New Hampshire to convert to synthetic with its new field that opened in the fall of 2024.

Private Schools:

1. St Thomas Aquinas (Dover)
2. Phillips Exeter – has two, Phelps (stadium) and Hatch Fields
3. St. Pauls (Concord)
4. Derryfield (Manchester)
5. Trinity (Manchester – built & owned by city of Manchester at Derryfield Park

York County, Maine:

1. Berwick Academy
2. York High School (under construction, spring 2025)
3. Town of Kittery (approved, 2024)

COLLEGES (<u>Every</u> college in NH has at least one turf field):

1. UNH has five:
    a. Wildcat Stadium
    b. Tucker Field (soccer)
    c. Memorial Field (in front on Whittemore Center) – AstroTurf, being replaced with turf 2024
    d. Bremmer Field (football practice field)
    e. Student Rec Field
2. Dartmouth has six:
    a. Memorial Field (stadium). Converted to turf 2006, renovated 2015
    b. Scully-Fahey Field: Astroturf 2000, replaced by turf in 2009;
    c. Chase Field (field hockey): Astroturf 2000, resurfaced 2008
    d. Red Rolfe Baseball Field (converted to synthetic, 2009)
    e. Dartmouth Softball Park (converted to synthetic, 2012)
    f. Graham indoor field
3. SNHU has two: Penman Stadium (2017) and Larkin Field
4. St. Anselm: Grappone Stadium (2022)
5. Keene State: Owl Field
6. Plymouth State: Panther Field (2021)
7. Franklin Pierce U: Sodexo Field
8. Colby Sawyer College: Veitch Field (2013)
9. New England College: Melander Field (2013)
10. Rivier College: Merrill Field (2010)

II. PARTICIPATION COUNTS

Few public projects touch as many families as this project will.

About 1,500 unique kids play a sport in Dover each year. That’s about 1 in 10 households.

HIGH SCHOOL		MIDDLE SCHOOL		YOUTH PROGRAMS	
Football	71				
Girls Soccer	41	Girls Soccer	15	Garrison City FC	500
Boys Soccer	42	Boys Soccer	21	Baseball	400
Field Hockey	24	Field Hockey	24	Cocheco Lax	180
Unified Soccer	23			Softball	150
Cross County	32	Cross Country	62	Football	125
Cheerleading	20				
Girls Lacrosse	37	Girls Lacrosse	25		
Boys Lacrosse	40	Boys Lacrosse	35		
Baseball	49	Baseball	24		
Track & Field	81	Track & Field	105		
Subtotals	460		311		1355
					2,136

III. TIGHE & BOND'S DECK OF FIELD DESIGNS

IV. CASE STUDY: FIELD CONSTRUCTION PROCESS AT ST. THOMAS AQUINAS

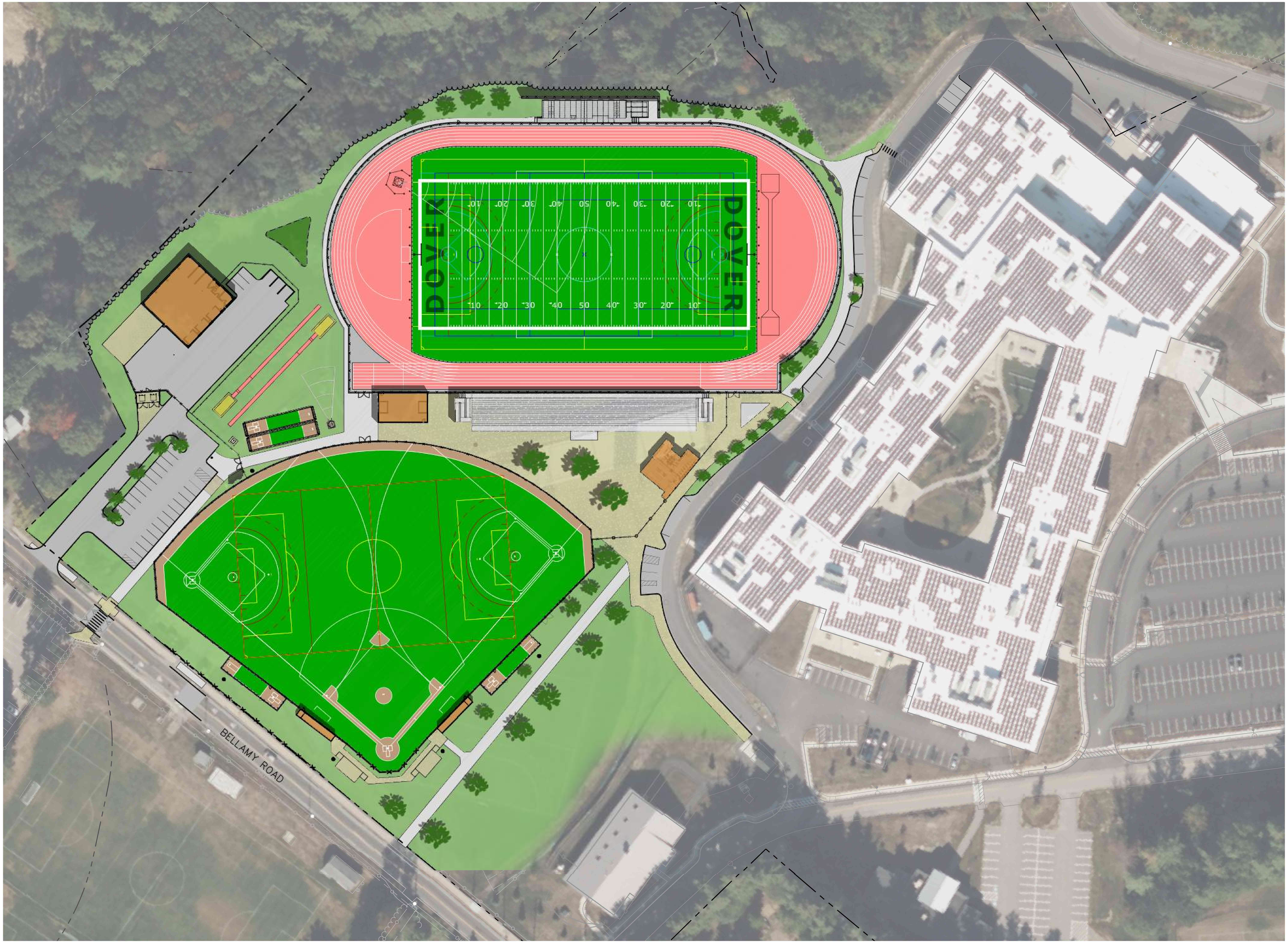
V. TIGHE & BOND'S BRIEFING ON SYNTHETIC TURF AND NATURAL GRASS

VI. SPORTS-RELATED INJURIES ON SYNTHETIC TURF AND NATURAL GRASS

A. American Journal of Sports Medicine summary
B. Article from The Lancet

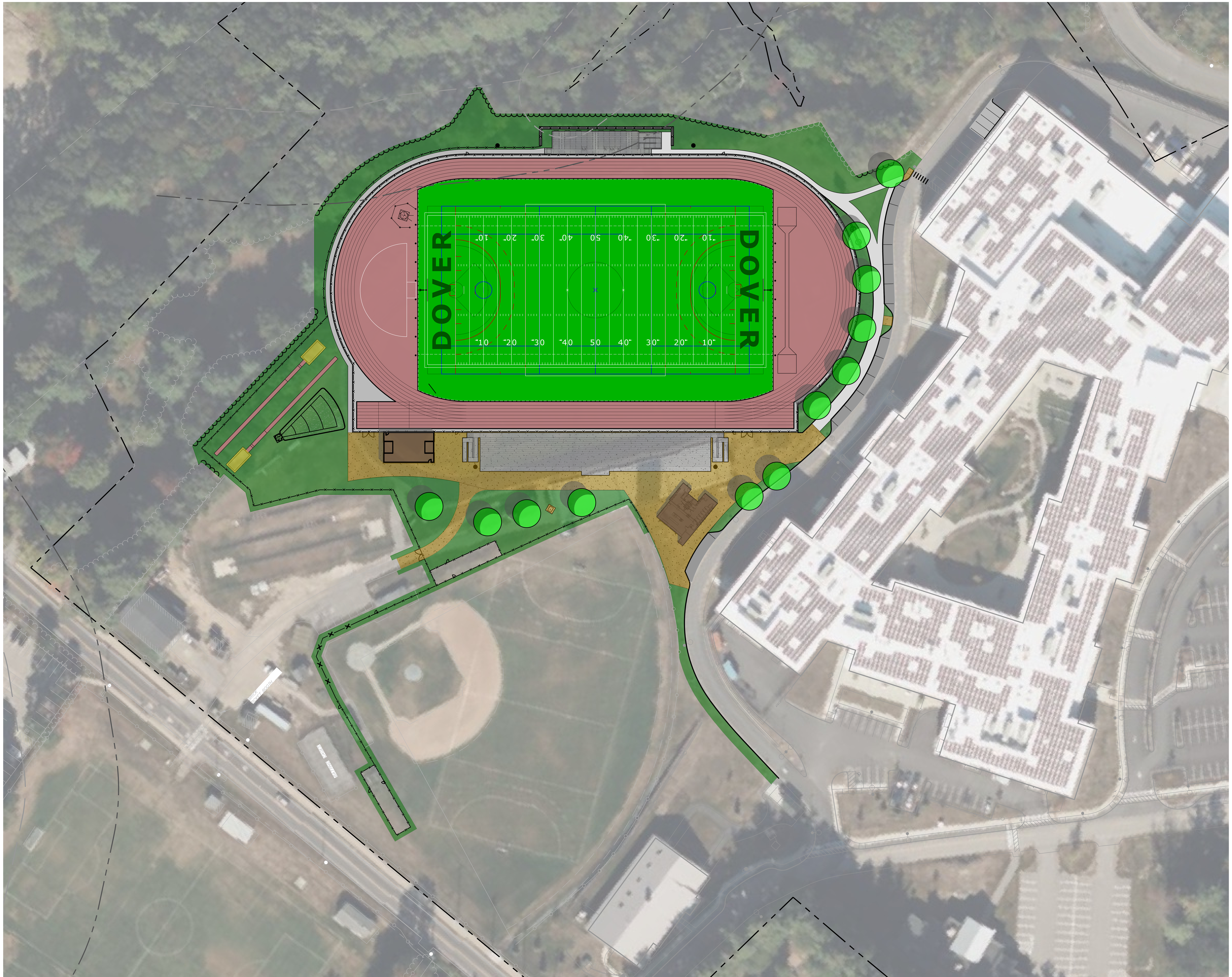
VII. ENVIRONMENTAL IMPACTS

A. Letter from AstroTurf
B. Letter from Shaw Industries
C. FieldTurf brochure
D. Evaluation of PFAS in Artificial Turf by TCR (2024)
E. Technical Memorandum for City of Portsmouth (2022)



Tighe&Bond
177 Corporate Drive
Portsmouth, NH 03801

SCALE IN FEET
0 50' 100'
GRAPHIC SCALE



Tighe&Bond
177 Corporate Drive
Portsmouth, NH 03801
(603) 433-8818

SCALE IN FEET
0 50' 100'
GRAPHIC SCALE

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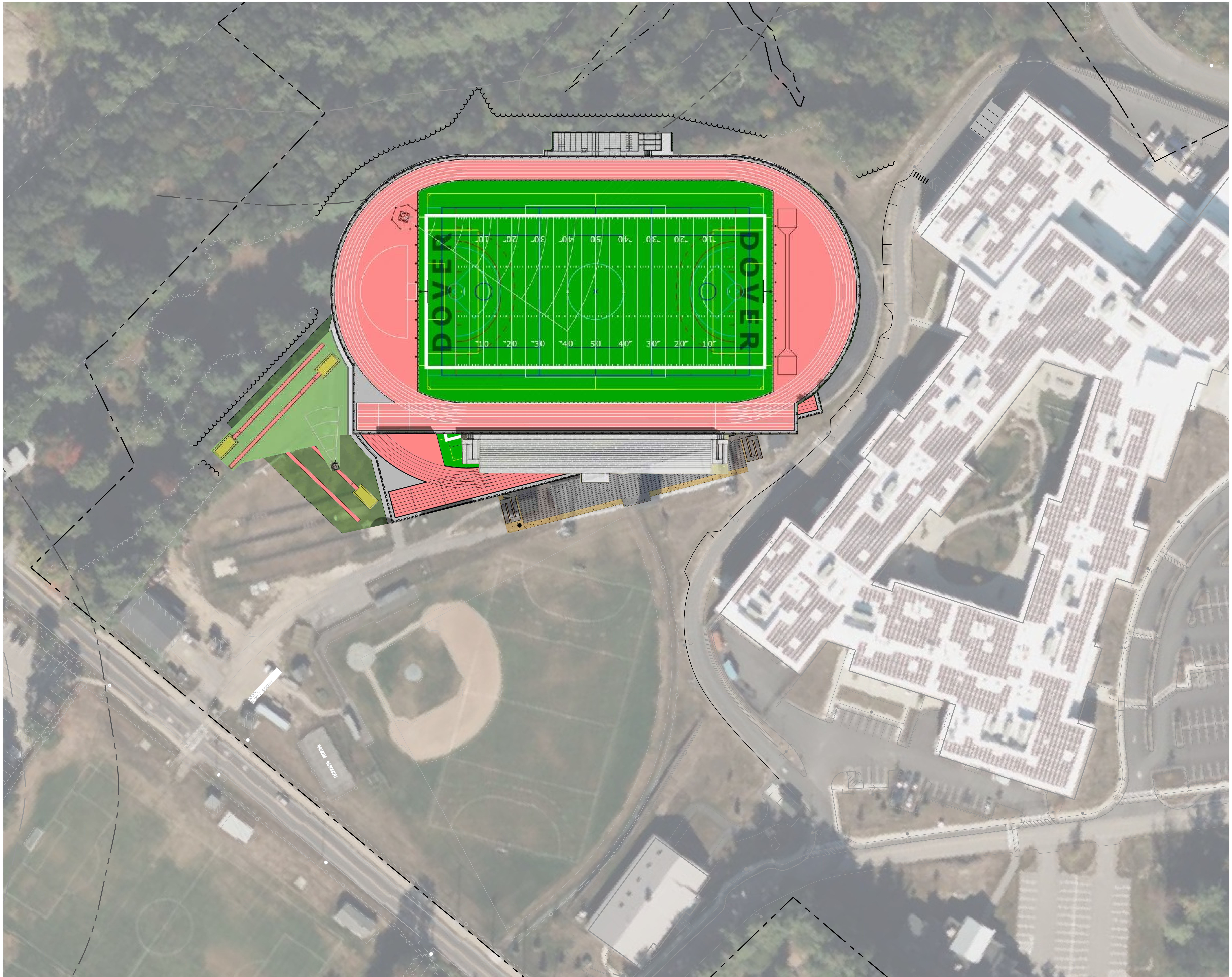


Tighe&Bond
177 Corporate Drive
Portsmouth, NH 03801
(603) 433-8818

N

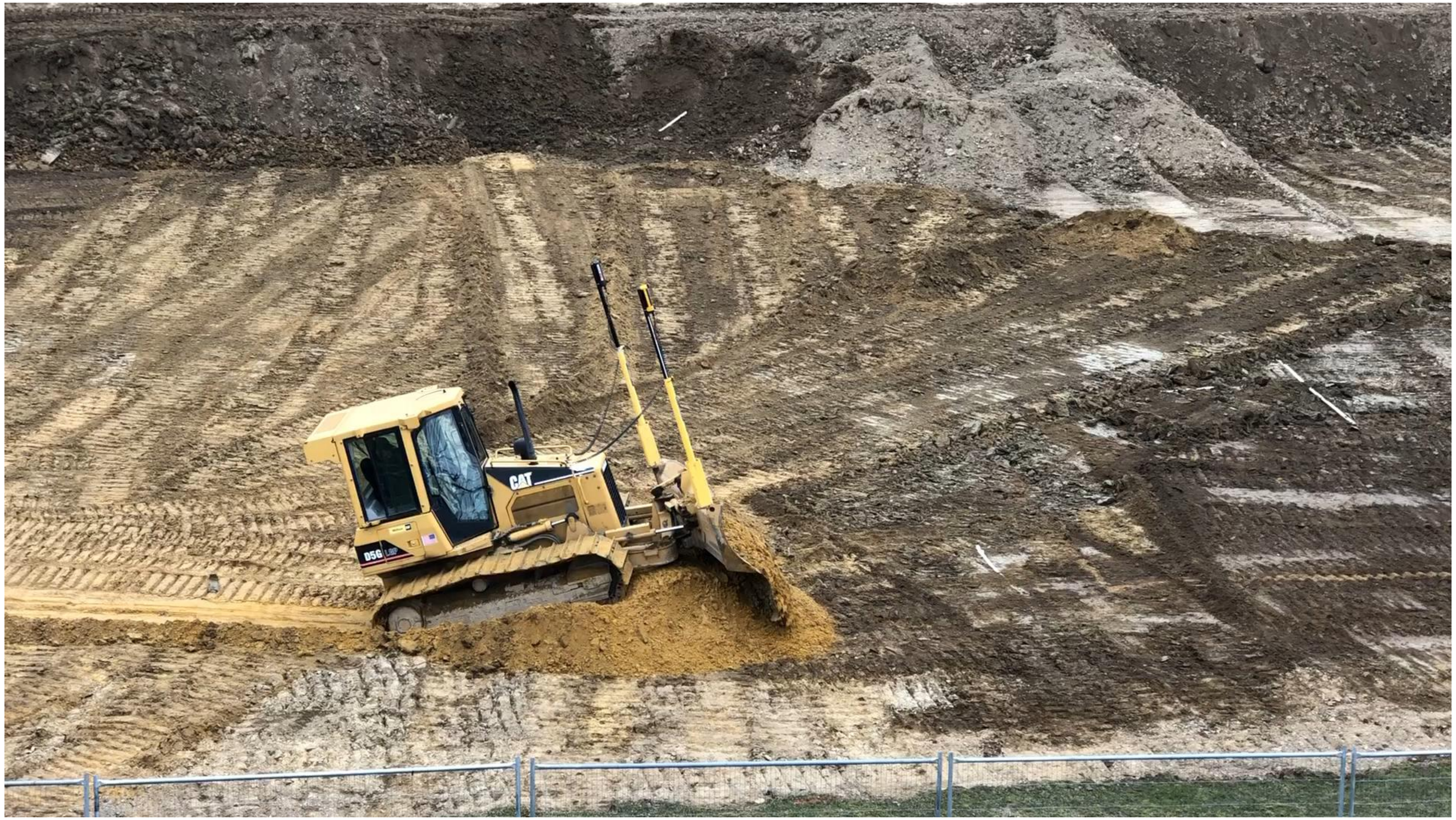
SCALE IN FEET
0 50' 100'
GRAPHIC SCALE

STA Turf Field Construction Project - 2020

Nov. 20, 2019: Tearing up a symbolic piece of the existing field before winter signaled there would be no going back. Real work began in March 2020.

Covid! Turns out most construction work was socially distanced, so we went ahead. March 16: Existing field stripped of grass and top soil.

March 23. We had to dig down several feet to establish the drainage we would need.



March 27, April 21: Putting in the light towers was one of the first things done. Like most items, these were ordered the previous fall, 3-6 months in advance.


May 13-22: Footings for grandstands

May 27 & 28: Grandstand construction by traveling crew from vendor. Note press box unit.

June 5 grandstand progress. Because we built into an existing hill, this allowed for handicapped access at the top.

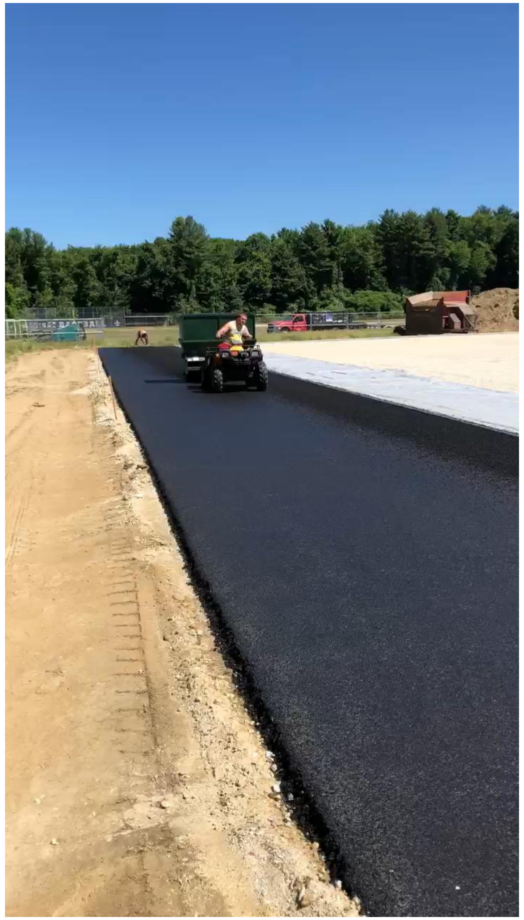
May 27. This is the "nailer" – the foundation wall that goes around the field to which the carpet is eventually attached. They built forms in sections, poured cement, then did another section.

June 1. This is the hole and foundation post for a football upright.

June 11-19: Drainage, drainage, drainage. Hundreds of loads of crushed stone trucked in. Larger stone on bottom, smaller stone on top, laser-graded for a slight crown to the field.

May 22, June 5: Meanwhile we're building the track. Crushed stone, then asphalt.

June 19: After a binder is applied on top of the asphalt, black crumb rubber is spread evenly on top of that.



June 23: After the crumb rubber is spread, it gets top-coated with an ultraviolet light resistant paint. We used red but other colors are available.

July 13: There is an older married couple from PA who specialize in the niche of doing initial lining of new tracks. They did the Oyster River one, too.

We designed a 112 meter track – enough to practice sprints, relays, 100, 110, & 300 hurdles and long and triple jumps into an extra wide pit. Note the graded gravel to right – the “extra” practice space turf goes right up to the track.

July 13: A traveling team from Georgia starts rolling out the carpet, starting in the middle of the field. Note shock pad going down simultaneously.

Laying the carpet is hard, physical work done mostly by hand.

July 15. This is a giant sewing machine, stitching one 10-yard section of carpet to the one before.

July 18: The main field is down.

July 18: The long white lines were stitched into the carpet – but the hash marks and numbers were cut out, then stitched/glued in on site. No infill yet.

The fleur de lis was the coup de grace.

Aug 10: On time and under budget, five months after site work began, STA held its first event on the field, a Covid-delayed in person graduation.

Tighe&Bond

DOVER HIGH SCHOOL ATHLETIC FACILITY

A Comparison of Natural Turf and Synthetic Turf

Presenter: Ryan Morrison, PE

Tighe&Bond

SUMMARY OF TOPICS

- Comparison with other schools
- Natural Turf design elements, considerations, and options
- Synthetic Turf Construction and Components
- Maintenance requirements
- Number of uses on field
- Cost for Construction

REGIONAL FIELD COMPARISON- STADIUM FIELDS

- Portsmouth – Synthetic Turf
- Oyster River – Synthetic Turf
- Exeter – Synthetic Turf
- Spaulding – Natural Grass
- St. Thomas High School – Synthetic Turf
- Timberlane – Natural Grass
- Manchester Memorial – Synthetic Turf
- Winnacunnet – Natural Grass

NATURAL GRASS

- Key design elements
  - Irrigated?
  - Drainage (Catch basins / Underdrains)
  - Quality control of topsoil and sand layer
  - Desired turf playing height

- Considerations
  - Will uses on field be managed
  - Will field be managed organically
  - Are lights recommended for the field

- Grow in period
  - One growing season – Sod
  - Three growing seasons – Seed

NATURAL GRASS OPTIONS

- Non-Organic
  - Most common field type in northeast
- Organic
  - More popular at recreation level fields
- Hybrid System (Synthetic & Natural)
  - Lambeau Field
- Considerations
  - Level of Athlete
  - Yearly maintenance costs
  - Inconsistent impact attenuation (Testing and Aeration required)
  - Rest periods / Shutdown/ Weather

SYNTHETIC TURF HISTORY

The evolution of synthetic turf

GEN 1: 1960s	GEN 2: 1970s	GEN 3: 2000s	GEN 3.5: 2010s	GEN 4: present
- Nylon fibers (abrasive) - Short pile heights - Glued over concrete or ashpalt - Soft cushion used beneath the turf	- Polypropylene fibers (less abrasive) - Short pile heights - Sand infill - Soft cushion used beneath the turf	- Introduction of soft, grass-like polyethylene fibers - Sand & rubber infill used to improve traction, impact safety and softness underfoot - Tall pile height: 2.0" - 2.5"	- Continued use of polyethylene fibers - Sand & rubber infill - Tall pile heights: 2.0" 2.5" - Introduction of shock pads for improved impact safety	- Continued use of polyethylene fibers - Sand & natural infill - Tall pile heights: 1.75" 2.0" - Use of a performance pad for safety & fine tune systems based on field & biometric data

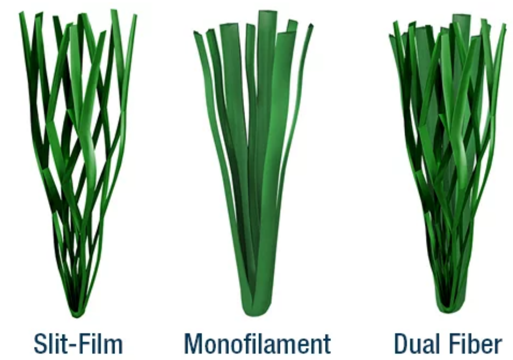
Think Houston Astros

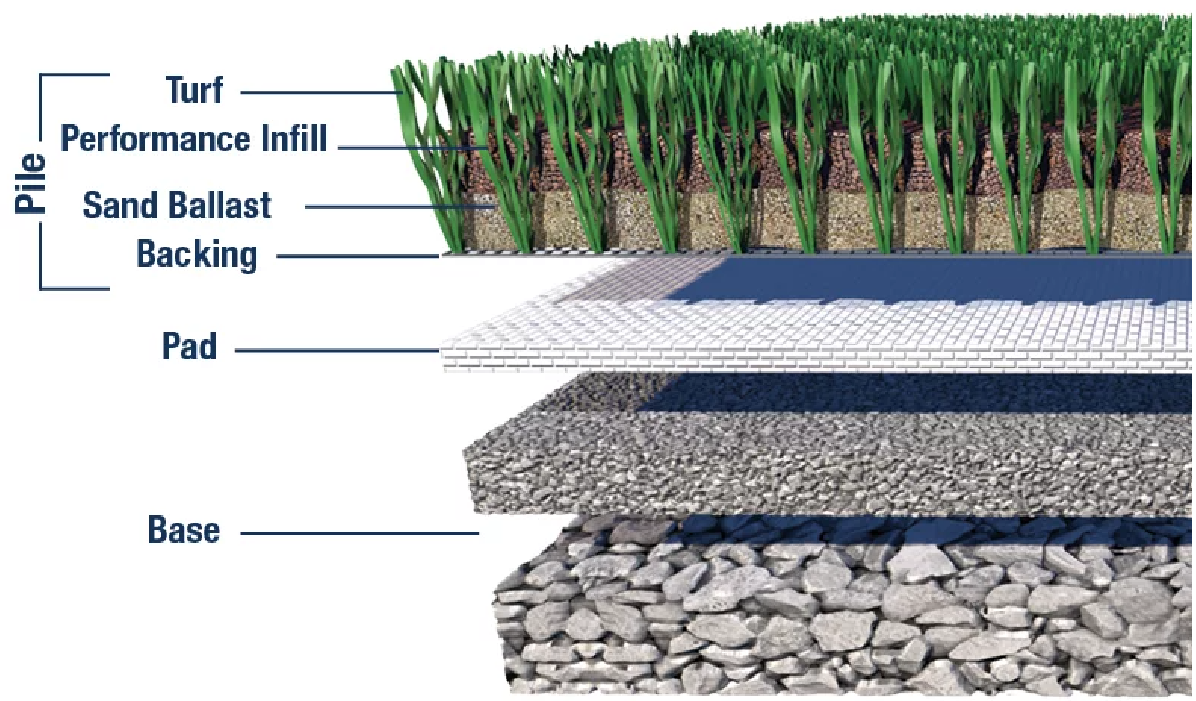
Typical AstoTurf Products

SOURCE: Shaw Sports Turf

SYNTHETIC TURF- MATERIALS/COMPONENTS

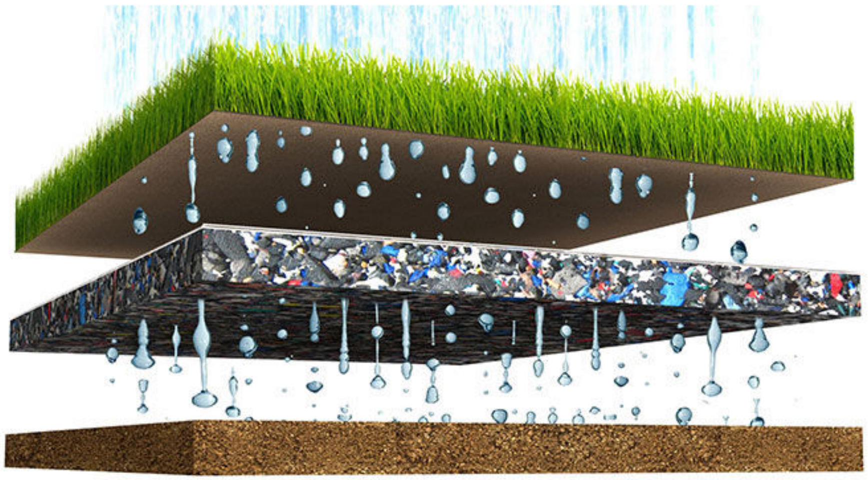
- **Turf Fiber Options**
  - Slit Film: trap infill in place and mitigate infill “splash” for sports with quick ball rotation (ie. Lacrosse / Baseball)
  - Monofilament: rigid allowing grass to stand upright and improve ball roll
  - Dual Fiber: blend of silt film and monofilament fibers





SYNTHETIC TURF- MATERIALS/COMPONENTS

- **Shock Pads**
  - Purpose: Used to make synthetic turf fields uniform in condition regardless of weather or temperature.
  - Reduces the quantity of fibers and infill required.



Product	Warrantee	Safety and Sustainability Considerations
Shaw Sports Turf NXTPLAY	25 Years	Made with 80 % Recycled content from previously deconstructed synthetic turf fields. Cradle to Cradle Certified.
Brock USA PowerBase YSR	25 Years	Made with Virgin Material and/or recycled pads only Cradle to Cradle Certified.
Brock USA SP Series	16 Years	1/2" to 3/4" pad height – Made with up to 30% recycled material
Schmitz Foam Products – ProPlay Sport 20D	25 Years	Fully Recyclable / Made from Recycled product Guaranteed that it can be returned to Schmitz Foam at end of life cycle

SYNTHETIC TURF- MATERIALS/COMPONENTS

- **Infill**
  - Material that hold the fibers up and that the athlete and ball plays on
  - Considerations
    - Impact resistance
    - Playability for athletes
    - Ability for infill material to stay in place
    - Durability of Infill
    - Heat considerations / Freeze Considerations
    - Environmental Considerations
      - What materials is it made of
      - Is it a recycled material or can it be recycled

INFILLS

Recommended Infill Materials

Product	Pros	Cons
Crumb Rubber / Sand (For Comparison)	Most commonly infill system Recycled material for crumb rubber	Black rubber can cause heat island effect. Potential for heavy metals in stormwater effluent
Envirofill (Acrylic coated round Sand)	16-year warranty Less likely to compact Reusable for multiple life cycles	Non-biodegradable, doesn't significantly reduce heat island effect.
Brockfill (Conditioned Yellow Pine Particles)	Sustainable harvested 10-year warranty More durable than cork More stable than crumb rubber Semi Organic (Sand) Lower Heat Island Effect	Added maintenance to replace breakdown of material. Prone to freezing
Safeshell (Walnut shells)	High-Bulk density less likely to float Lower Heat Island Effect Less Prone to Freezing than other Organics Semi-Organic (Sand)	Added maintenance to replace breakdown of material (Lower than other organics).
GreenPlay Pure Cork Performance Infill (Cork)	Safely harvested from trees Lowers Heat Island Effect Fully Organic System	Added maintenance to replace breakdown of material. Buoyancy of material causes migration. Quicker than other alternatives to break down.
NaturalPlay (Coconut Fibers and Safe Shell)	Lowers Heat Island Effect Semi-Organic (Sand) Less Prone to Freezing Better traction than Safeshell alone	Added maintenance to replace breakdown of material (Lower than other organics).

NATURAL GRASS MAINTENANCE STRATEGY HIGH SCHOOL STADIUM LEVEL FIELD

- Soil sampling and Spring Inspection
- Service irrigation
- Weed and Pest Control
- Fertilizer
- Cut-Grass / Re-stripe / – Weekly
- Aeration/ Top Dressing / Overseeding (1 – 2 times per season)
- Rest Field – 30 days in growing season
- Lime Application
- Inclement weather policy very important

- **Total Labor 80 hours – 150 hours per year**

NATURAL GRASS (ORGANIC) MAINTENANCE HIGH SCHOOL STADIUM LEVEL FIELD

- Soil sampling and Spring Inspection (Additional metrics required organic and bacterial biomass)
- Service irrigation
- Weed Control – Organic options available
- Pest Control – Beneficial nematodes (dependability)
- Fertilizer – Organic nitrogen (Slow release)
- Cut-Grass / Re-stripe / – Bi-Weekly (3.5 – 3 inches)
- Aeration/ Top Dressing / Overseeding (2–3 times per year)
- Rest Field – 30 days in growing season (Maybe more)
- Lime Application
- Incelement weather policy very important

- **Total Labor 120 hours – 180 hours per year**

SYNTHETIC TURF MAINTENANCE REQUIREMENTS

1. Clean Debris from field regularly – Frequency will depend on setting
2. Drag field monthly to weekly – Depends on use and type of infill
3. Rake field to redistribute infill material
4. Supplement infill as necessary – typically required at high use areas (Goal mouth and/or batter box)
5. Remove any gum or seeds from field
   - (Typically recommend a sign of prohibited activities field)

- No inclement weather policy needed
- Typically, can get on field earlier in spring and stay on longer in fall
- Winter use possible

TOTAL POTENTIAL PLAYING TIME FOR FIELD AT HIGH SCHOOL

- Playing season – Mid March to Mid November
- 6 months (Accounting for Summer Months off)
- Available play time 5 hours (No lights) = 2 uses
- Use defined as a team or teams for approximately 2 hours
- Yearly available uses = 6 months x 4 weeks x 7 days per week x 2 uses per day = 330 uses per season
- With lights = 4 uses per day = 700 uses per year

- Physical education and some youth sports are not an equivalent use

TYPICAL NUMBER OF USES SUPPORTED BY NATURAL GRASS FIELD

- Typical number of uses supported range from 200 – 250 uses per year
- Consider 30-day rest period in growing season
- Rainy days (Rain outs – can last longer than a day)
- Field opens later and closes earlier in season
- Because of additional aeration and lawnmowing techniques organic field tend to support on lower end of spectrum
- Overuse results in over compaction and unsafe fields

TYPICAL NUMBER OF USES SUPPORTED BY SYNTHETIC TURF FIELD

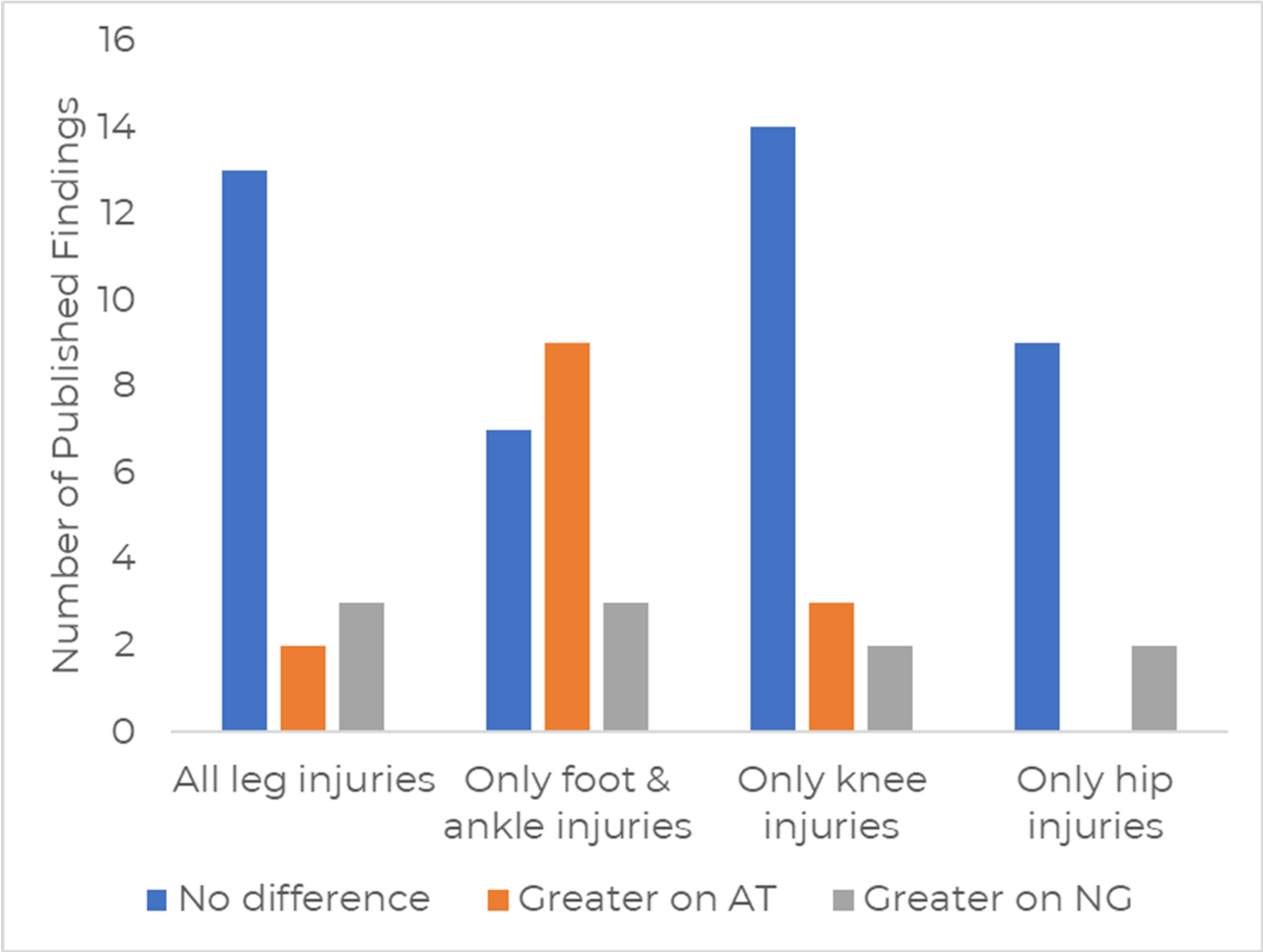
- Turf fibers will not degrade from use
- Overuse may require additional infill maintenance
- Capet warranty is for 8 years
- Pad warranty is ranges from 16 -25 years
- Infill warranty varies
- Warranty covers annual testing Gmax vs HIC

SYNTHETIC TURF - PFAS CONCERNS

- **Polyfluoroalkyl substances (PFAS)**
  - EPA estimates that there are nearly 15,000 types of PFAS

- **PFAS found in number of household items**
  - Non-stick cookware
  - Shampoo
  - Furniture
  - Make-up
  - Dental Floss
  - Pizza boxes
  - Soccer Balls

- **Turf suppliers can provide certification that no PFAS was used in the manufacturing of synthetic turf carpet**



LEG INJURY COMPARISON

On Artificial Turf vs. Natural Grass

Gould HP, Lostetter SJ, Samuelson ER, Guyton GP. Lower Extremity Injury Rates on Artificial Turf Versus Natural Grass Playing Surfaces: A Systematic Review. Am J Sports Med. 2023 May;51(6):1615-1621. DOI: 10.1177/03635465211069562.

Tighe&Bond

SYNTHETIC TURF – OTHER HEALTH TOPICS

- **Chemical Exposure**
  - Per 2019 US EPA CDC Study
    - Exposures to chemicals and metals in crumb rubber is expected to be low
    - Exposure to VOCs and SVOC's is limited due to low amount of emission
  - Other Studies completed by New York and Massachusetts
    - Potential for chemical exposure from crumb rubber is low

- **Heat Stress**
  - Depending on infill temperature differential can vary
  - Typically, not of concern for high school in Northeast
  - Most schools not opting for watering field

- **Infill Allergy**
  - Walnut
  - Latex

SYNTHETIC TURF - SUSTAINABILITY

- **Carpet – Fully Recyclable**
  - Currently always a newly manufactured product
  - Old fields recycled as other products
- **Infill – Typically non-recyclable**
  - (Envirofill – one reuse)
  - Crumb rubber is a recycled product
- **Shock Pad**
  - Recyclable and or reusable (Cradle to Cradle)
  - Can buy as a recycled product

COST – SYNTHETIC TURF

- **Natural Grass**
  - Assume sand cap and drainage
  - Irrigation
  - Import top-soil
  - Irrigations
  - $4.50 - $5.00 per square foot
  - $350,000 - $400,000
  - Maintenance Cost
    - $20,000 - $50,000 Per Year

- **Synthetic Turf**
  - Crumb Rubber – $6.9 SF - $600K
  - Envirofill - $8.2 SF - $700 K
  - Brockfill - $7.5 SF - $650 K
  - Safeshell – $8.2 SF - $700 K
  - Greenplay – $8.8 SF - $760 K
  - Natural Play – $8.8 SF - $760K
  - Maintenance Cost
    - $5,000 - $10,000 Per Year

QUESTIONS ?

Am J Sports Med. 2023 May;51(6):1615-1621. doi: 10.1177/03635465211069562.
Epub 2022 May 20.

Lower Extremity Injury Rates on Artificial Turf Versus Natural Grass Playing Surfaces: A Systematic Review

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Affiliations
PMID: 35593739 DOI: 10.1177/03635465211069562

Abstract

Background: No study has provided a comprehensive systematic review of sports injuries on artificial turf versus natural grass.

Purpose: To comprehensively examine the risk of overall injuries and multiple types of lower extremity injuries across all sports, all levels of competition, and on both old-generation and new-generation artificial turf.

Study design: Systematic review; Level of evidence, 3.

Methods: A systematic review of the English-language literature was performed according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. All included articles compared overall injury rates or lower extremity (hip, knee, or foot and ankle) injury rates on artificial turf and natural grass. All sports, levels of competition, and turf types were included. Studies were excluded if they did not include overall injury rates or lower extremity injury rates. Because of the heterogeneity of the included studies, no attempt was made to aggregate risk ratios to conduct a quantitative meta-analysis.

Results: A total of 53 articles published between 1972 and 2020 were identified for study inclusion. Most studies on new-generation turf (13/18 articles) found similar overall injury rates between playing surfaces. When individual anatomic injury locations were analyzed, the greatest proportion of articles reported a higher foot and ankle injury rate on artificial turf compared with natural grass, both with old-generation (3/4 articles) and new-generation (9/19 articles) turf. Similar knee and hip injury rates were reported between playing surfaces for soccer athletes on new-generation turf, but football players, particularly those at high levels of competition, were more likely to sustain a knee injury on artificial turf than on natural grass.

Conclusion: The available body of literature suggests a higher rate of foot and ankle injuries on artificial turf, both old-generation and new-generation turf, compared with natural grass. High-quality studies also suggest that the rates of knee injuries and hip injuries are similar between playing surfaces, although elite-level football athletes may be more predisposed to knee injuries on artificial turf compared with natural grass. Only a few articles in the literature reported a higher overall injury rate on natural grass compared with artificial turf, and all of these studies received financial support from the artificial turf industry.

Keywords: artificial turf; football; injury risk; natural grass; playing surfaces; soccer.

Comment in

Lower Extremity Injury Rates on Artificial Turf Versus Natural Grass Playing Surfaces: Letter to the Editor.

Oudmaijer M, Koolen O, van der Meij L, Kloprogge S, Gerger H.

Am J Sports Med. 2024 Jan;52(1):NP1-NP2. doi: 10.1177/03635465231209991.

PMID: 38164677 No abstract available.

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Incidence of football injuries sustained on artificial turf compared to grass and other playing surfaces: a systematic review and meta-analysis

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Summary

Background Prior reviews have not conducted statistical synthesis of injury incidence on artificial turf in football. To analyse and compare the incidence of injuries sustained playing football (soccer) on artificial turf compared to grass and other playing surfaces.

Methods This was a systematic review and meta-analysis. We searched PubMed, Scopus, SPORTDiscus, and Web of Science databases in October 2022 without filters. All observational studies (prospective or retrospective) that analysed injuries sustained playing football on artificial turf and which included a control group that played on grass or other surface were included. Studies were included if they reported the number of injuries and the exposure time for the playing surfaces. Risk of bias was assessed by Newcastle-Ottawa Scale. A random effects model was used to calculate the pooled incidence rate ratios (IRR) with 95% confidence intervals. Protocol was registered with PROSPERO on October 30th, 2022. Registration number: CRD42022371414.

Findings We screened 1447 studies, and evaluated 67 full reports, and finally included 22 studies. Risk of bias was a notable issue, as only 5 of the 22 studies adjusted their analysis for potential confounders. Men (11 studies: IRR 0.82, CI 0.72–0.94) and women (5 studies: IRR 0.83, CI 0.76–0.91) had lower injury incidence on artificial turf. Professional players had a lower incidence of injury (8 studies: IRR 0.79, CI 0.70–0.90) on artificial turf, whereas there was no evidence of differences in the incidence of injury in amateur players (8 studies: IRR 0.91, CI 0.77–1.09). The incidence of pelvis/thigh (10 studies: IRR 0.72, CI 0.57–0.90), and knee injuries (14 studies: IRR 0.77, CI 0.64–0.92) were lower on artificial turf.

Interpretation The overall incidence of football injuries is lower on artificial turf than on grass. Based on these findings, the risk of injury can't be used as an argument against artificial turf when considering the optimal playing surface for football.

Funding No specific funding was received for this study.

Keywords: Football; Injury; Epidemiology; Incidence; Playing surface; Athletes; Sports medicine

Introduction

Football (soccer) is the most played team sport globally, and it is the national sport in many countries. Football has a major impact on communities both physically and financially.[1] Traditionally, football has been played on natural surfaces such as grass. However, since the introduction of first-generation artificial turf in the 1960's, artificial surfaces have gained increasing popularity, especially recently. The quality of artificial turf has improved greatly in recent years. Currently, the International Association of Football Federations (FIFA) is implementing quality programs for artificial turf and

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Research in context

Evidence before this study

The safety of artificial turf as playing ground has been under debate since the first generation of artificial turf was introduced in 1960s. We searched PubMed and Scopus for words football and injuries and "artificial turf" without additional limitations to understand the prior literature in September and October 2022. Previous studies have reported contradictory results on varying from lower to similar to higher risk of injuries on artificial turf. However, we did not identify any previous systematic review which would have focused football injuries on artificial turf and provided statistical synthesis. Previous systematic reviews and meta-analyses had included all sports played on artificial turf and found higher injury incidence when American football was included, and that female athletes have higher incidence of anterior cruciate ligament injuries.

Added value of this study

This is the first systematic review that also produced statistical pooled synthesis on the football injury incidence on artificial turf compared to grass and other playing surfaces and by far the largest research reporting subgroups and all types of injuries. The overall incidence was 14% (7%–21%) lower on artificial turf than on grass. Men and women both had lower injury incidences on artificial turf. We did not find any evidence from any subgroup and injury category analysis that would have shown increased injury incidence on artificial turf. Furthermore, injuries to lower body (pelvis/thigh, and knees) had lower incidence on artificial turf.

Implications of all the available evidence

Based on these results, artificial turf seem to be safe surfaces for football as the overall injury incidence is low. Further studies especially in amateurs, women, and youth athletes are needed to have better estimates in these groups on the injury incidences. These findings can be utilized by sports physicians in everyday work but also by policy makers deciding on football pitch renovations and projects, and football associations when discussing optimal playing surfaces.

artificial pitches may soon be awarded FIFA quality or quality pro standards.[2] The main benefits of artificial turf are that it is easy to maintain and provides a flat surface, which is especially important in areas where the growing season is short due to the cold climate. An added benefit is that artificial turf does not require sunlight (easier to maintain in large stadia) and watering (saves water in dry areas).

However, since the introduction of first generation artificial turf, a key question has been whether the turf is associated with an increased or decreased incidence of injury.[3] When injuries occur to top level players on artificial turf, they tend to make headlines. For example, AS Roma head coach Jose Mourinho claimed that playing on an artificial pitch in Norway caused a knee injury to a Roma player.[4] A previous meta-analysis, which included all sports played on artificial turf, found that the rates of anterior cruciate ligament injuries were higher in women, but not in men.[5] Interestingly, according to the findings of a novel meta-analysis,[6] hamstring injuries are 50% more likely to occur on grass than on artificial turf in all field sports. Another recent systematic review reported that the risk of injury playing football on both playing surfaces was similar, but the authors did not conduct a statistical synthesis of the results.[7] To date, the majority of the prior literature on injuries sustained on artificial turf has focused solely on American football. However, as it is known that football and American football are vastly different sports with different injury profiles, it is important that football is analysed separately.[8,9]

The aim of this systematic review and meta-analysis is to analyse the risk of injuries when playing football on artificial turf compared to grass and other playing surfaces.

Methods

Search strategy and selection criteria

We conducted a systematic review and meta-analysis. We searched the EBSCOhost (SPORTDsicus), PubMed, Scopus, and Web of Science databases in October 2022 using the following search phrase: Artificial AND (turf OR grass). Grey literature was not searched. Complete search strategy is provided in the Supplementary file S2. The search results were then uploaded to Covidence software (Alfred Health, Monash University, Melbourne, Australia) for screening. Two authors (IK and VI) independently screened the titles and abstracts and later the full texts. Cases of discrepancy were solved by reaching consensus. The screening process had moderate inter-rater reliability scores (proportionate agreement 0.96 and Cohen's Kappa 0.63).

To be included in the systematic review, a study had to fulfil all the following criteria. The study had to focus on football (soccer) only or report football separately. Further, injuries sustained on artificial turf had to be compared to injuries sustained on grass or other playing surfaces. We included prospective and retrospective observational (cohort) studies reporting the number of injuries per exposure time. If a study did only report the injury incidence without number of injuries or exposure time, it was excluded. Studies that did not report original data (editorials, reviews, systematic reviews, commentaries) were excluded. Studies not reported in English were also excluded. Conference presentations were excluded, but any corresponding published publications were hand searched, if not included in the initial search.

Data analysis

Data extraction was performed by a single author (OP or VI) and verified by a second author (IK) to a predesigned Excel spreadsheet to minimise potential extraction errors. We extracted the following information: name of authors, name of journal, publication year, country, study design, number of injuries, exposure time, injury types, level of play, sex, and comparator surface. Furthermore, exposure time was extracted either per hour or per athlete exposure. Athlete exposure was used only in one study, and it meant that a single player had attended either a training session or a game (Table 1). In studies that reported injuries per game (one study; Table 1), we estimated the incidence per playing hour by multiplying the number of games by eleven players per team and a playing time of 90 min to obtain the total number of exposure hours.

Risk of bias was assessed according to the Newcastle-Ottawa Scale for cohort studies.[10] Two authors (IK and VI) independently conducted the assessments and conflicting cases were decided by mutual consensus.

All analyses were conducted according to the Cochrane handbook guidelines. To be pooled together in the meta-analysis, studies had to report the number of injuries per exposure time. If the exposure time and incidences were reported, the number of injuries were calculated. Similarly, if the number of injuries and incidence were reported, the exposure time was calculated.

Pooled injury incidence rate ratios (IRR) with 95% confidence intervals were calculated by mixed-effects Poisson regression model with random study effects. Heterogeneity was expected to be high due to the attributable factors of different players. Such factors included the physical testing results of the player, history of injury, and external factors such as weather, type of stud and playing surface interaction. Thus, for all analyses, a random effects method was used. To control the heterogeneity, we conducted more specific subgroup analyses with less expected heterogeneity. Statistical heterogeneity was assessed by the I^2 statistic and is presented alongside the analyses in the forest plots. We performed sensitivity analysis by including only studies with the lowest risk of bias and another sensitivity analysis by including only prospective studies. Presence of publication bias was assessed by generating funnel plots and performing Egger's test. A further moderator analysis was performed by meta-regression to estimate the impact of publication year to IRR estimates.

Based on the previously published literature, we performed subgroup analyses because we expected the risk of injury to differ in certain scenarios. Thus, we compared the injury incidence rate ratio on artificial turf versus grass separately for men, women, training sessions, matches, amateur players, professional players, youth players (age less than 18), adult players, injury mechanisms, anatomical injury locations, and geographical location (Northern-Europe vs Central Europe, East-Asia, and the USA vs Middle-East). Additional sensitivity analysis was performed by including only studies analysing the latest (third) generation artificial turf.

We have rated the evidence quality for main outcomes according to the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) framework.[11] The evidence quality was ranked in a scale from very low to high.

This study has been reported according to the preferred reporting items in systematic reviews and meta-analysis (PRISMA) 2020. The PRISMA checklist is provided in Supplementary file S1.[12]

This systematic review was registered with PROSPERO (Registration number: CRD42022371414).

Role of the funding source

There was no funding source for this study.

Results

Search results

Initially, a total of 1447 abstracts and titles were screened. In addition, we analysed 67 full reports and finally included 22 studies for systematic review and meta-analysis (Fig. 1).[13–33] All the included studies were cohort studies. Of these, thirteen were conducted in Europe, six in the USA, and three in Asia (Table 1). All studies were conducted between 2001 and 2014. 16 studies focused on professional football players and 17 studies focused on adults. The number of injuries reported varied between 51 and 3449. One study was conducted on second generation turf, three studies did not specify the generation, and the rest 18 studies analysed third generation turf (Table 1).

Risk of bias

The risk of bias in the included studies was mostly due to a failure to control for potential confounders in the analyses (Table 2). Indeed, only five studies tried to confound for potential sources of extrinsic bias and player attributable bias in their analyses. However, we judged that none of the included studies had to be removed from the analysis due to a high risk of bias.

Overall injury incidences

Overall, the incidence of injury was lower on artificial turf than on grass (20 studies; IRR 0.86, CI 0.78–0.95; I^2 84%, Fig. 2; evidence quality low; Table 3). The injury incidence was higher on artificial turf when compared to other playing surfaces (5 studies; IRR 1.73, CI 1.25–2.41; I^2 90%; Fig. 3; evidence quality very low;

Study	Country	Study period	Prospective or retrospective	Study design	Level of play	Turf generation	Age	Gender	Training or match	Total n of injuries	Exposure measure	Injury type
Almutawa 2014	Saudi-Arabia	2010–2011	Prospective	Cohort	Professional	Third	Adult	Men	Both	82	Hours	All injuries
Aoki 2010	Japan	2005	Prospective	Cohort	Amateur	Not specified	Youth	Both	Both	525	Hours	All injuries
Bjørneboe 2010	Norway	2004–2007	Prospective	Cohort	Professional	Third	Adult	Men	Both	1067	Hours	All injuries
Calloway 2019	USA	2013–2016	Retrospective	Cohort	Professional	Third	Adult	Men	Match	2147	Games	All injuries
Ekstrand 2006	Europe	2003–2004	Prospective	Cohort	Professional	Third	Adult	Men	Both	775	Hours	All injuries
Ekstrand 2011a	Europe	2001–2009	Prospective	Cohort	Professional	Third	Adult	Men	Both	2908	Hours	Muscle injuries
Ekstrand 2011b	Europe	2003–2008	Prospective	Cohort	Professional	Third	Adult	Both	Both	2105	Hours	Acute injuries
Ekstrand 2012	Europe	2001–2009	Prospective	Cohort	Professional	Third	Adult	Men	Both	51	Hours	Stress fractures
Fuller 2007a	USA	2005–2006	Prospective	Cohort	Amateur	Third	Adult	Both	Training	1592	Hours	All injuries
Fuller 2007b	USA	2005–2006	Prospective	Cohort	Amateur	Third	Adult	Both	Match	1794	Hours	All injuries
Howard 2020	USA	2004–2014	Retrospective	Cohort	Amateur	Not specified	Adult	Both	Both	3449	Athlete exposure	ACL
Hägglund 2011	Europe	2001–2009	Prospective	Cohort	Professional	Third	Adult	Men	Both	137	Hours	Patellar tendon injuries
Hägglund 2016	Sweden	2009	Prospective	Cohort	Amateur	Third	Youth	Women	Both	96	Hours	Knee injuries
Kordi 2011	Iran	2008	Prospective	Cohort	Amateur	Second	Adult	Men	Match	97	Hours	All injuries
Kristenson 2013	Norway, Sweden	2010–2011	Prospective	Cohort	Professional	Third	Adult	Men	Both	1020	Hours	Acute injuries
Kristenson 2016	Norway, Sweden	2010–2011	Prospective	Cohort	Professional	Third	Adult	Men	Both	372	Hours	All injuries
Lanzetti 2017	Italy	2011–2012	Prospective	Cohort	Professional	Third	Adult	Men	Match	43	Hours	All injuries
Meyers 2013	USA	2007–2011	Prospective	Cohort	Amateur	Third	Adult	Women	Match	693	Hours	All injuries
Meyers 2014	USA	2007–2012	Prospective	Cohort	Amateur	Third	Adult	Men	Match	722	Hours	All injuries
Rössler 2017	Switzerland, Czech Republic	2012–2014	Prospective	Cohort	Amateur	Not specified	Youth	Both	Both	417	Hours	All injuries
Soligard 2010	Norway	2005–2008	Prospective	Cohort	Amateur	Third	Youth	Both	Match	2454	Hours	Acute injuries
Steffen 2007	Norway	2005	Prospective	Cohort	Amateur	Third	Youth	Women	Both	456	Hours	Acute injuries

Table 1: **Background information of the included studies.**

Table 3). Both men (11 studies: IRR 0.82, CI 0.72–0.94; I^2 88%; Fig. 2) and women (5 studies: IRR 0.83, CI 0.76–0.91; I^2 0%; Fig. 2) had a lower incidence of injuries on artificial turf (evidence quality low, Table 3). Professional players had a lower incidence of injury (8 studies: IRR 0.79, CI 0.70–0.90; I^2 84%; I Fig. 4; evidence quality low; Table 3) on artificial turf, but there was no evidence of a difference in amateur players (8 studies: IRR 0.91, CI 0.77–1.09; I^2 88%; Fig. 4; evidence quality very low; Table 3). There was no evidence of any difference reported in studies that analysed matches played on artificial turf (6 studies: IRR 0.86, CI 0.72–1.03; I^2 85%; Fig. 5; evidence quality very low; Table 3) or training sessions (1 study: IRR 1.04, CI 0.92–1.17; Fig. 5; evidence quality very low; Table 3).

Injury mechanisms, types, and locations

Non-contact injuries were less frequent on artificial turf (6 studies: IRR 0.86, CI 0.74–1.00; I^2 39%; Fig. 6; evidence quality low, Table 3) than on grass. There was no evidence of differences in contact injuries (7 studies: IRR 0.78, CI 0.60–1.12; I^2 87%; Fig. 6; evidence quality very low, Table 3). Muscle strains were less frequent on artificial turf (11 studies: IRR 0.79, CI 0.64–0.96; I^2 86%; Fig. 7; Evidence quality low; Table 3), and other injury types (contusions, sprains, and other) did not show any evidence of differences between playing surfaces (Fig. 7, Table 3). In one study, stress fractures were assessed and the rates between the playing surfaces were similar (IRR 0.80, CI 0.40–1.61).

In a more specific analysis of the anatomical location of the injuries, the overall incidences of injury on artificial turf were lower for the total rate of lower body injuries (12 studies: IRR 0.86, CI 0.74–1.00; I^2 87%; Supplementary Figure S1), pelvis and thigh injuries (10 studies: IRR 0.72, CI 0.57–0.90; I^2 90%), and knee injuries (14 studies: IRR 0.77, CI 0.64–0.92; I^2 65%; Supplementary Figure S1). Furthermore, on artificial turf, men had a lower incidence of upper body (5 studies: IRR 0.73, CI 0.54–0.97; I^2 0%), pelvis and thigh (8 studies: IRR 0.70, CI 0.53–0.92; I^2 92%), and knee injuries (10 studies: IRR 0.76, CI 0.58–0.99; I^2 77%; Supplementary Figure S2). Furthermore, we found no evidence of differences in anatomical location in women (Supplementary Figure S3). Professional players had a lower incidence of head, upper body, lower body, knee, and pelvis injuries on artificial turf ((Supplementary Figure S4), whereas amateur players did not have an increased or decreased incidence of injury on artificial turf (Supplementary Figure S5). There were no differences in the incidences of injury between games or training sessions on artificial turf. However,

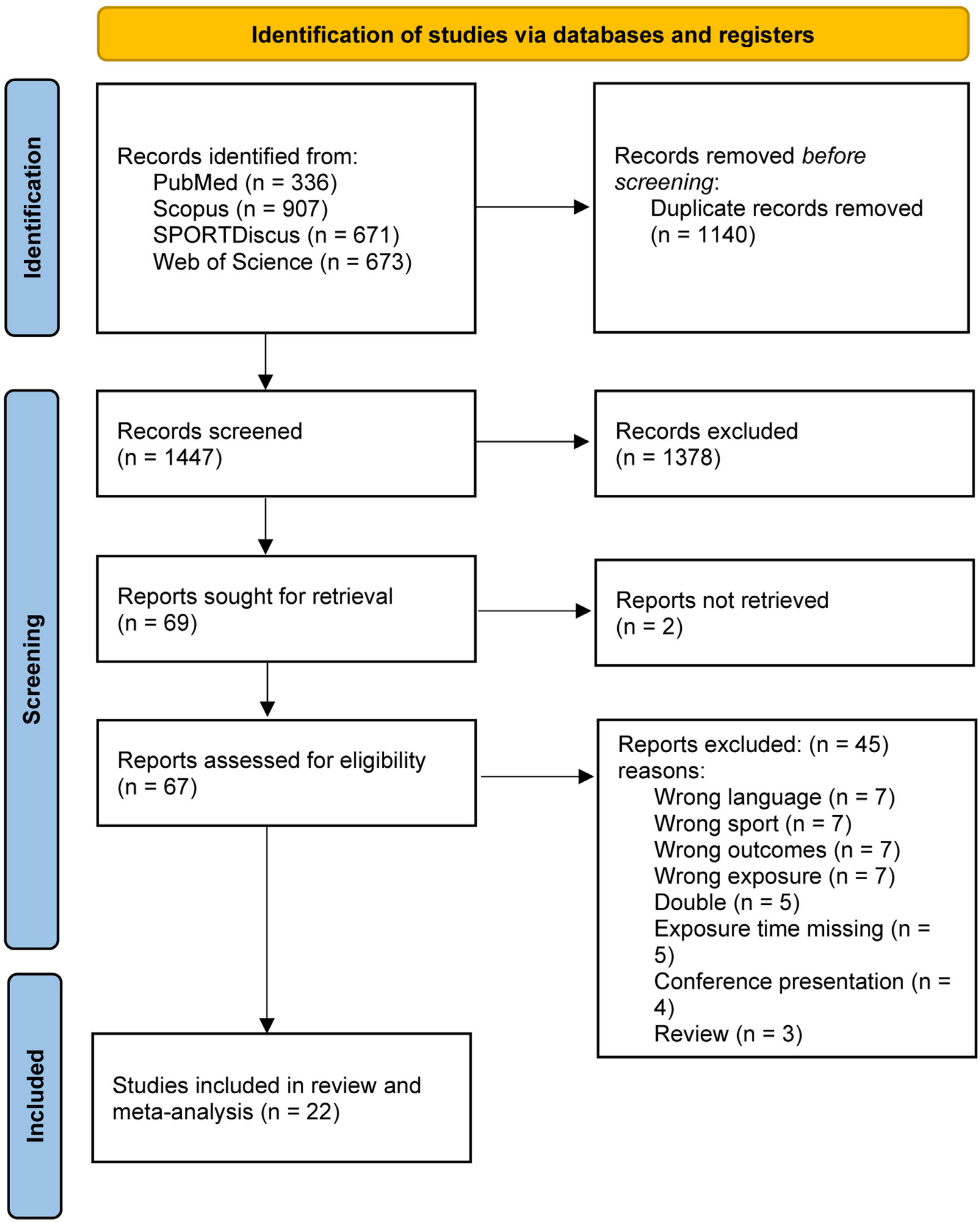

Fig. 1: Flowchart of the study selection process.

a smaller number of studies analysed this difference (Supplementary Figures S6 and S7). Adult players had a lower incidence of lower body (10 studies: IRR 0.85, CI 0.73–0.99; I^2 87%), pelvis and thigh (8 studies: IRR 0.70, CI 0.53–0.92; I^2 92%), and knee injuries (11 studies: IRR 0.76, CI 0.61–0.94; I^2 73%; Supplementary Figure S8), but

Study	Selection				Comparability	Outcome			Total
	Representativeness of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	Comparability of cohorts based on the design or analysis	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow up of cohorts	Total (9 max)
Almutawa 2014	1	1	1	1	0	1	1	1	7
Aoki 2010	1	1	1	1	0	1	1	1	7
Bjørneboe 2010	1	1	1	1	0	1	1	1	7
Calloway 2019	1	1	1	1	0	1	1	1	7
Ekstrand 2006	1	1	1	1	0	1	1	1	7
Ekstrand 2011a	1	1	1	1	0	1	1	1	7
Ekstrand 2011b	1	1	1	1	0	1	1	1	7
Ekstrand 2012	1	1	1	1	0	1	1	1	7
Fuller 2007a	1	1	1	1	0	1	1	1	7
Fuller 2007b	1	1	1	1	0	1	1	1	7
Howard 2020	1	1	0	1	0	1	1	1	6
Hägglund 2011	1	1	1	1	0	1	1	1	7
Hägglund 2016	1	1	1	1	2	1	1	1	9
Kordi 2011	1	1	1	1	0	1	1	1	7
Kristenson 2013	1	1	1	1	0	1	1	1	7
Kristenson 2016	1	1	1	1	0	1	1	1	7
Lanzetti 2017	1	1	1	1	0	1	1	1	7
Meyers 2013	1	1	1	1	2	1	1	1	9
Meyers 2014	1	1	1	1	2	1	1	1	9
Rössler 2018	1	1	1	1	2	1	1	1	9
Soligard 2012	1	1	1	1	2	1	1	1	9
Steffen 2007	1	1	1	1	0	1	1	1	7

Table 2: **Risk of bias of the included studies assessed by Newcastle-Ottawa Scale. Maximum number of points is nine, and a higher score means the least risk of bias.**

there were no evidence of any differences in incidences of injury in youth players (Supplementary Figure S9).

Geographical location

In geographical analysis, one study was conducted in Middle East, and it found lower injury incidence on artificial turf (IRR 0.68, CI 0.49–0.93; Supplementary Figure S10). Ten studies were performed in Central regions (includes Central Europe, East-Asia, and the USA), and in these regions the estimates did not show evidence of a difference (IRR 0.91, CI 0.78–1.07; Supplementary Figure S10). Five studies were conducted in Northern Europe, and the injury incidence was lower on artificial turf (IRR 0.78, CI 0.70–0.87; Supplementary Figure S10).

Sensitivity analyses and other additional analyses

In a sensitivity analysis with only third generation artificial turfs included, the incidence estimates did not show evidence of a difference compared to the main analyses in most of the analyses (Supplementary Figures S11, S13–S15). However, the estimate did change notably in amateurs, and the incidence was lower on artificial turf (IRR 0.83, CI 0.71–0.98; Supplementary Figure S12). Similarly, the additional sensitivity analysis with only prospective studies did not change notably any of the IRR estimates (Supplementary Figures S16–S20). A further sensitivity analysis, for which only studies with highest quality were included, did not change the effect estimates (Supplementary Figure S21). We performed a further meta-regression moderator analysis to estimate the impact of publication year and it did not find any meaningful associations in any of the main analyses. Publication bias was assessed by funnel plots and Egger's test and we did not find evidence of it (Supplementary Figure S22).

Discussion

Based on the evidence from this systematic review, the incidence of injury is typically lower when football is played on artificial turf than it is when played on grass. This finding was seen in both men and women. Professional players had a lower incidence of injury on artificial turf, whereas amateur players had a similar incidence of injury on grass and other playing surfaces and artificial playing surfaces. Similarly, adult players had a lower incidence of injuries on artificial turf, but youth players did not. Non-contact injuries and muscle strains were less frequent on artificial turf. Furthermore, in subgroup analysis, the incidence of pelvis and thigh, and knee injuries sustained on artificial turf were found to be lower in men and professional players. The

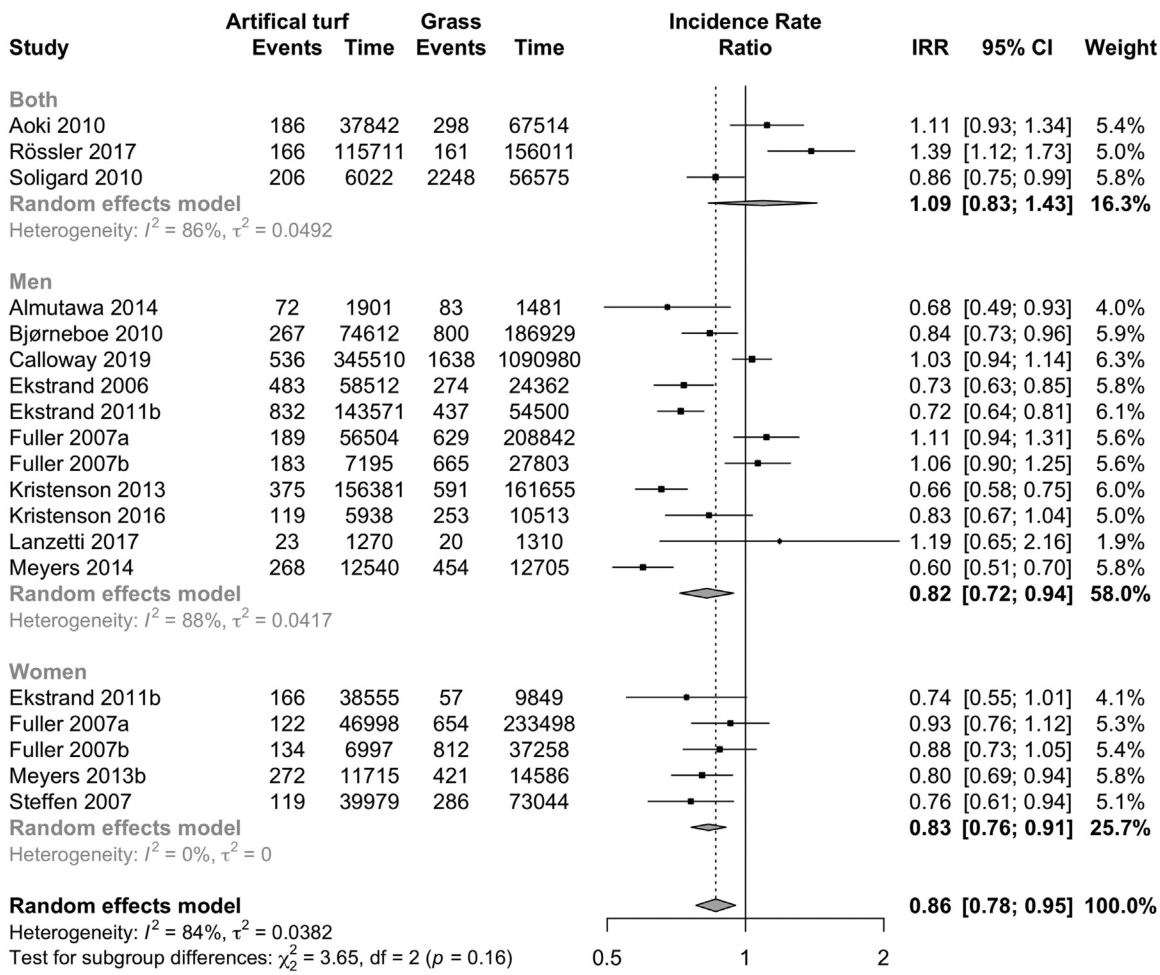

Fig. 2: Forest plot of the incidence of overall injuries on artificial turf compared to grass stratified by sex.

Outcome	GRADE	Comment
Overall injury incidence		
Artificial turf vs grass	Low	Downgraded due to risk of bias, inconsistency, upgraded due to lack of imprecision
Artificial turf vs other surfaces	Very low	Downgraded due to risk of bias, inconsistency and limited study sample
Men	Low	Downgraded due to risk of bias, inconsistency, upgraded due to lack of imprecision
Women	Low	Downgraded due to risk of bias, limited sample size, upgraded due to lack of imprecision and inconsistency.
Professionals	Low	Downgraded due to risk of bias, inconsistency, upgraded due to lack of imprecision
Amateurs	Very low	Downgraded due to risk of bias, inconsistency and imprecision.
Matches	Very low	Downgraded due to risk of bias, inconsistency and imprecision.
Training	Very low	Downgraded due to risk of bias, inconsistency and imprecision.
Injury mechanism		
Non-contact	Low	Downgraded due to risk of bias, imprecision, upgraded due to low inconsistency.
Contact	Very low	Downgraded due to risk of bias, inconsistency and imprecision.
Injury type		
Muscle strain	Low	Downgraded due to risk of bias, inconsistency, upgraded due to lack of imprecision.
Contusions	Low	Downgraded due to risk of bias, imprecision, upgraded due to low inconsistency,
Sprains	Very low	Downgraded due to risk of bias, inconsistency and imprecision.

Table 3: **Evidence quality for main outcomes assessed according to the GRADE framework.**

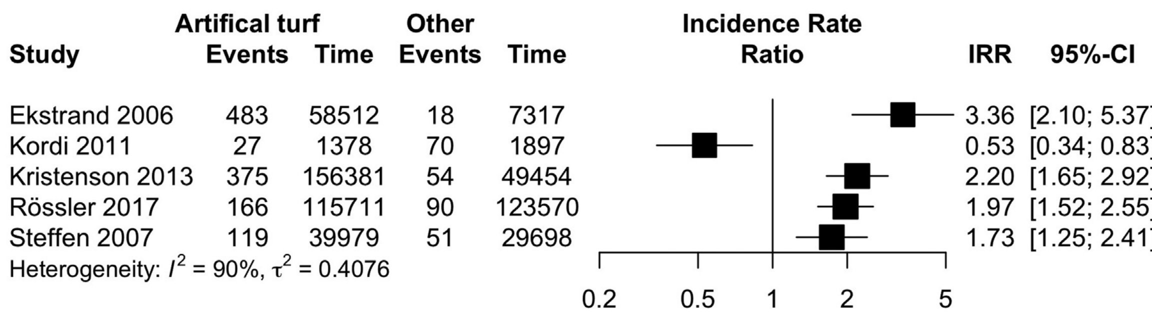

Fig. 3: Forest plot of the incidence rate ratios of overall injuries on artificial turf compared to other playing surfaces.

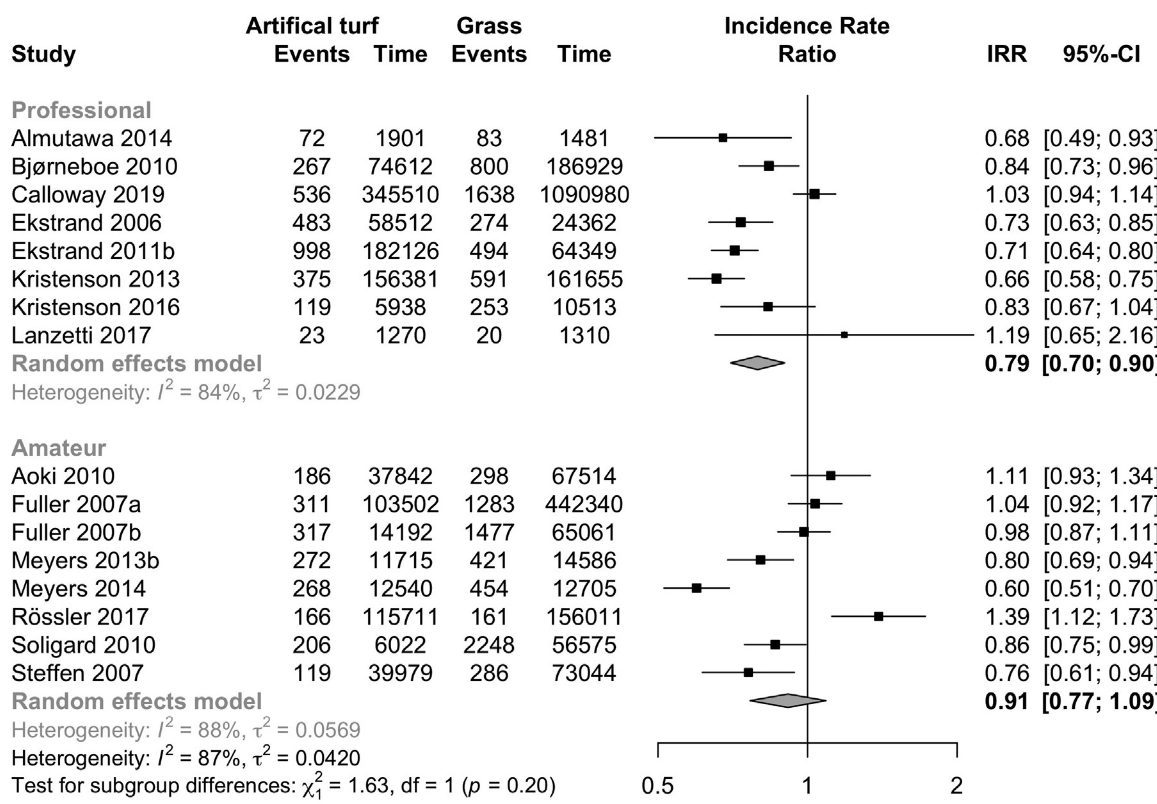

Fig. 4: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified between professional and amateur players.

majority of the subgroups analyses had high uncertainty and imprecision in the estimates with wide confidence intervals.

To the best of our knowledge, this is the largest study on the incidence of injury associated with playing football on artificial turf. A recent meta-analysis by Xiao et al. found that women had a higher incidence of ACL injury in all sports played on artificial turf, but the incidences of injury were similar in men and in training sessions.[5] In our analysis, we did not find any evidence of an increased incidence of knee or ACL injuries in women or in games. An earlier systematic review by Balazs et al. found an increased risk for ACL injury in American football, but not in football.[34] From the results of our analysis, it seems that the overall incidence of knee injuries was lower on artificial turf. A systematic review by Gould et al., which did not present any quantitative pooled synthesis, concluded that a higher rate of foot and ankle injuries occur on artificial turf. However, the lack of a meta-analysis lessens the value of such a conclusion.[7] In our analysis, no evidence that any joint had an increased risk for injuries on artificial turf

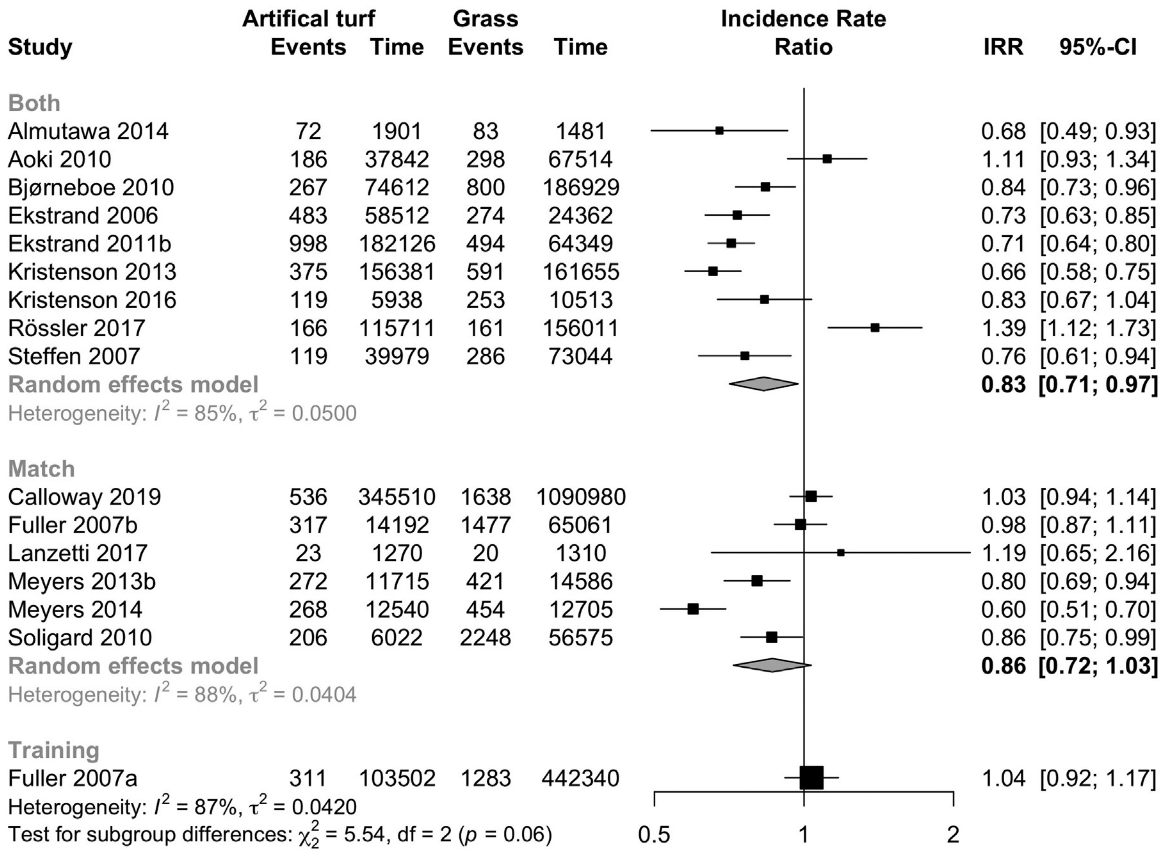

Fig. 5: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by matches and training sessions.

was found. Overall, lower rates of non-contact injuries and strains occurred on artificial turf. A previous meta-analysis by Maniar et al. reported an increased hamstring injury risk in field sports played on grass compared to artificial turf.[6] Similar findings were also seen in our results, as the incidence of pelvic and thigh region injuries were 27% lower on artificial turf than on grass.

Based on the finding of this study, the incidence of injury is lower on artificial turf, which should be noted when discussing and planning the renovation of football fields. Although football is traditionally played on grass, it seems that the flat and homogenous surface offered by artificial turf may prevent injuries, and thus reduce the use of resources and related healthcare costs. We performed a geographical stratified analysis to estimate indirectly the weather conditions, and it seemed that especially the incidence was lower in Northern Europe, where the growing season for grass is the shortest. Additionally, we analysed only the third generation artificial turfs and the injury incidences were mostly lower or similar to grass. When discussing the optimal playing surface and possible playing surfaces in football, possible injuries should not be used as an argument to prevent artificial turf being used. This was the case for the men's 2026 World Cup in the USA, where FIFA decided that all artificial turf pitches should be converted to grass prior to the World Cup. Interestingly, women played on artificial turf in the 2015 World Cup in Canada and youth World Cups have also been played on artificial turf. Furthermore, the official rules of both FIFA and UEFA allow artificial turf to be used as a playing surface.

A survey conducted with professional football coaches in the Netherlands revealed interesting results, as 63% of the participants saw artificial turf as the surface of the future, and 57% believed that technical skills improve better on artificial turf. However, 70% of participants still preferred natural grass.[35] Professional players have reported a higher fear of injury when playing on artificial turf compared to grass.[36]

Recent studies, however, have shown that the players' preference for natural grass is more likely about cognitive bias rather than physical differences between the playing surfaces.[37] Although elite level players were found to make less slide tackles and prefer

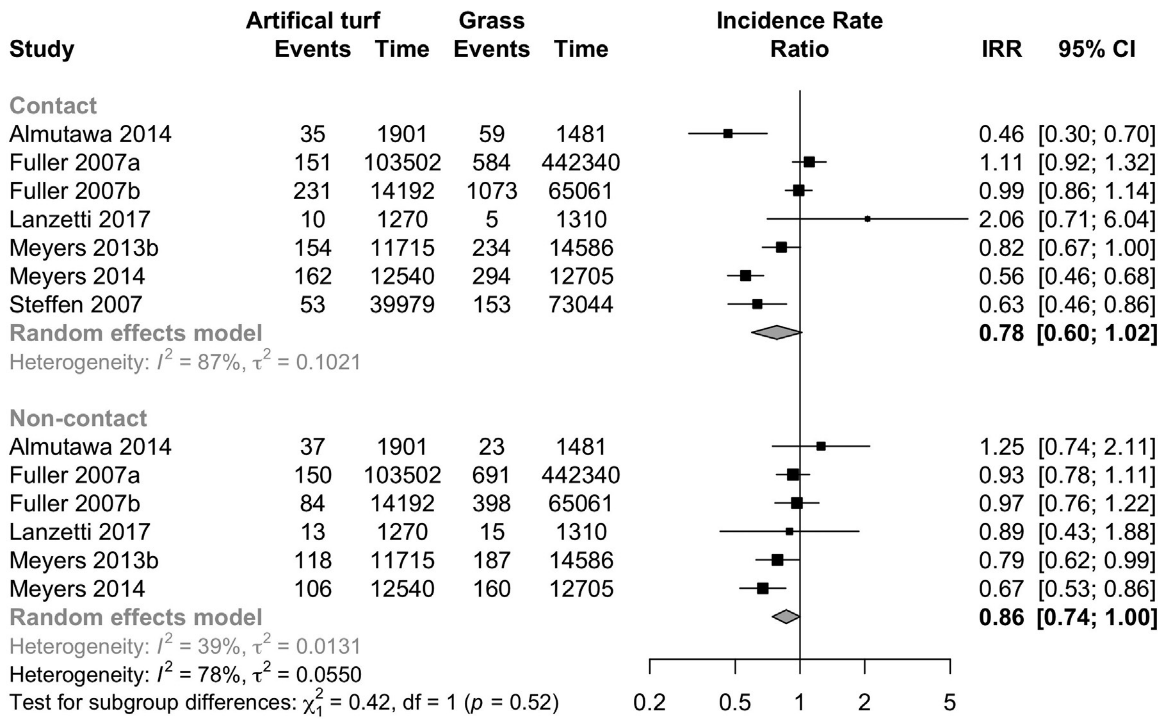

Fig. 6: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by injury mechanism (contact vs non-contact).

shorter passes on artificial turf, the measured game parameters were otherwise similar.[38] However, the players' feelings were clearly more negative towards artificial turf.[38]

To the best of our knowledge, this is the largest study on the incidence of injury associated with playing football on artificial turf. Moreover, we are unaware of previous studies that provide pooled estimates of the differences in incidence of injury between different playing surfaces. The present study was conducted according to our study protocol, and we only made minor deviations from the original protocol. For example, we decided to use the Newcastle-Ottawa scale alone in reporting the risk of bias instead of the Joanna Briggs Institute Critical Appraisal checklist.

The limitations of the present study arise mainly from the included original studies. In many cases, injuries were defined differently between the studies. For example, some studies classified injury as any event that led to the interruption of a training session or match, whereas other studies defined injury as an event that required assessment from medical personnel (physiotherapist or team doctor). In another classification, an injury was defined as leading to absence from training sessions or matches. Although this causes heterogeneity between the studies, we pooled the incidence rate ratios, which means that the pooled estimate is derived from the interstudy comparisons. A further limitation was the failure to adjust for confounding, as 17 of the 22 studies did not control for external confounding factors, such as the weather, wetness of the pitch and the studs used, or control for player attributable confounders (history of injury, physical abilities, etc). A further limitation is the limited number of included studies in the subgroup analyses, which causes clear imprecision to the estimates.

Future research is still needed to better understand the epidemiology of injuries, especially in amateur and youth athletes playing on artificial turf. More research is also needed at the elite female level to better estimate the incidence of injury on artificial turf. Future studies should be designed to better control for potential player attributable and external confounding factors in the analyses to increase the quality in the reporting.

The results of our current study can be utilized in decision making when planning new football pitches both in professional level and in communities as the artificial turf seems to have lower injury incidence than grass pitches. Furthermore, these results can be utilized by medical departments in football teams and associations when discussing factors related to possible injuries.

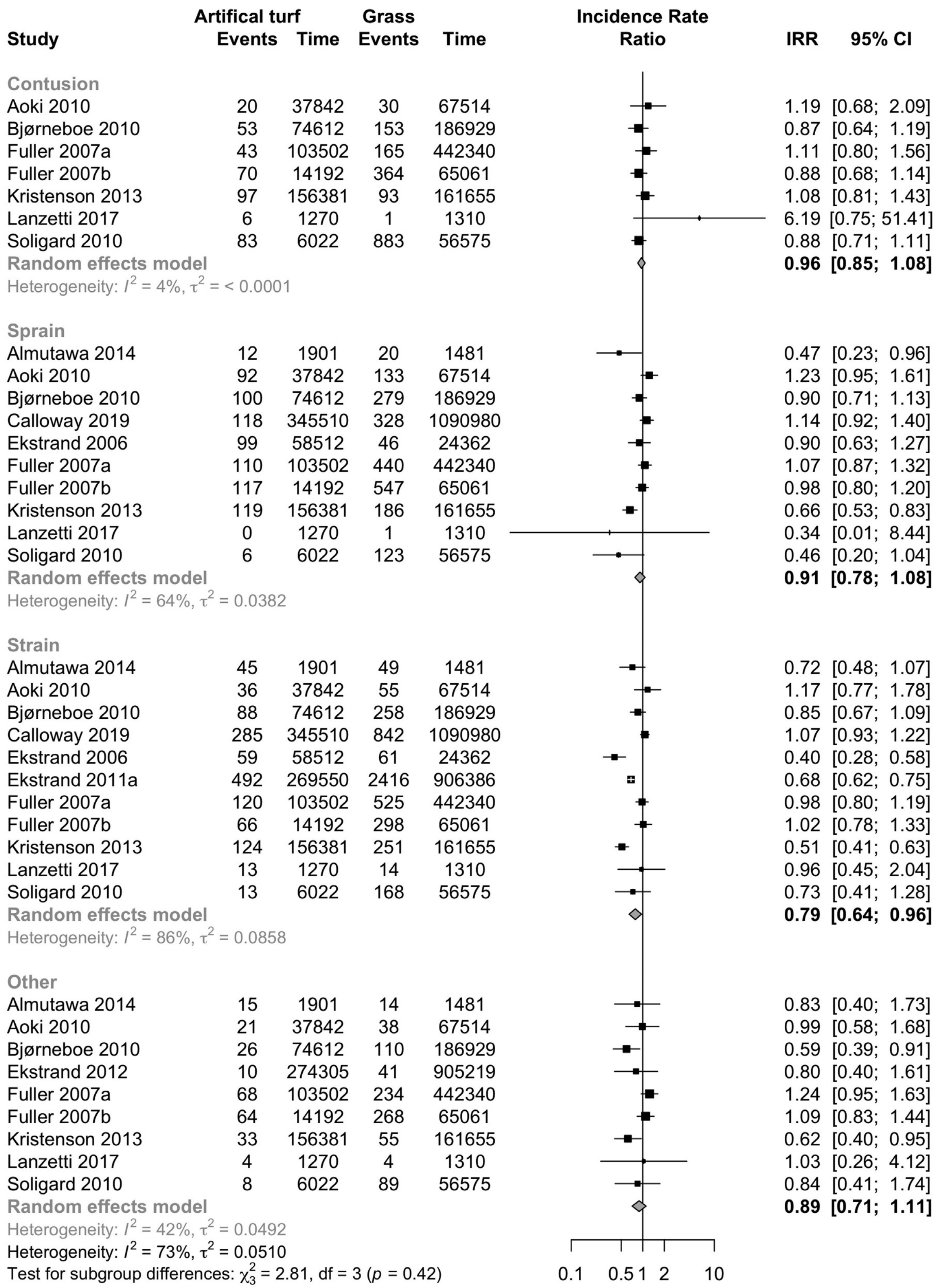

Fig. 7: Forest plot of the injury incidence rate ratios on artificial turf compared to grass and other playing surfaces stratified by injury type (fracture, sprain, ligament injury).

Contributors

Ilari Kuitunen: Conseptualization, Data curation, Investigation, Methodology, Validation, Writing—original draft, Writing—review & editing.

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Ville T Ponkilainen: Formal analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing—review & editing.

Data sharing statement

All data used in the analyses are available upon request from the corresponding author.

Declaration of interests

None of the authors have any potential conflicts of interest.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.eclinm.2023.101956.

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AstroTurf Products Are Not Manufactured with PFAS

PFAS have become an increasingly debated topic with contamination now commonly found in groundwater, rainwater, and soil. Artificial turf has also come under scrutiny as a possible source of PFAS. All synthetic turf products currently produced at AstroTurf are manufactured without PFAS. AstroTurf specifies that all turf ingredients be free of PFAS when purchasing raw materials. Our raw materials and finished goods have been submitted to third-party analytical chemistry labs and tested for 32 PFAS using state-of-the-art procedures finding that PFAS concentrations were below detectable limits. In 2020, AstroTurf removed a fluorinated polymer (non-migrating and not one of the 32 PFAS of concern) from the turf construction. This was a proactive decision over and above the regulation to eliminate doubt of PFAS during testing. AstroTurf continues to be the leader in artificial turf - safe for consumers - safe for the environment. As we understand the concern on the presence of these chemicals, AstroTurf will continue to monitor and safeguard the quality and safety of their products.

AstroTurf prides itself on its responsibility to the health and safety of our customers and employees, to the environment and to manufacturing in a responsible manner.

Anthony Daniell
Director of Research and Development
Synthetic Turf Resources

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March 6, 2023

SHAW SPORTS TURF PFAS STATEMENT

Dear Valued Customer:

Shaw has a longstanding commitment to sustainability and the responsible manufacture of our products. This includes a strong focus on the material chemistry of our products. This commitment applies to our brands and is inclusive of Shaw Sports Turf.

PFAS chemicals are one of many substances that we require our supply partners to disclose the presence of in raw materials, components, and finished goods purchased by Shaw. Based on information provided to date by suppliers, Shaw Sports Turf does not use PFAS chemicals currently listed on California's Proposition 65 regulations or identified as target analytes in USEPA Methods for analysis of PFAS (specifically Methods 533, 537, 3827 and Draft Method 1633) to manufacture the components of its sports turf field products.

We are committed to continuously improving the performance and material health profile of our Shaw Sports Turf products. If you have any questions, please email us at sustainability@shawinc.com

Corporate Sustainability & Product Stewardship
Shaw Industries Group, Inc.
(CRH)

SUSTAIN THE GAME

Innovation With Purpose

FieldTurf®
A Tarkett Sports Company

Our **Commitment**

Protect People & Planet; that's our sustainability commitment

That means our innovation isn't limited to product specs. Our promise to keep players safe on our turf has naturally evolved into an obsession — one with a singular focus to completely eliminate its potential to harm not just people but the environment, too. Now in everything we do, we strive for the lowest impact on people and the planet — from our zero turf to landfill commitment, to circular design, to the utmost care for those who play on and handle our products.

Our Committment isn't New
We've Been Leading the Industry for Years

1995

FieldTurf is founded by two athletes who believe in a better game for all. They promise to Change The Game for athletes with a surface that offers improved performance and safety.

1997

The first 3rd-generation infill turf, a revolutionary playing surface, is installed at Ringgold High School in PA.

2009

Introduce the "Green Machine," the only unit able to remove both rolls of artificial turf and infill unharmed.

2010

The first field to be completely recycled.

Flagship manufacturing facility in Calhoun, GA opens, allowing for continued investment and focus on quality and excellence.

2014

The first infill recycling center in the Pacific Northwest is launched, enabling infill to be recycled from aged fields to avoid landfills.

2016

EcoMax — the first synthetic turf infill made partially of recycled materials — is introduced.

Safety study supported by FieldTurf wins AOSSM's STOP Sports Injuries Award, which recognizes top research leading toward significant awareness and change in the prevention of traumatic and overuse injuries in youth sports.

2019

ThermaGreen, creators of innovative shock pads made of post-industrial cross-linked polyethylene, is added to the FieldTurf family.

2021

FieldTurf introduces Goal Zero, a new commitment to divert 100% of job site and manufacturing waste from landfills by 2025 in North America.

2022

FieldTurf launches industry-first carbon offset program.

FieldTurf surface at Mercedes-Benz Stadium is fully recycled during replacement.

FieldTurf fibers are now produced with green energy at Morton Extrusionstechnik – electrical power.

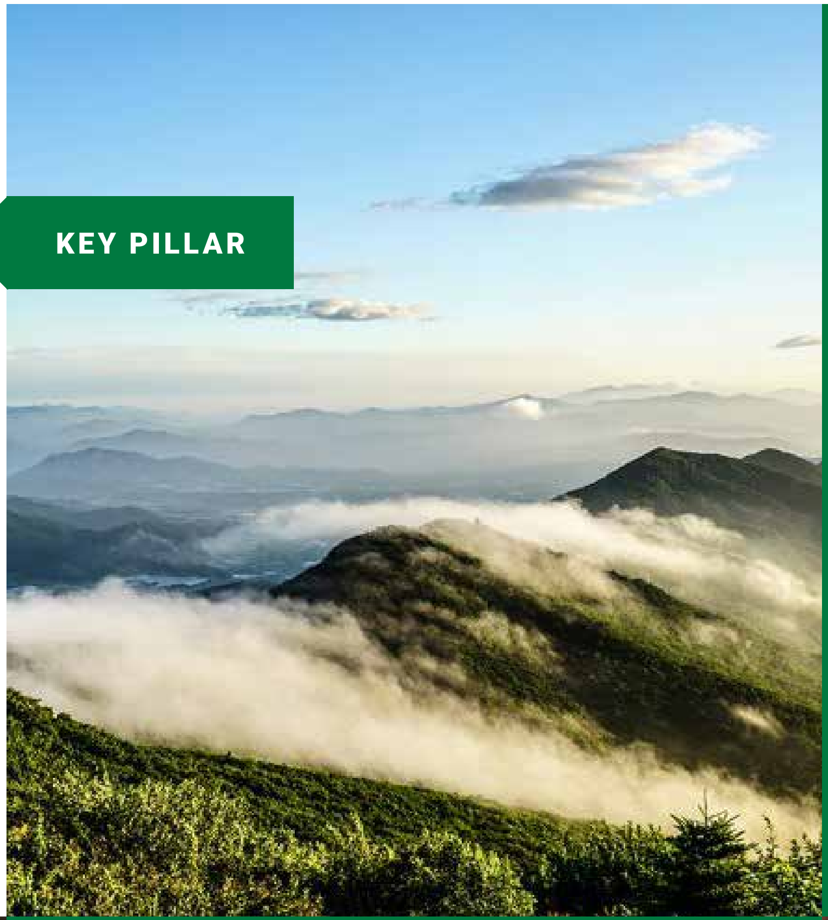
2023

Tarkett's ambitious 2030 climate targets approved by the Science Based Targets initiative (SBTi) – Fully aligned with the Paris Climate Agreement objective.

Operational **Footprint**

KEY PILLAR

We're working year over year to minimize the environmental impact of our operations, including reducing the greenhouse gas emissions in our manufacturing processes, so you can rest easy knowing your field is contributing to your sustainability goals.



Beyond **the Field**

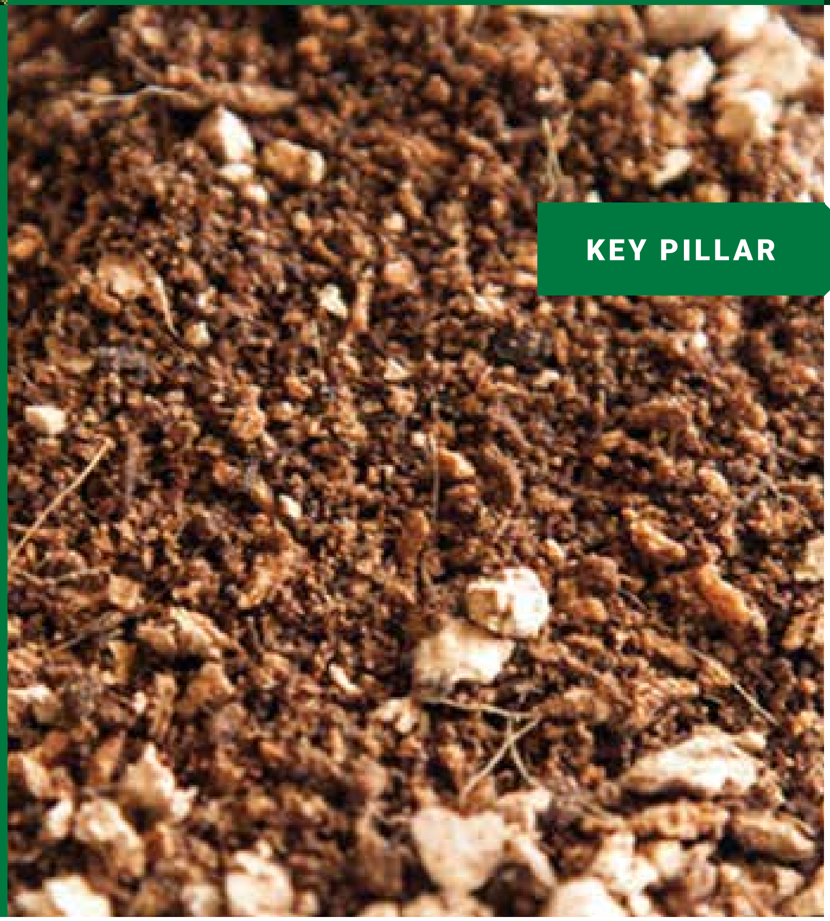
Our dedication to responsible impact extends beyond the turf; it's about enhancing the lives within the communities we touch. Our products can help conserve local ecosystems and increase the availability of play areas, ensuring youth have consistent access to active, engaging sports environments.

KEY PILLAR

KEY PILLAR

Protecting **People & Athletes**

Safety is our #1 priority, always, whether it's keeping athletes safer on our fields or ensuring our own people are kept safe while they work. Through continuous advancements in our systems and processes, we strive not only to meet but to exceed safety standards, ensuring a superior experience for athletes and a secure workplace for our employees.



KEY PILLAR

Purpose-Led **Products**

We offer a variety of sustainability-minded products to further improve the impact of your field. From natural infills to carpet recycling, FieldTurf products let you make the environmentally-conscious choice without sacrificing quality.

Powering **Positive Change**

Focused on **Reducing Our Impact**

We're continuously improving our operations to reduce FieldTurf's impact on climate change and help our clients achieve their climate goals, so the next generation of athletes can continue to play.

SBTi Approved

- Tarkett has set ambitious targets to reduce our Scope 1 and Scope 2 greenhouse gas emissions by 50% by 2030, which were approved by the Science Based Targets initiative (SBTi).
- SBTi is dedicated to driving ambitious climate action in the private sector by enabling organizations to set science-based reduction targets in line with the Paris Climate Agreement
- We've already reduced our emissions by 41% since 2019

We're harnessing renewable energy to reduce our manufacturing impact

- Tarkett has entered into renewable energy contracts to power our manufacturing sites. So far, 13 plants are running off of 100% renewable electricity - that's 44% of our energy consumption.
- FieldTurf polyethylene fibers are extruded with green energy. All of the electrical power consumed at Morton Extrusionstechnik, our state-of-the-art fiber extrusion plant, is certified to have been generated from renewable energies.

Going Beyond Mitigation

- With FieldTurf's carbon offset program, we're reducing our greenhouse gas impact further than what we can immediately reduce. Clients can now make the installation of their fields carbon-neutral through our partnership with the Carbonfund Foundation.

Data representing 2023 achievements

CARBON OFFSET

Join Our Journey **to Carbon Neutrality**

CARBON OFFSET

With the FieldTurf Carbon Offset Program, you can now calculate the exact emissions from your new surface and offset them so your project achieves carbon neutrality.

Step 1
Plan Your Facility

One size does not fit all. Location, product, size, and date can vary the impact of your project.

Once your scope and products are finalized, our proprietary carbon calculator will assess your total emissions.

Step 2
Calculate the Impact

FieldTurf's exclusive surface intensity calculator can calculate the exact amount of CO_2e emissions that will result from your project.

This is achieved by tallying the emissions from a field's specific materials, manufacturing, transport, and installation.

Step 3
Offset the Emissions

Your voluntary offsets are simply added to your invoice. Offsets are provided through the Carbonfund Foundation's Carbonfree® Partner Program.

This program funds third-party validated and verified renewable energy, forestry, and energy efficiency projects supporting a low-carbon transition for the planet. Every project will be awarded a certified carbon free sign to display at their facility.

Carbon emissions for each project are calculated using FieldTurf's proprietary surface intensity calculator. Actual emissions may occasionally vary due to uncontrolled project-related factors.

Making a Difference **With Every Field**

Committed to **Zero-Waste-to-Landfill**

In our efforts to improve the circularity of our value chain, we're eliminating waste and reducing the need for new materials in our products. We're offering our clients new opportunities to improve the environmental impact of their fields, from manufacturing efficiencies, to installation, to end-of-life.

17 MILLION LBS. RECYCLED

Over 17 million tires recycled into raw materials to build new fields annually

65 MILLION LBS. OF INFILL

Over 65 million pounds of infill re-used in new fields through onsite re-use and infill regeneration.

Data representing 2023 achievements

- As part of our Goal Zero zero-waste-to-landfill commitment, FieldTurf is working to divert 100% of our job site and manufacturing waste from landfills by 2025 in North America. Partnering with us means moving one step closer to eliminating waste and transitioning to a circular economy.
- Through Goal Zero, over 350,000 lbs of job site waste was diverted in 2023.

Our fields are 100% recyclable

- All the components in the systems manufactured by FieldTurf are 100% recyclable. FieldTurf is expanding its partnerships with recycling facilities across North America to be able to recycle carpet from anywhere, anytime, once it's reached the end of its life.

Infill can be regenerated and re-used

- When replacing your aged surface, you can choose to either reuse the existing infill on your next project or leverage our Infill Take Back program. The reclaimed material is collected, cleaned, and recycled in future projects. Both options deliver a material that has been tested and proven to equal new infill in quality and durability, but with the added bonus of greatly reducing your project cost and carbon footprint.
- FieldTurf is dedicated to increasing our number of recycling facilities that can take back infill and reprocess it. The Infill Take Back Program may not be available in your area.

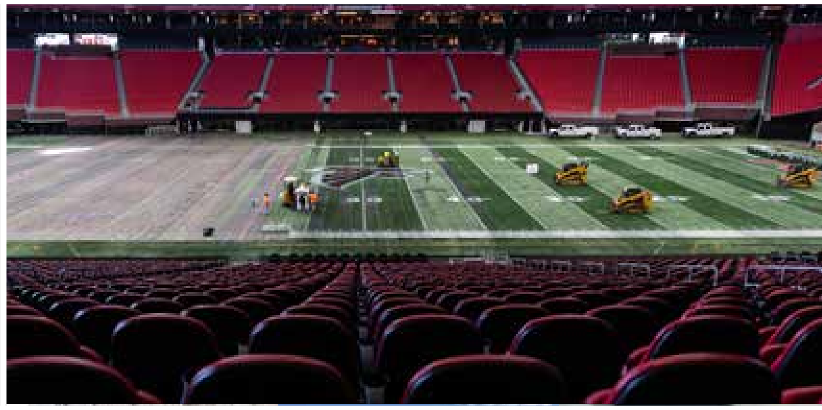
Field **Recycling**

Field **Recycling**

1

Field Removal

The aged carpet and infill are removed from the venue and prepared for transport.



2

Infill Regeneration

The carpet rolls are sent to a Tarkett Sports recycling facility to extract the infill, clean it, and separate it for reuse.

3

Carpet Recycling

The aged carpet is sent to a specialized facility to be cut, processed, and refined into a blend.

4

Product Manufacturing

Using a proprietary process that upcycles the material into a high-grade polyurethane & polypropylene blend, the carpet can be transformed into various products like nailer boards, planters, and park benches.

A Better **Solution**

We were founded with the promise to create a better solution for athletes — and now we extend that dedication to all the lives we touch through investments in safety research, product performance, and respect for the well-being of our teams and our communities.

4 MILLION LBS. SAVED

Over 4 million pounds of fertilizer saved annually

When not managed properly, these materials can negatively affect plant, animal, and human environments.

Extensive athlete safety research

- FieldTurf collaborates with renowned research institutions like the University of Calgary and The Center for Sports Surface Research at Penn State on a variety of studies to help optimize player safety and performance, helping protect athletes and preventing injuries.

Reduce the need for fertilizers and chemicals

- With synthetic turf, there's no need to add fertilizers or spray harsh chemicals that may be harmful to athletes, communities, and the environment through direct exposure or runoff.

SmartTeam and cutting-edge research

- With the help of advanced biometrics and real-time analytics, the SmartTeam Project will collect millions of data points obtained through athlete-monitoring wearables, video analytics, and surface testing. The project's mission is to translate the findings into tangible learnings that could result in meaningful change for athletes.

Tarkett Human-Conscious Design®

- All of our surfaces are designed with people and the planet as our first priority. Since Tarkett's inception, we've worked diligently to create healthier spaces and improve the quality of life of our fields' users.

Data representing 2023 achievements

Making A Difference **Beyond the Field**

We can help make a difference both on the field, and beyond. Our fields can conserve resources and prevent damage to surrounding local ecology. Our team also works to ensure our communities are thriving, because when a community thrives, so do its sports.

16 BILLION GALLONS SAVED

Combined, FieldTurf fields help conserve over 16 billion gallons of water every year.

We conserve water

- Water is a human right that is essential to life, and its stewardship is core to our sustainability strategy. From manufacturing to installation, our products address water efficiency, scarcity, and quality.
- Every FieldTurf field is estimated to save 2 million* gallons of water annually vs natural grass.

Get more activity for the same field

- Between seasonal changes and downtime for maintenance and grass recovery, high-quality natural grass fields can only be used for a fraction of the time an artificial turf field can, which means a FieldTurf field will give you more use and more play time for your athletes and community. Synthetic turf can be played on for 3,000 hours/year, whereas natural grass fields can only be played on for 300 – 600 hours to maintain the best playable condition.

"Natural Grass Can't Do the Job. The current, failed field cancels play over 40% of the time because (a) it doesn't recover from rain and (b) a natural grass playing surface cannot be maintained under heavy use."

Julie Souza
Deputy Mayor and Council Member, City of Rye

*Source: https://www.abc4.com/news/local-news/salt-lake-county-council-approves-converting-three-murray-sports-fields-to-artificial-turf/

Data representing 2023 achievements

We've Got **Your Back**

FieldTurf isn't just committed to protecting the athletes who use our fields, we also work tirelessly to support our team in everything they do, and it shows in the quality of the fields we design and install.

Keeping our people safe

FieldTurf is continuously looking for opportunities to mitigate health and safety risks in our operations, with a goal to reach a 1.0 injury frequency rate (Recordable Lost Time Accident Frequency Rate FR1t) by 2025.

DEI

We're an equal opportunity employer with a zero tolerance policy for harassment and discrimination in the workplace. On top of encouraging an inclusive culture, we also incorporate diversity considerations into our recruitment processes, and we conduct employee feedback surveys to understand how we can further improve our culture.

Empowering **Tomorrow's Champions**

We believe in shaping a brighter future through the power of sport and community. By focusing on protecting the future of play, our 'Better Tomorrow' represents the charitable spirit of our organization, dedicated to empowering sports and coaches in need through meaningful partnerships and support. Our program is more than just a pledge; it's an active engagement in uplifting communities, fostering an environment of inclusivity, and nurturing the growth of sportsmanship and talent.

Partners with Good Sports, who helped equip over 475,000 kids in 2023.

Women Leaders in Sports partners with prominent women in the sports world who develop, connect, and champion women to advance and be powerful influences in sports.

Partners with the Cure Classic All-Star Game, part of the Orlando Sports Foundation and its mission to "bring teams together to find a Cure for Cancer".

Partners with Make-A-Wish® Georgia, helping grant wishes for exceptional kids in Georgia

The High School Broyles Award is presented by FieldTurf, honoring the nation's top high school assistant football coaches.

Partners of leading national associations to support future generations of coaches & athletes.

Supported over 800 community initiatives with employees volunteering 3,500 days and over 1.1 million euros of product donations between 2017 and 2022 through our Tarkett Cares program.

Our commitment to offering your program with an extensive portfolio of purpose-led products is unwavering. We continue to invest in product development and innovation to design the most sustainable synthetic turf systems in the industry.

One Step Ahead to Offer You **Unique Solutions**

FieldTurf Offers a Leading **Portfolio of Alternative Infills**

Made from natural materials, helping divert waste from landfills.

PureFill

Harvested from cork oak trees every nine years, without harming the trees.
USDA Certified Biobased Product.

PureSelect

Granulated olive cores.
USDA Certified Biobased Product.

PureCob

Granulated woody-ring portion of corn cobs.
USDA Certified Biobased Product.

PureGeo

Granulated coconut, peat, and cork mix.

Our **SuReTec™** program relies on chemical recycling using mass balance pyrolysis oil from post-use end-of-life plastics and mechanical recycling converting plastic waste into new secondary raw materials to reduce the amount of virgin plastics used to make artificial turf fiber.

ACROSS OUR GROUP, WE'RE LEADING THE FIELD IN SUSTAINABILITY. LEARN ABOUT OUR ACHIEVEMENTS:

Tarkett

TARKETT HUMAN CONSCIOUS DESIGN™

Our commitment to stand with present & future generations. To create flooring and sports surfaces that are good for people and for the planet. And to do it every day.

It's a holistic way of doing business, capable of marrying the specific expectations of each of our customers with the profound challenges of protecting our planet. Working together with our partners, we deliver safer and healthier spaces in which people can reach their full potential.

For over 140 years, we have proudly been undertaking this commitment. We launched our first recycling-focused circular economy initiative in 1957, have raised indoor air quality standards for more than a decade, and excel in researching and designing solutions for diverse environments.

We hold people and the planet at the heart of our operations–and we're dedicated to proving it, day after day.

Preserving resources through circular economy

RENEWABLE, ABUNDANT OR RECYCLED MATERIALS

69% of raw materials do not contribute to resource scarcity

RECYCLED RESOURCES

154,000 tons of recycled materials in production

18% of our raw materials are recycled materials

2030 global objective: 30%

FLOORING TAKE-BACK

close to **119,000**

tons of flooring collected from 2010 to 2022 by Tarkett ReStart® collection and recycling program in our 8 recycling centers across the globe

WATER CONSUMPTION

-61% versus 2010 (m³)

69% of plants equipped with a closed loop water system

Fighting climate change

RENEWABLE ENERGY

13 plants purchasing 100% renewable electricity

44% of total energy consumption comes from renewable energies

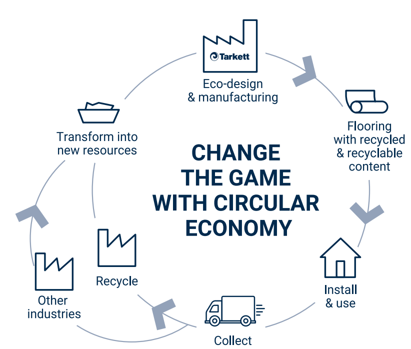
GREENHOUSE GAS EMISSIONS

-47% Scope 1 & 2 versus 2019

2030 objective: -50% vs. 2019
& -30% scope 1+2+3 vs. 2019

132,682 tons CO_2e

(Scope 1 & 2) in 2023 from production sites and car leasing



250 euros / ton CO_2e

This is the shadow carbon price we apply internally to assess the impact of our investments on our carbon footprint

Using good materials for people's health and the environment

CRADLE TO CRADLE® MATERIALS ASSESSMENT

94% of our raw materials are third-party assessed for their impact on people's health and the environment based on Cradle to Cradle® criteria

INDOOR AIR QUALITY

99% of flooring solutions have low VOC (volatile organic compounds) emission levels (10 times lower than the most stringent world standard)

HEALTHY INDOOR ENVIRONMENT / PHTHALATE-FREE

96% of our flooring solutions containing PVC (vinyl and carpet) are phthalate-free[1] on a global level (% of m² produced)

Respecting and developing teams

SAFETY

3.28

2025 objective: 1.0

injury frequency rate (Recordable Lost Time Accident Frequency Rate FR1t)[2]

DIVERSITY

29%

2025 objective: 30%

of women among managers & senior executives

INTERNAL MOBILITY

65%

2025 objective: 70%

of open management positions filled by an internal candidate

Supporting local communities and global initiatives

TARKETT cares — COMMUNITY SUPPORT

900

community initiatives with employees volunteering **3,800** days and **over 1.2 million euros** of product donations between 2017 and 2023

Tarkett Academy — EXPERTISE SHARING

60,000

professionals or students trained as professional installers or in flooring installation techniques from 2012 to 2023

Engaging with our value chain to promote climate solutions and circular economy

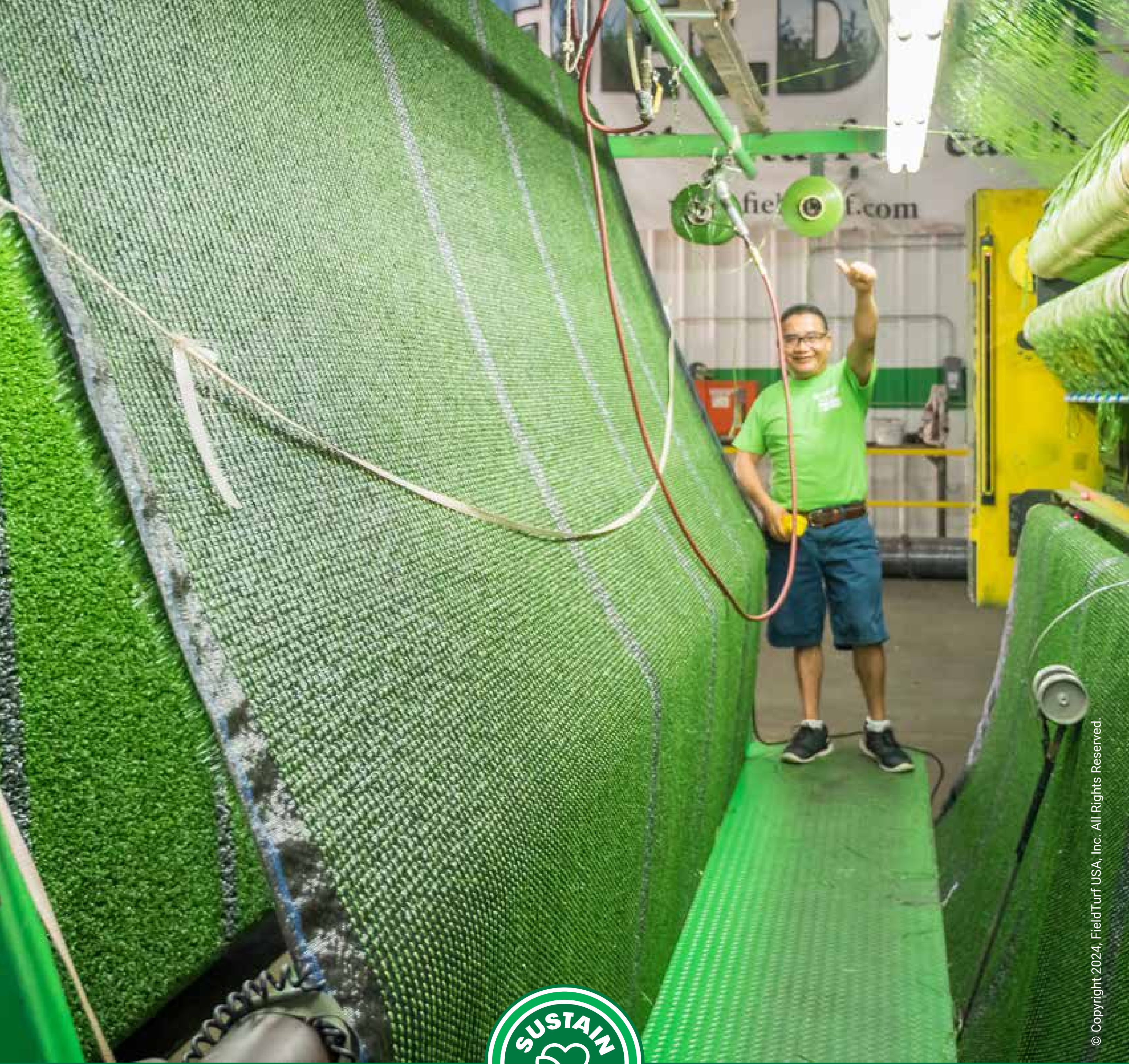
Deploying our responsible sourcing program

90% of requested suppliers completed a third-party CSR assessment (in spend)

Engaging with customers, architects, designers and end-users

38 showrooms in 21 countries

[1] Except recycled content for certain products and countries.
[2] Number of accidents with lost time < & > 24 hours per million worked hours.



SUSTAIN THE GAME

Innovation **With Purpose**

FieldTurf®
A Tarkett Sports Company

fieldturf.com

Technical Memorandum

To: Peter H. Rice, Director of Public Works (City of Portsmouth, NH)
Suzanne Woodland (Deputy City Attorney)

From: Elizabeth Denly, TRC Vice President, PFAS Initiative Leader & Chemistry Director
Dr. Karen Vetrano, TRC Risk Assessment and Toxicology Manager

Date: June 7, 2022

Subject: Evaluation of PFAS in Synthetic Turf

1.0 SUMMARY OF INVESTIGATION

The City of Portsmouth recently installed a synthetic turf ballfield. Due to concerns raised by community members, the material used for the synthetic turf was evaluated for the potential presence of per- and polyfluoroalkyl substances (PFAS).

TRC prepared a sampling and analysis plan (SAP) in February 2022 which provided details and requirements on the following:

- Sampling procedures for the materials under investigation: carpet/grass, in-fill material, and the shock pad;
- Requirements for packaging of these materials by the manufacturer and shipping of these materials to the analytical laboratory;
- Procedures to be used by the analytical laboratory for the homogenization/compositing, extraction, and analysis of each material;
- Reporting limit goals for the individual PFAS analyses in each material; and
- Required field and analytical quality control samples and measurement criteria.

TRC worked directly with the synthetic turf manufacturers to establish an appropriate procedure for the collection of representative samples for analysis. TRC also worked directly with the analytical laboratory, Eurofins TestAmerica (Eurofins) in Lancaster, Pennsylvania, to ensure appropriate procedures would be used by the laboratory for the handling of these materials and that the resulting data would be representative of the materials under evaluation.

The evaluation was performed using the same synthetic turf material product purchased and installed by the City of Portsmouth, but the samples of this material that underwent evaluation were obtained directly from the manufacturers. Figures 1 through 3 provide photographs of the samples submitted for analysis.

- US Greentech (Safeshell Infill): Sample ID: Safeshell #1-3
- FieldTurf (Synthetic Turf Carpet): Sample ID: Carpet-001
- Schmitz Foam Products (ProPlay Pad): Sample ID: PP Pad-001

Prior to the laboratory extraction process, each material was disaggregated using a cryo-mill which reduced each material down to a homogenous powdery material. This process helped to ensure a representative sample of each material was being used in the extraction. Eurofins performed three analyses of each sample.

1) 70 individual PFAS using a modified version of USEPA Method 537.1, with isotope dilution liquid chromatography/dual mass spectrometry (i.e., pre-oxidation analysis)
2) Total oxidizable precursor (TOP) assay
3) Non-targeted analysis using quadrupole time of flight mass spectrometry (QTOF-MS).

Three equipment blanks were generated by the laboratory during the cryo-milling process to ensure the equipment was not contributing PFAS to the samples and that the equipment was properly decontaminated between samples. The equipment blanks were analyzed for only the 70 individual PFAS. Equipment blanks were associated with the samples as follows:

- EB-001: associated with Carpet-001
- EB-002: associated with PP Pad-001
- EB-003: associated with Safeshell #1-3

2.0 ANALYTICAL RESULTS

The results of the analyses for the 70 PFAS and TOP Assay are presented in Table 1. The results of the q-TOF analyses are discussed below and provided in Attachment 1. Copies of the laboratory data packages are provided in Attachment 1.

<u>TOP Assay</u>

TOP Assay analyses were performed on each sample. The purpose of the TOP Assay analyses was to determine if PFAS precursors are present in the samples. There are thousands of potential PFAS precursors, with only several that are commonly analyzed for by commercial laboratories. The current analytical method can quantify a list of 70 PFAS; the list of compounds includes perfluoroalkyl acids (PFAAs) and select PFAS precursors. This method is not designed to identify and report on the full suite of PFAS that may be present in each sample. However, through a strong oxidation procedure, the TOP Assay analysis causes the breakdown of PFAS precursor compounds into the measurable and regulated PFAAs. As a result, this investigation was designed to quantify the potential risk of accelerating precursor transformation into PFAAs that could result from the oxidation of these samples, a worst-case scenario. The analysis was completed by utilizing a pre- and post-TOP Assay procedure.

The post-oxidation analyses of the three samples did not result in a significant increase of PFAAs, indicating that these materials do not contain a significant mass of precursor PFAS. Potential transformation or oxidation of these materials in the future will therefore not likely cause an increase in the PFAA concentrations and will not result in additional risk.

<u>Non-targeted QTOF-MS Results</u>

Non-targeted QTOF-MS analyses were performed on each sample to determine if “other” PFAS were present that were not included in the analysis of the 70 individual PFAS. Consistent with the TOP Assay analyses, the QTOF-MS analyses did not reveal the presence of a significant mass of “other” PFAS. The QTOF-MS data are qualitative in nature; results represent qualitative estimations of presumptive positives. The process used to identify these peaks is described in the data package in Attachment 1.

There were several additional peaks identified in these samples but only one peak was tentatively identified in sample Carpet-001 as bis(2,2,3,3,4,4,4- heptafluorobutyl) carbonate; this peak had a lower intensity than some of the unknown peaks also noted in this sample. Most of the compounds screened after the non-target analysis appeared as [M-H]-, which indicates a loss of hydrogen after dissociation in water. This indicates the presence of either a carboxylic or sulfonic acid functional group in the backbone of the compounds. However, in almost all cases, the identifications of these peaks were not available and reported as “unknown”.

Data Usability Evaluation

An evaluation of analytical data usability was performed and included the following parameters:
- Holding times and sample preservation
- Blanks (method and equipment)
- Isotopically labeled surrogate results
- Laboratory control sample (LCS) results
- Internal standards
- Sample results and reporting limits

The focus of the review was to ensure that the laboratory generated valid data for the PFAS results, and that results were usable for project objectives. Due to significantly low recoveries of PS Acid and EVE Acid in the LCS analyses, the nondetect results for these compounds are not usable for project objectives in the pre-oxidation analyses of all samples.

The following data quality nonconformances were noted, all of which have a minor impact on the usability of the data.

- Holding Times
  - The equipment blank samples were analyzed one to three days outside of the holding time. There is no significant effect on these results due to the minor holding time nonconformance.
- Method Blank Contamination
  - The positive results for PFOSA in equipment blank EB-001 and PFOS in equipment blanks EB-001, EB-002, and EB-003 are likely false positives due to method blank contamination.
  - The positive results for 6:2 FTS in the post-oxidation analyses of samples Carpet-001 and PP Pad-001 are likely false positives due to method blank contamination.
- Equipment Blank Contamination
  - The positive result for HFPO-DA in the post-oxidation analysis of sample PP Pad-001 is likely a false positive due to equipment blank contamination.
- Isotopically Labeled Surrogate Results
  - Potential uncertainty exists for 6:2 FTCA and 7:3 FTCA in the post-oxidation analyses of samples Carpet-001 and PP Pad-001 and 8:2 FTCA in the post-oxidation analysis of sample Safeshell #1-3 due to slightly low recoveries of the associated isotopically labeled surrogates.
  - Potential uncertainty exists for PFPeA in the pre-oxidation analysis of sample Safeshell #1-3 due to high recovery of the associated isotopically labeled surrogate.
- Ion Ratios
  - Potential uncertainty exists for the positive results for 6:2 FTS and PFOS in the post-oxidation analysis of sample Carpet-001 and 6:2 FTS, PFHxA, and PFHpA in the post-oxidation analysis of sample PP Pad-001 due to ion ratios outside of the

acceptance criteria.

In general, data are usable for project decisions based on a review of the accuracy, precision, and sensitivity of the data. With the exception of PS Acid and EVE Acid, the PFAS data are valid as reported and may be used for decision-making purposes.

3.0 PRELIMINARY RISK EVALUATION

A preliminary evaluation of the potential risk of exposure to PFAS detected in the synthetic turf components was performed. Consideration was made as to which turf components contain PFAS and the types of exposure applicable to those components.

As previously discussed, Table 1 presents the results of the analyses for the 70 PFAS and TOP Assay which are denoted under each sample as "Pre-Treatment" and "Post-Treatment", respectively. As discussed above, the TOP Assay subjects the samples to strong oxidizers, under specific laboratory conditions in order to accelerate potential precursor oxidation into the measurable and regulated PFAAs, thus representing a worst-case scenario.

The USEPA (USEPA 2022a) and individual states (ITRC 2022) have derived health-based soil screening criteria under residential exposures for some of the PFAS. Table 2 presents a comparison of the detected concentrations to USEPA and New Hampshire (NH) human health-based residential soil screening values. When neither of these values were available, the lowest available screening value was obtained from another state. Finally, if there were no promulgated screening values available for a detected compound, the lowest NH residential soil screening level (PFOS) was used as a surrogate. Comparing detected concentrations in the synthetic turf components (i.e., grass/carpet, shock pad, and infill material) to available soil screening criteria is highly conservative (i.e., health protective). For example, USEPA residential soil screening criteria assume a combination of ingestion, dermal contact and inhalation (if volatile) exposures over a period of 24 hours/day, 350 days/year for 6 years for non-cancer effects and over a period of 350 days/year for a combined 26 years (20-year-old adult and 6-year-old child combined exposures) (USEPA 2014, 2022b). Exposures to the synthetic turf components will be much less than the assumed residential soil exposures. Additionally, the primary route of exposure for residential soils is ingestion, whereas exposure to the synthetic turf carpet and infill would be through limited dermal exposure. It is not expected that there would be physical contact with the shock pad since it is beneath the carpet and infill material.

<u>Carpet Sample</u>

As shown in Table 1, there were no detectable concentrations of PFAS in the FieldTurf, synthetic turf carpet pre-treatment sample. The following eight individual PFAS were detected at very low concentrations in the TOP Assay after extreme oxidizing conditions:

- 6:2 Fluorotelomer sulfonic acid*
- HFPODA (Gen-X)
- Perfluorobutanoic Acid (PFBA)
- Perfluorohexanoic Acid (PFHxA)
- Perfluorooctanesulfonic Acid (PFOS)
- Perfluoropentanoic Acid (PFPeA)
- PPF Acid (Pentafluoropentionic Acid)
- R-EVE

*It should be noted that 6:2 Fluorotelomer sulfonic acid was also detected in a blank sample and therefore is not considered an actual detection in this sample.

With the exception of PPF Acid, all the detected compounds were below 1 nanogram/gram (ng/g), which is equivalent to 0.001 milligrams per kilogram (mg/kg). PPF acid was detected at 1.08 ng/g (0.00108 mg/kg).

As shown in Table 2, for those detected concentrations in the post-treatment carpet sample with residential soil screening values, all were well below their respective values, ranging from 446 (HFPODA) to 24,120 (Perfluorobutanoic acid) times lower. Two detected compounds do not have screening criteria. Conservatively assuming that these compounds are as toxic as PFOS, the detected concentrations were well below the surrogate PFOS screening value, ranging from 92 (PPF Acid) to 1,472 (R-EVE) times lower.

<u>ProPlay Pad</u>

As shown in Table 1, there were three PFAS with very low detected concentrations in the ProPlay (PP) Pad pre-treatment sample:

- Perfluorononanoic acid (PFNA)
- Perfluortridecanoic acid (PFTrDA)
- Perfluoroundecanoic acid (PFUnA)

The following six PFAS were detected at very low concentrations in the TOP Assay after extreme oxidizing conditions:

- 6:2 Fluorotelomer sulfonic acid*
- HFPODA (Gen-X)
- Perfluoroheptanoic Acid (PFHpA)
- Perfluorohexanoic Acid (PFHxA)
- PPF Acid (Perfluoropropionic Acid)
- R-EVE

*It should be noted that 6:2 Fluorotelomer sulfonic acid was also detected in a blank sample and therefore is not considered an actual detection in this sample.

All the detected compounds were below 1 ng/g, which is equivalent to 0.001 mg/kg.

As shown in Table 2, for those detected concentrations in the PP Pad sample with residential soil screening values, all were well below the documented screening value. For the pre-treatment samples, concentrations ranged from 117 (Perfluoroundecanoic acid) to 2,252 (Perfluorononanoic acid) times lower, while for the post-treatment samples, concentrations ranged from 119 (Perfluoroheptanoic acid) to 1,875 (Perfluorohexanoic acid) times lower than their respective health-based values. Two detected compounds do not have screening criteria. Conservatively assuming that these compounds are as toxic as PFOS, the detected concentrations were well below the surrogate PFOS screening value, ranging from 408 (PPF Acid) to 735 (R-EVE) times lower.

<u>Safeshell #1-3 Infill</u>

As shown in Table 1, there were six PFAS with very low detected concentrations in the SafeShell Infill pre-treatment sample:

- PEPA (Perfluoro-2-ethoxypropanoic acid)
- Perfluoropentanoic Acid (PFPeA)
- PFMOAA (Perfluoro-2-methoxyacetic acid)
- PFO2HxA (Perfluoro (3,5-dioxahexanoic)acid)
- PMPA (Perfluoro-2-methoxypropanoic acid)
- PPF Acid (Perfluoropropionic Acid)

The following four PFAS were detected at very low concentrations in the TOP Assay after extreme oxidizing conditions:

- 6:2 FTCA (6:2 Fluorotelomer carboxylic acid)
- 6:2 FTUCA (6:2 Fluorotelomer unsaturated carboxylic acid)
- PFO2HxA (Perfluoro (3,5-dioxahexanoic)acid)
- TAF (Perfluoro (3,5,7,9,11-pentaoxadodecanoic) acid

With the exception of PFMOAA and PPF acid in the pre-treatment sample, all the detected compounds were below 1 ng/g, which is equivalent to 0.001 mg/kg. PFMOAA was detected at a concentration of 5.16 ng/g (0.00516 mg/kg) and PPF acid was detected at a concentration of 41 ng/g (0.041 mg/kg).

As shown in Table 2, only Perfluoropentanoic acid, detected in the pre-treatment SafeShell sample has an associated soil screening value and was 1500 times lower than that value. Five of the compounds detected in the pre-treatment sample did not have associated screening values. Conservatively assuming that these compounds are as toxic as PFOS, the detected concentrations were below the surrogate PFOS screening value, ranging from 2.5 (PPF Acid) to 2,169 (PMPA) times lower.

None of the post-treatment detected compounds had associated soil screening values. Conservatively assuming that these compounds are as toxic as PFOS, the detected concentrations were well below the surrogate PFOS screening value, ranging from 325 (PFO2HxA) to 2,353 (6:2 FTCA) times lower.

Conclusions

A preliminary evaluation of the potential risk of exposure to PFAS detected in the components of the synthetic turf system (grass/carpet, infill, and shock pad) was conducted by comparing the detected concentrations to available promulgated federal and state residential soil screening levels (USEPA, 2022a, ITRC, 2022). These screening values are meant to establish unlimited use of contaminated soil sites and therefore are extremely conservative (i.e., health protective) when used for comparing concentrations in synthetic turf.

Two primary PFAS analyses were conducted on the synthetic turf components, a modified version of EPA Method 537.1 which can detect 70 individual PFAS and the TOP Assay. The TOP Assay is meant as a worst-case condition and is used to quantify the potential risk of accelerating precursor transformation into PFAAs that could result from the oxidation of these samples in nature, thereby increasing the types and concentrations of PFAAs. The post-oxidation analyses of the three samples did not result in a significant increase of PFAAs, indicating that these materials do not contain a significant mass of precursor PFAS. Potential transformation or oxidation of these materials in the future will not cause an increase in PFAA concentrations and will not result in additional risk.

Of the synthetic turf components, the grass/carpet and infill material would be expected to be the two components in which there will be physical contact. The carpet sample had no detectable PFAS in the pre-treatment sample. Post-treatment samples showed very low level, trace concentrations (as evidenced in Table 1 as “J”, estimated values) of a limited number of PFAS. When compared to the health-based soil screening levels, all concentrations were orders of magnitude below the target benchmark levels, thus indicating no significant risk from exposure to these compounds.

The Shellsafe Infill material had very low-level concentrations of a limited number of PFAS in the pre-treatment and post-treatment samples. With the exception of PPF Acid detected in the pre-treatment sample, all were orders of magnitude below the target benchmark levels, thus indicating no significant risk from exposure to these compounds. PPF Acid does not have a promulgated health-based soil screening level and was compared to the NH residential soil screening level for PFOS and was 2.5 times lower, which still indicates no potential significant risk from this exposure. PPF Acid is a small molecule consisting of only two fully fluorinated carbons and is considered an ultra-short chain PFAA (Bjornsdotter, M.K et al. 2020). Unlike PFOS which bioaccumulates and has an estimated half-life in humans of over 5 years (i.e., the body concentration decreases by half every 5 years with no additional exposure), PPF Acid is not expected to bioaccumulate, thus decreasing potential chronic toxicity. Therefore the comparison with the PFOS screening level as a surrogate is very conservative.

The comparison of detected PFAS concentrations in the shock pad to soil concentrations is an extremely conservative evaluation since it is covered by the grass/carpet and infill material and thus not available for contact. Nevertheless, the same evaluation was conducted. The shock pad had very low-level concentrations of a limited number of PFAS in the pre-treatment and post-treatment samples. All concentrations were orders of magnitude below the target benchmark levels, thus indicating no significant risk from exposure to these compounds.

Based on this evaluation, the detection of very low levels of a limited number of PFAS in the synthetic turf components does not represent a human health risk to those using the synthetic turf ballfields.

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FIGURES

Figure 1: US Greentech (Safeshell Infill)

Figure 2: FieldTurf (Synthetic Turf Carpet) **Figure 3: Schmitz Foam Products (ProPlay Pad)**

TABLES

Table 1
Summary of Analytical Results for Synthetic Turf Samples -- March 2022
Portsmouth, NH

		Sample Name:	**Carpet-001**				**PP Pad-001**			
		Lab Sample ID:	410-75808-1				410-76735-1			
		Sample Date:	3/8/2022				3/16/2022			
		Sample Type:	Pre-Treatment		Post-Treatment		Pre-Treatment		Post-Treatment	
		Units:	ng/g		ng/g		ng/g		ng/g	
Analysis	Analyte									
PFAS										
	10:2 FTCA		0.120	U	0.120	U	0.120	U	0.120	U
	10:2 FTS		0.400	U	0.400	U	0.399	U	0.400	U
	10:2 FTUCA		0.120	U	0.120	U	0.120	U	0.120	U
	11Cl-PF3OUdS		0.120	U	0.120	U	0.120	U	0.120	U
	3:3 FTCA		0.120	U	0.120	U	0.120	U	0.120	U
	4:2 Fluorotelomer sulfonic acid		0.400	U	0.400	U	0.399	U	0.400	U
	5:3 FTCA		0.120	U	0.120	U	0.120	U	0.120	U
	6:2 Fluorotelomer sulfonic acid		0.400	U	**0.187**	**JBI**	0.399	U	**0.162**	**JBI**
	6:2 FTCA		0.120	U	0.120	U	0.120	U	0.120	U
	6:2 FTUCA		0.120	U	0.120	U	0.120	U	0.120	U
	7:3 FTCA		0.120	U	0.120	U	0.120	U	0.120	U
	8:2 Fluorotelomer sulfonic acid		0.600	U	0.600	U	0.599	U	0.600	U
	8:2 FTCA		0.120	U	0.120	U	0.120	U	0.120	U
	8:2 FTUCA		0.120	U	0.120	U	0.120	U	0.120	U
	9Cl-PF3ONS		0.400	U	0.400	U	0.399	U	0.400	U
	DONA		0.600	U	0.120	U	0.599	U	0.120	U
	EVE Acid		0.120	U	0.120	U	0.120	U	0.120	U
	HFPODA		0.400	U	**0.515**	**J**	0.399	U	**0.526**	**J**
	Hydro-EVE Acid		0.120	U	0.120	U	0.120	U	0.120	U
	Hydrolyzed PSDA		0.120	U	0.120	U	0.120	U	0.120	U
	Hydro-PS Acid		0.120	U	0.120	U	0.120	U	0.120	U
	MTP		0.120	U	0.120	U	0.120	U	0.120	U
	NEtFOSA		0.400	U	0.400	U	0.399	U	0.400	U
	NEtFOSAA		0.400	U	0.400	U	0.399	U	0.400	U
	NEtFOSE		0.400	U	0.400	U	0.399	U	0.400	U
	NMeFOSA		0.400	U	0.400	U	0.399	U	0.400	U
	NMeFOSAA		0.400	U	0.400	U	0.399	U	0.400	U
	NMeFOSE		0.400	U	0.400	U	0.399	U	0.400	U
	NVHOS		0.120	U	0.120	U	0.120	U	0.120	U
	PEPA		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluoro (2-ethoxyethane) sulfonic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluoro-4-ethylcyclohexanesulfonic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorobutanesulfonic acid		0.400	U	0.400	U	0.399	U	0.400	U
	Perfluorobutanoic acid		0.400	U	**0.199**	**J**	0.399	U	0.400	U
	Perfluorodecanesulfonic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorodecanoic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorododecanesulfonic acid		0.400	U	0.400	U	0.399	U	0.400	U
	Perfluorododecanoic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluoroheptanesulfonic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluoroheptanoic acid		0.120	U	0.120	U	0.120	U	**0.210**	**I**
	Perfluorohexadecanoic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorohexanesulfonic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorohexanoic acid		0.120	U	**0.0570**	**J**	0.120	U	**0.160**	**I**
	Perfluorononanesulfonic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorononanoic acid		0.120	U	0.120	U	**0.0444**	**J**	0.120	U
	Perfluorooctadecanoic acid		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorooctanesulfonamide		0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorooctanesulfonic acid		0.120	U	**0.135**	**I**	0.120	U	0.120	U

Table 1
Summary of Analytical Results for Synthetic Turf Samples -- March 2022
Portsmouth, NH

			Sample Name:	**Carpet-001**				**PP Pad-001**			
			Lab Sample ID:	410-75808-1				410-76735-1			
			Sample Date:	3/8/2022				3/16/2022			
			Sample Type:	Pre-Treatment		Post-Treatment		Pre-Treatment		Post-Treatment	
			Units:	ng/g		ng/g		ng/g		ng/g	
Analysis	Analyte										
	Perfluorooctanoic acid			0.120	U	0.120	U	0.120	U	0.120	U
	Perfluoropentanesulfonic acid			0.120	U	0.120	U	0.120	U	0.120	U
	Perfluoropentanoic acid			0.120	U	**0.0499**	**J**	0.120	U	0.120	U
	Perfluoropropanesulfonic acid			0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorotetradecanoic acid			0.120	U	0.120	U	0.120	U	0.120	U
	Perfluorotridecanoic acid			0.120	U	0.120	U	**0.0406**	**J**	0.120	U
	Perfluoroundecanoic acid			0.120	U	0.120	U	**0.0538**	**J**	0.120	U
	PFECA A			0.120	U	0.120	U	0.120	U	0.120	U
	PFECA B			0.120	U	0.120	U	0.120	U	0.120	U
	PFECA F			0.120	U	0.120	U	0.120	U	0.120	U
	PFECA G			0.120	U	0.120	U	0.120	U	0.120	U
	PFMOAA			0.120	U	0.120	U	0.120	U	0.120	U
	PFO2HxA			0.120	U	0.120	U	0.120	U	0.120	U
	PFO3OA			0.120	U	0.120	U	0.120	U	0.120	U
	PFO4DA			0.120	U	0.120	U	0.120	U	0.120	U
	PMPA			0.120	U	0.120	U	0.120	U	0.120	U
	PPF Acid			0.120	U	**1.08**	**J**	0.120	U	**0.245**	
	PS Acid			0.120	U	0.120	U	0.120	U	0.120	U
	R-EVE			0.120	U	**0.0679**	**J**	0.120	U	**0.136**	
	R-PSDA			0.120	U	0.120	U	0.120	U	0.120	U
	R-PSDCA			0.120	U	0.120	U	0.120	U	0.120	U
	TAF			0.120	U	0.120	U	0.120	U	0.120	U
	Total PFCA			0.300	U	**0.306**		0.300	U	**0.370**	

Notes:
ng/g - nanograms per gram.
ng/L - nanograms per liter.
B - Compound was found in the laboraotry method blank and sample.
I - Value is EMPC (estimated maximum possible concentration).
J - Estimated value.
NA - Not applicable.
U - Analyte was not detected at specified quantitation limit.
Values in **bold** indicate the analyte was detected.
PFAS - Per- and Poly-fluoroalkyl Substances.

Table 1
Summary of Analytical Results for Synthetic Turf Samples -- March 2022
Portsmouth, NH

	Sample Name:		**Safeshell #1-3**				**EB-001**		**EB-002**		**EB 003**	
	Lab Sample ID:		410-76903-1				410-75808-2		410-76735-2		410-76903-4	
	Sample Date:		3/9/2022				3/21/2022		3/21/2022		3/22/2022	
	Sample Type:		Pre-Treatment		Post-Treatment		Equipment Blank		Equipment Blank		Equipment Blank	
	Units:		ng/g		ng/g		ng/L		ng/L		ng/L	
Analysis	Analyte											
PFAS												
	10:2 FTCA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	10:2 FTS		0.394	U	0.399	U	4.24	U	5.00	U	4.76	U
	10:2 FTUCA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	11Cl-PF3OUdS		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	3:3 FTCA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	4:2 Fluorotelomer sulfonic acid		0.394	U	0.399	U	1.70	U	2.00	U	1.90	U
	5:3 FTCA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	6:2 Fluorotelomer sulfonic acid		0.394	U	0.399	U	4.24	U	5.00	U	4.76	U
	6:2 FTCA		0.118	U	**0.0425**	**J**	1.70	U	2.00	U	1.90	U
	6:2 FTUCA		0.118	U	**0.149**		1.70	U	2.00	U	1.90	U
	7:3 FTCA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	8:2 Fluorotelomer sulfonic acid		0.591	U	0.599	U	2.54	U	3.00	U	2.85	U
	8:2 FTCA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	8:2 FTUCA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	9Cl-PF3ONS		0.394	U	0.399	U	1.70	U	2.00	U	1.90	U
	DONA		0.591	U	0.120	U	1.70	U	2.00	U	1.90	U
	EVE Acid		0.118	U	0.120	U	8.48	U	9.99	U	9.52	U
	HFPODA		0.394	U	0.599	U	2.54	U	**0.609**	**J**	2.85	U
	Hydro-EVE Acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Hydrolyzed PSDA		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Hydro-PS Acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	MTP		0.118	U	0.120	U	4.24	U	5.00	U	4.76	U
	NEtFOSA		0.394	U	0.399	U	4.24	U	5.00	U	4.76	U
	NEtFOSAA		0.394	U	0.399	U	2.54	U	3.00	U	2.85	U
	NEtFOSE		0.394	U	0.399	U	2.54	U	3.00	U	2.85	U
	NMeFOSA		0.394	U	0.399	U	2.54	U	3.00	U	2.85	U
	NMeFOSAA		0.394	U	0.399	U	1.70	U	2.00	U	1.90	U
	NMeFOSE		0.394	U	0.399	U	2.54	U	3.00	U	2.85	U
	NVHOS		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PEPA		**0.0687**	**J**	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoro (2-ethoxyethane) sulfonic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoro-4-ethylcyclohexanesulfonic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorobutanesulfonic acid		0.394	U	0.399	U	1.70	U	2.00	U	1.90	U
	Perfluorobutanoic acid		0.394	U	0.399	U	4.24	U	5.00	U	4.76	U
	Perfluorodecanesulfonic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorodecanoic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorododecanesulfonic acid		0.394	U	0.399	U	2.54	U	3.00	U	2.85	U
	Perfluorododecanoic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoroheptanesulfonic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoroheptanoic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorohexadecanoic acid		0.118	U	0.120	U	2.54	U	3.00	U	2.85	U
	Perfluorohexanesulfonic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorohexanoic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorononanesulfonic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorononanoic acid		0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorooctadecanoic acid		0.118	U	0.120	U	2.54	U	3.00	U	2.85	U
	Perfluorooctanesulfonamide		0.118	U	0.120	U	**0.447**	**J**	2.00	U	1.90	U
	Perfluorooctanesulfonic acid		0.118	U	0.120	U	**0.501**	**J**	**0.804**	**J**	**0.731**	**J**

Table 1
Summary of Analytical Results for Synthetic Turf Samples -- March 2022
Portsmouth, NH

			Sample Name:	**Safeshell #1-3**				**EB-001**		**EB-002**		**EB 003**	
			Lab Sample ID:	410-76903-1				410-75808-2		410-76735-2		410-76903-4	
			Sample Date:	3/9/2022				3/21/2022		3/21/2022		3/22/2022	
			Sample Type:	Pre-Treatment		Post-Treatment		Equipment Blank		Equipment Blank		Equipment Blank	
			Units:	ng/g		ng/g		ng/L		ng/L		ng/L	
Analysis	Analyte												
	Perfluorooctanoic acid			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoropentanesulfonic acid			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoropentanoic acid			**0.200**		0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoropropanesulfonic acid			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorotetradecanoic acid			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluorotridecanoic acid			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	Perfluoroundecanoic acid			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PFECA A			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PFECA B			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PFECA F			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PFECA G			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PFMOAA			**5.16**		0.120	U	1.70	U	2.00	U	1.90	U
	PFO2HxA			**0.0644**	**J**	**0.308**		1.70	U	2.00	U	1.90	U
	PFO3OA			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PFO4DA			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	PMPA			**0.0461**	**J**	0.120	U	1.70	U	2.00	U	1.90	U
	PPF Acid			**41.0**		0.120	U	4.24	U	5.00	U	4.76	U
	PS Acid			0.118	U	0.120	U	8.48	U	9.99	U	9.52	U
	R-EVE			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	R-PSDA			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	R-PSDCA			0.118	U	0.120	U	1.70	U	2.00	U	1.90	U
	TAF			0.118	U	**0.0859**	**J**	4.24	U	5.00	U	4.76	U
	Total PFCA			**0.200**	**J**	0.300	U	NA		NA		NA	

Notes:
ng/g - nanograms per gram.
ng/L - nanograms per liter.
B - Compound was found in the laboraotry method blank and sample.
I - Value is EMPC (estimated maximum possible concentration).
J - Estimated value.
NA - Not applicable.
U - Analyte was not detected at specified quantitation limit.
Values in **bold** indicate the analyte was detected.
PFAS - Per- and Poly-fluoroalkyl Substances.

Table 2
Comparison of Risk-Based Soil Screening Levels with Detected PFAS Concentrations
Portsmouth, NH

		Residential Soil Screening Levels													
					Sample Name:	**Carpet-001**		**PP Pad-001**				**Safeshell #1-3**			
					Sample Date:	3/8/2022		3/16/2022				3/9/2022			
					Sample Type:	Post-Treatment		Pre-Treatment		Post-Treatment		Pre-Treatment		Post-Treatment	
Analyte	CAS #	EPA RSL mg/kg	NH DCRB mg/kg	Lowest Alternate State Level mg/kg	Units:	ng/g	mg/kg	ng/g	mg/kg	ng/g	mg/kg	ng/g	mg/kg	ng/g	mg/kg
6:2 FTCA (a)	53826-12-3	NA	0.1	NA		--	--	--	--	--	--	--	--	0.0425	0.00004
6:2 FTUCA (a)	70887-88-6	NA	0.1	NA		--	--	--	--	--	--	--	--	0.149	0.00015
HFPODA	13252-13-6	0.23	NA	NA		0.515	0.00052	--	--	0.526	0.00053	--	--	--	--
PEPA (a)	267239-61-2	NA	0.1	NA		--	--	--	--	--	--	0.0687	0.00007	--	--
Perfluorobutanoic acid	375-22-4	NA	NA	4.8 (HI EAL)		0.199	0.00020	--	--	--	--	--	--	--	--
Perfluoroheptanoic acid	375-85-9	NA	NA	0.025 (HI EAL)		--	--	--	--	0.21	0.00021	--	--	--	--
Perfluorohexanoic acid	307-24-4	NA	NA	0.3 (TX PCL)		0.057	0.00006	--	--	0.16	0.00016	--	--	--	--
Perfluorononanoic acid	375-95-1	0.19	0.1	NA		--	--	0.0444	0.00004	--	--	--	--	--	--
Perfluorooctanesulfonic acid	1763-23-1	0.13	0.1	NA		0.135	0.00014	--	--	--	--	--	--	--	--
Perfluoropentanoic acid	2706-90-3	NA	NA	0.3 (TX PCL)		0.0499	0.00005	--	--	--	--	0.2	0.00020	--	--
Perfluorotridecanoic acid	72629-94-8	NA	NA	0.0084 (HI EAL)		--	--	0.0406	0.00004	--	--	--	--	--	--
Perfluoroundecanoic acid	2058-94-8	NA	NA	0.0063 (HI EAL)		--	--	0.0538	0.00005	--	--	--	--	--	--
PFMOAA (a)	674-13-5	NA	0.1	NA		--	--	--	--	--	--	5.16	0.00516	--	--
PFO2HxA (a)	39492-88-1	NA	0.1	NA		--	--	--	--	--	--	0.0644	0.00006	0.308	0.00031
PMPA (a)	13140-29-9	NA	0.1	NA		--	--	--	--	--	--	0.0461	0.00005	--	--
PPF Acid (a)	422-64-0	NA	0.1	NA		1.08	0.00108	--	--	0.245	0.00025	41	0.04100	--	--
R-EVE (a)	2416366-22-6	NA	0.1	NA		0.0679	0.00007	--	--	0.136	0.00014	--	--	--	--
TAF (a)	39492-91-6	NA	0.1	NA		--	--	--	--	--	--	--	--	0.0859	0.000086
Total PFCA	TOTAL PFCA	NA	NA	NA		0.306	0.00031	--	--	0.37	0.00037	0.2	0.00020	--	--

(a) NH residential PFOS value used as a surrogate.
EPA RSL = USEPA Regional Screening Level (USEPA 2022)
NH DCRB = New Hampshire Direct Contact Risk-Based Soil Concentration (ITRC 2022)
TX PCL = Texas Protective Concentration Level (ITRC 2022)
HI EAL = Hawaii Environmental Action Level, unrestricted land use scenario (ITRC 2022)

ATTACHMENT 1
ANALYTICAL DATA PACKAGES

Environment Testing America

ANALYTICAL REPORT

Eurofins Lancaster Laboratories Environment Testing, LLC
2425 New Holland Pike
Lancaster, PA 17601
Tel: (717)656-2300

Laboratory Job ID: 410-75808-1
Client Project/Site: Synthetic Turf

For:
TRC Companies, Inc
650 Suffolk Street
Lowell, Massachusetts 01854

Attn: Elizabeth Denly

Marrissa Williams

Authorized for release by:
5/13/2022 12:05:09 PM

Marrissa Williams, Project Manager
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LINKS

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Analytical test results meet all requirements of the associated regulatory program (e.g., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis. Data qualifiers are applied to note exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

· QC results that exceed the upper limits and are associated with non-detect samples are qualified but further narration is not required since the bias is high and does not change a non-detect result. Further narration is also not required with QC blank detection when the associated sample concentration is non-detect or more than ten times the level in the blank.

· Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD is performed, unless otherwise specified in the method.

· Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Measurement uncertainty values, as applicable, are available upon request.

Test results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" and tested in the laboratory are not performed within 15 minutes of collection.

Marrissa Williams

Marrissa Williams
Project Manager
5/13/2022 12:05:09 PM

Table of Contents

Definitions/Glossary

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Qualifiers

LCMS

Qualifier	Qualifier Description
*-	LCS and/or LCSD is outside acceptance limits, low biased.
*+	LCS and/or LCSD is outside acceptance limits, high biased.
*5-	Isotope dilution analyte is outside acceptance limits, low biased.
*5+	Isotope dilution analyte is outside acceptance limits, high biased.
B	Compound was found in the blank and sample.
cn	Refer to Case Narrative for further detail
E	Result exceeded calibration range.
H	Sample was prepped or analyzed beyond the specified holding time
I	Value is EMPC (estimated maximum possible concentration).
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
1C	Result is from the primary column on a dual-column method.
2C	Result is from the confirmation column on a dual-column method.
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Job ID: 410-75808-1

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC

Narrative

Job Narrative
410-75808-1

Receipt
The samples were received on 3/11/2022 10:17 AM, 3/18/2022 8:41 AM, 3/21/2022 12:09 PM and 3/21/2022 2:00 PM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 15.5°C, 16.4°C and 17.2°C

Receipt Exceptions
The following samples were received at the laboratory outside the required temperature criteria: Safeshell #1-3 (410-76903-1), Safeshell #2 (410-76903-2), Safeshell #3 (410-76903-3) and EB 003 (410-76903-4). This does not meet regulatory requirements. The client was contacted regarding this issue, and the laboratory was instructed to proceed with analysis.

LCMS
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

PFAS
Method 537_IDA_TOPS: The sample injection standard peak areas in the following sample: Carpet-001 (410-75808-1) are outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.The recovery for a target analyte(s) in the laboratory control spike sample associated with the following sample: Carpet-001 (410-75808-1) is outside the QC acceptance limits. The QC limits applied to this data are advisory and the associated results are estimated.Target analytes were detected in the method blank associated with post oxidation samples: Carpet-001 (410-75808-1). No further action was taken.

Method 537_IDA_TOPS: The recovery for a target analyte(s) in the laboratory control spike sample associated with the following sample: PP Pad-001 (410-76735-1) is outside the QC acceptance limits. The QC limits applied to this data are advisory and the associated results are estimated.Target analytes were detected in the method blank associated with post oxidation samples: PP Pad-001 (410-76735-1). No further action was taken.

Method 537_IDA_TOPS: The sample injection standard peak areas in the following sample: Safeshell #1-3 (410-76903-1) are outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample.The recovery for a target analyte(s) in the laboratory control spike sample associated with the following sample: Safeshell #1-3 (410-76903-1) is outside the QC acceptance limits. The QC limits applied to this data are advisory and the associated results are estimated.

Method PFC_IDA: The following samples were analyzed one day past the extract hold time: EB-001 (410-75808-2) and EB-002 (410-76735-2). The data is reported.

Method PFC_IDA: The recovery for a target analyte(s) in the laboratory control spike(s) associated with the following samples: EB-001 (410-75808-2) and EB-002 (410-76735-2) is outside the QC acceptance limits. Sufficient sample volume was not available to re-extract this sample.Target analyte(s) were detected in the method blank associated with the following samples: EB-001 (410-75808-2) and EB-002 (410-76735-2). Sufficient sample volume was not available to re-extract this sample.

Method PFC_IDA: The labeled isotope recovery is outside of the QC acceptance limits in the following sample: EB 003 (410-76903-4). Since the recovery is biased high and the associated target analyte is not detected, the data is reported.The following sample was analyzed past the extract hold time: EB 003 (410-76903-4). The data is reported.The recovery for a target analyte(s) in the laboratory control spike(s) associated with the following sample: EB 003 (410-76903-4) is outside the QC acceptance limits. Sufficient sample volume was not available to re-extract this sample.Target analyte(s) were detected in the method blank associated with the following sample: EB 003 (410-76903-4). Sufficient sample volume was not available to re-extract this sample.

Method PFC_IDA: The recovery for target analyte Perfluorooctadecanoic acid is outside the QC acceptance limits in the closing continuing calibration verification standard. Since the result is high and target Perfluorooctadecanoic acid is not detected in the following samples: Carpet-001 (410-75808-1) and PP Pad-001 (410-76735-1), the data is reported.

Method PFC_IDA: The recovery for the labeled isotope(s) in the following samples: Carpet-001 (410-75808-1) and PP Pad-001

Job ID: 410-75808-1 (Continued)

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC (Continued)

(410-76735-1) is outside the QC acceptance limits. Since the recovery is high and the native analyte is not detected in the sample, the data is reported.

Method PFC_IDA: The recovery for the labeled isotope(s) in the following sample: Safeshell #1-3 (410-76903-1) is outside the QC acceptance limits due to the matrix of the sample.

Method PFC_IDA: The recovery for the labeled isotope(s) and target analyte(s) in the laboratory control spike samples associated with samplesCarpet-001 (410-75808-1), PP Pad-001 (410-76735-1) and Safeshell #1-3 (410-76903-1) is outside of QC acceptance limits. The QC limits should be considered advisory until sufficient data points can be obtained to generate statistical limits.Poor recoveries for PS Acid and Eve Acid were observed in the laboratory control spike samples associated with samples: Carpet-001 (410-75808-1), PP Pad-001 (410-76735-1) and Safeshell #1-3 (410-76903-1). The results reported for PS acid and Eve Acid should be considered estimated.

Method PFC_IDA: The recovery for the labeled isotope(s) in the method blank associated with samples: Safeshell #1-3 (410-76903-1) is outside the QC acceptance limits. Since the recovery is high and the associated native analyte is not detected in the method blank, the data is reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: Carpet-001

Lab Sample ID: 410-75808-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
6:2 Fluorotelomer sulfonic acid	0.187	J H I B cn	0.400	0.120	ng/g	1		537 TOP	Post-Treatment
HFPODA	0.515	J H cn	0.600	0.200	ng/g	1		537 TOP	Post-Treatment
Perfluorobutanoic acid	0.199	J H cn	0.400	0.160	ng/g	1		537 TOP	Post-Treatment
Perfluorohexanoic acid	0.0570	J H cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
Perfluorooctanesulfonic acid	0.135	H I cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
Perfluoropentanoic acid	0.0499	J H cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
PPF Acid	1.08	H *+ cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
R-EVE	0.0679	J H cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
PFBA	0.199				ng/g	1		Total PFCA-Dif	Total/NA
PFPA	0.0499				ng/g	1		Total PFCA-Dif	Total/NA
PFHxA	0.0570				ng/g	1		Total PFCA-Dif	Total/NA
PFHpA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFOA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFNA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
Total PFCA	0.306				ng/g	1		Total PFCA-Dif	Total/NA
Total PFCA	0.306		0.300	0.100	ng/g	1		Total PFCA-Sum	Post-Treatment

Client Sample ID: EB-001

Lab Sample ID: 410-75808-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonamide	0.447	J H B cn	1.70	0.424	ng/L	1		537 IDA	Total/NA
Perfluorooctanesulfonic acid	0.501	J H B cn	1.70	0.424	ng/L	1		537 IDA	Total/NA

Client Sample ID: PP Pad-001

Lab Sample ID: 410-76735-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorononanoic acid	0.0444	J cn	0.120	0.0399	ng/g	1		537 IDA	Pre-Treatment
Perfluorotridecanoic acid	0.0406	J cn	0.120	0.0399	ng/g	1		537 IDA	Pre-Treatment
Perfluoroundecanoic acid	0.0538	J cn	0.120	0.0399	ng/g	1		537 IDA	Pre-Treatment
6:2 Fluorotelomer sulfonic acid	0.162	J H I B cn	0.400	0.120	ng/g	1		537 TOP	Post-Treatment
HFPODA	0.526	J H cn	0.600	0.200	ng/g	1		537 TOP	Post-Treatment
Perfluoroheptanoic acid	0.210	H I cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
Perfluorohexanoic acid	0.160	H I cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
PPF Acid	0.245	H *+ cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
R-EVE	0.136	H cn	0.120	0.0400	ng/g	1		537 TOP	Post-Treatment
PFBA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFPA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFHxA	0.160				ng/g	1		Total PFCA-Dif	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: PP Pad-001 (Continued)

Lab Sample ID: 410-76735-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PFHpA	0.210				ng/g	1		Total PFCA-Dif	Total/NA
PFOA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFNA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
Total PFCA	0.370				ng/g	1		Total PFCA-Dif	Total/NA
Total PFCA	0.370		0.300	0.100	ng/g	1		Total PFCA-Sum	Post-Treatment

Client Sample ID: EB-002

Lab Sample ID: 410-76735-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
HFPODA	0.609	J H cn	3.00	0.500	ng/L	1		537 IDA	Total/NA
Perfluorooctanesulfonic acid	0.804	J H B cn	2.00	0.500	ng/L	1		537 IDA	Total/NA

Client Sample ID: Safeshell #1-3

Lab Sample ID: 410-76903-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PEPA	0.0687	J cn	0.118	0.0394	ng/g	1		537 IDA	Pre-Treatment
Perfluoropentanoic acid	0.200	cn	0.118	0.0394	ng/g	1		537 IDA	Pre-Treatment
PFMOAA	5.16	*- cn	0.118	0.0394	ng/g	1		537 IDA	Pre-Treatment
PFO2HxA	0.0644	J cn	0.118	0.0394	ng/g	1		537 IDA	Pre-Treatment
PMPA	0.0461	J cn	0.118	0.0394	ng/g	1		537 IDA	Pre-Treatment
PPF Acid - DL	41.0	*-	1.18	0.394	ng/g	10		537 IDA	Pre-Treatment
6:2 FTCA	0.0425	J H *+ cn	0.120	0.0399	ng/g	1		537 TOP	Post-Treatment
6:2 FTUCA	0.149	H *- cn	0.120	0.0399	ng/g	1		537 TOP	Post-Treatment
PFO2HxA	0.308	H *+ cn	0.120	0.0399	ng/g	1		537 TOP	Post-Treatment
TAF	0.0859	J H *+ cn	0.120	0.0399	ng/g	1		537 TOP	Post-Treatment
PFBA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFPA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFHxA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFHpA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFOA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
PFNA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
Total PFCA	0.000				ng/g	1		Total PFCA-Dif	Total/NA
Total PFCA	0.200	J	0.300	0.100	ng/g	1		Total PFCA-Sum	Pre-Treatment

Client Sample ID: EB 003

Lab Sample ID: 410-76903-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluorooctanesulfonic acid	0.731	J H B cn	1.90	0.476	ng/L	1		537 IDA	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: Carpet-001
Date Collected: 03/08/22 17:12
Date Received: 03/11/22 10:17

Lab Sample ID: 410-75808-1
Matrix: Solid

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
10:2 FTS	<0.120	cn	0.400	0.120	ng/g		04/04/22 11:19	04/06/22 12:18	1
10:2 FTUCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
11Cl-PF3OUdS	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
3:3 FTCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
4:2 Fluorotelomer sulfonic acid	<0.120	cn	0.400	0.120	ng/g		04/04/22 11:19	04/06/22 12:18	1
5:3 FTCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
6:2 Fluorotelomer sulfonic acid	<0.120	cn	0.400	0.120	ng/g		04/04/22 11:19	04/06/22 12:18	1
6:2 FTCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
6:2 FTUCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
7:3 FTCA	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
8:2 Fluorotelomer sulfonic acid	<0.120	cn	0.600	0.120	ng/g		04/04/22 11:19	04/06/22 12:18	1
8:2 FTCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
8:2 FTUCA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
9Cl-PF3ONS	<0.0400	cn	0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
DONA	<0.0400	cn	0.600	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
EVE Acid	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
HFPODA	<0.0800	cn	0.400	0.0800	ng/g		04/04/22 11:19	04/06/22 12:18	1
Hydro-EVE Acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Hydrolyzed PSDA	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Hydro-PS Acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
MTP	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
NEtFOSA	<0.100	cn	0.400	0.100	ng/g		04/04/22 11:19	04/06/22 12:18	1
NEtFOSAA	<0.0400	cn	0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
NEtFOSE	<0.100	cn	0.400	0.100	ng/g		04/04/22 11:19	04/06/22 12:18	1
NMeFOSA	<0.100	cn	0.400	0.100	ng/g		04/04/22 11:19	04/06/22 12:18	1
NMeFOSAA	<0.0400	cn	0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
NMeFOSE	<0.100	cn	0.400	0.100	ng/g		04/04/22 11:19	04/06/22 12:18	1
NVHOS	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PEPA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorobutanesulfonic acid	<0.0800	cn	0.400	0.0800	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorobutanoic acid	<0.160	cn	0.400	0.160	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorodecanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorodecanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorododecanesulfonic acid	<0.0400	cn	0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorododecanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoroheptanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoroheptanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorohexadecanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorohexanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorohexanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorononanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorononanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorooctadecanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorooctanesulfonamide	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorooctanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1

Client Sample ID: Carpet-001 **Lab Sample ID: 410-75808-1**
Date Collected: 03/08/22 17:12 **Matrix: Solid**
Date Received: 03/11/22 10:17

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoropentanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoropentanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoropropanesulfonic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorotetradecanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluorotridecanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
Perfluoroundecanoic acid	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFECA A	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFECA B	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFECA F	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFECA G	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFMOAA	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFO2HxA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFO3OA	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PFO4DA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PMPA	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PPF Acid	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
PS Acid	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
R-EVE	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
R-PSDA	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
R-PSDCA	<0.0400	*- cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1
TAF	<0.0400	cn	0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 12:18	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
d5-NEtFOSAA	*169*	*cn*	*10 - 193*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
d3-NMeFOSAA	*131*	*cn*	*10 - 178*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C3 HFPO-DA	*138*	*cn*	*10 - 169*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
d7-N-MeFOSE-M	*94*	*cn*	*10 - 179*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
d9-N-EtFOSE-M	*99*	*cn*	*10 - 185*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
M2-6:2 FTS	*197*	*cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
M2-8:2 FTS	*269*	**5+ cn*	*15 - 200*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C3 PFBS	*151*	*cn*	*27 - 179*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
M2-4:2 FTS	*330*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C5 PFHxA	*149*	*cn*	*10 - 174*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C9 PFNA	*164*	*cn*	*26 - 165*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C6 PFDA	*148*	*cn*	*26 - 161*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C7 PFUnA	*137*	*cn*	*12 - 173*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C3 PFHxS	*157*	*cn*	*24 - 171*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C2-PFDoDA	*117*	*cn*	*11 - 166*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
d5-NEtPFOSA	*85*	*cn*	*10 - 180*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
d3-NMePFOSA	*83*	*cn*	*10 - 175*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C2-2-Perfluorohexylethanoic acid	*260*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C2-2-Perfluorooctylethanoic acid	*364*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C2-2-Perfluorodecylethanoic acid	*328*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*114*	*cn*	*10 - 164*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*154*	*cn*	*10 - 162*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*157*	*cn*	*10 - 161*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C4 PFBA	*144*	*cn*	*28 - 153*	*04/04/22 11:19*	*04/06/22 12:18*	*1*
13C5 PFPeA	*147*	*cn*	*24 - 161*	*04/04/22 11:19*	*04/06/22 12:18*	*1*

Client Sample ID: Carpet-001
Lab Sample ID: 410-75808-1
Date Collected: 03/08/22 17:12
Matrix: Solid
Date Received: 03/11/22 10:17

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFHpA	146	cn	10 - 178	04/04/22 11:19	04/06/22 12:18	1
13C8 PFOA	152	cn	26 - 159	04/04/22 11:19	04/06/22 12:18	1
13C8 PFOS	155	*5+ cn	41 - 154	04/04/22 11:19	04/06/22 12:18	1
13C8 FOSA	133	cn	14 - 163	04/04/22 11:19	04/06/22 12:18	1
13C2 PFTeDA	129	cn	10 - 169	04/04/22 11:19	04/06/22 12:18	1

Client Sample ID: Carpet-001
Lab Sample ID: 410-75808-1
Date Collected: 03/08/22 17:12
Matrix: Solid
Date Received: 03/11/22 10:17

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
10:2 FTS	<0.120	H cn	0.400	0.120	ng/g		05/10/22 10:06	05/12/22 12:51	1
10:2 FTUCA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
11Cl-PF3OUdS	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
3:3 FTCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
4:2 Fluorotelomer sulfonic acid	<0.120	H cn	0.400	0.120	ng/g		05/10/22 10:06	05/12/22 12:51	1
5:3 FTCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
6:2 Fluorotelomer sulfonic acid	**0.187**	**J H I B cn**	0.400	0.120	ng/g		05/10/22 10:06	05/12/22 12:51	1
6:2 FTCA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
6:2 FTUCA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
7:3 FTCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
8:2 Fluorotelomer sulfonic acid	<0.120	H cn	0.600	0.120	ng/g		05/10/22 10:06	05/12/22 12:51	1
8:2 FTCA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
8:2 FTUCA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
9Cl-PF3ONS	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
DONA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
EVE Acid	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
HFPODA	**0.515**	**J H cn**	0.600	0.200	ng/g		05/10/22 10:06	05/12/22 12:51	1
Hydro-EVE Acid	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Hydrolyzed PSDA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Hydro-PS Acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
MTP	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
NEtFOSA	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:51	1
NEtFOSAA	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
NEtFOSE	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:51	1
NMeFOSA	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:51	1
NMeFOSAA	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
NMeFOSE	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:51	1
NVHOS	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PEPA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorobutanesulfonic acid	<0.0800	H cn	0.400	0.0800	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorobutanoic acid	**0.199**	**J H cn**	0.400	0.160	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorodecanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorodecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorododecanesulfonic acid	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorododecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoroheptanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoroheptanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorohexadecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorohexanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorohexanoic acid	**0.0570**	**J H cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorononanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorononanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorooctadecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorooctanesulfonamide	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorooctanesulfonic acid	**0.135**	**H I cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1

Client Sample Results

Client: TRC Companies, Inc — Job ID: 410-75808-1
Project/Site: Synthetic Turf

Client Sample ID: Carpet-001 — **Lab Sample ID: 410-75808-1**
Date Collected: 03/08/22 17:12 — **Matrix: Solid**
Date Received: 03/11/22 10:17

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoropentanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoropentanoic acid	**0.0499**	**J H cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoropropanesulfonic acid	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorotetradecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluorotridecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
Perfluoroundecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFECA A	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFECA B	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFECA F	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFECA G	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFMOAA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFO2HxA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFO3OA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PFO4DA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PMPA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PPF Acid	**1.08**	**H *+ cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
PS Acid	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
R-EVE	**0.0679**	**J H cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
R-PSDA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
R-PSDCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1
TAF	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:51	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*522*	**5+ cn*	*10 - 200*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
M2-8:2 FTS	*488*	**5+ cn*	*15 - 200*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2 PFTeDA	*247*	**5+ cn*	*10 - 169*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C3 HFPO-DA	*108*	*cn*	*10 - 169*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C3 PFBS	*125*	*cn*	*27 - 179*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C4 PFBA	*99*	*cn*	*28 - 153*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C4 PFHpA	*144*	*cn*	*10 - 178*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C5 PFPeA	*68*	*cn*	*24 - 161*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C8 PFOA	*112*	*cn*	*26 - 159*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C8 PFOS	*138*	*cn*	*41 - 154*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
d5-NEtFOSAA	*384*	**5+ cn*	*10 - 193*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
d7-N-MeFOSE-M	*121*	*cn*	*10 - 179*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
d9-N-EtFOSE-M	*188*	**5+ cn*	*10 - 185*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C3 PFHxS	*171*	*cn*	*24 - 171*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C5 PFHxA	*92*	*cn*	*10 - 174*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C6 PFDA	*168*	**5+ cn*	*26 - 161*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C7 PFUnA	*213*	**5+ cn*	*12 - 173*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
d3-NMePFOSA	*106*	*cn*	*10 - 175*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
d5-NEtPFOSA	*119*	*cn*	*10 - 180*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C8 FOSA	*167*	**5+ cn*	*14 - 163*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2-PFDoDA	*158*	*cn*	*11 - 166*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C9 PFNA	*110*	*cn*	*26 - 165*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2-2-Perfluorohexylethanoic acid	*48*	**5- cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2-2-Perfluorooctylethanoic acid	*111*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2-2-Perfluorodecylethanoic acid	*181*	**5+ cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*66*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 12:51*	*1*

Client Sample ID: Carpet-001
Date Collected: 03/08/22 17:12
Date Received: 03/11/22 10:17

Lab Sample ID: 410-75808-1
Matrix: Solid

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment (Continued)

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2-2H-Perfluoro-2-decenoic acid	*199*	**5+ cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*265*	**5+ cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 12:51*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA	*84*	*cn*	*10 - 137*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C4 PFOA	*109*	*cn*	*10 - 146*	*05/10/22 10:06*	*05/12/22 12:51*	*1*
13C2 PFUnA	*109*	*cn*	*10 - 143*	*05/10/22 10:06*	*05/12/22 12:51*	*1*

Client Sample ID: Carpet-001

Date Collected: 03/08/22 17:12
Date Received: 03/11/22 10:17

Lab Sample ID: 410-75808-1

Matrix: Solid

Method: Total PFCA-Dif - Total PFCA (Treatment Difference)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PFBA	0.199				ng/g			05/13/22 13:16	1
PFPA	0.0499				ng/g			05/13/22 13:16	1
PFHxA	0.0570				ng/g			05/13/22 13:16	1
PFHpA	0.000				ng/g			05/13/22 13:16	1
PFOA	0.000				ng/g			05/13/22 13:16	1
PFNA	0.000				ng/g			05/13/22 13:16	1
Total PFCA	0.306				ng/g			05/13/22 13:16	1

Client Sample Results

Client Sample ID: Carpet-001
Date Collected: 03/08/22 17:12
Date Received: 03/11/22 10:17

Lab Sample ID: 410-75808-1
Matrix: Solid

Method: Total PFCA-Sum - Total PFCA (Summary) - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	<0.100		0.300	0.100	ng/g			05/13/22 13:14	1

Client Sample ID: Carpet-001
Lab Sample ID: 410-75808-1
Date Collected: 03/08/22 17:12
Matrix: Solid
Date Received: 03/11/22 10:17

Method: Total PFCA-Sum - Total PFCA (Summary) - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	0.306		0.300	0.100	ng/g			05/13/22 13:14	1

Client Sample ID: EB-001
Date Collected: 03/21/22 13:53
Date Received: 03/21/22 14:00

Lab Sample ID: 410-75808-2
Matrix: Water

Method: 537 IDA - EPA 537 Isotope Dilution

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
10:2 FTS	<0.848	H cn	4.24	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
10:2 FTUCA	<0.594	H cn	1.70	0.594	ng/L		04/04/22 06:59	05/03/22 01:18	1
11Cl-PF3OUdS	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
3:3 FTCA	<0.254	H cn	1.70	0.254	ng/L		04/04/22 06:59	05/03/22 01:18	1
4:2 Fluorotelomer sulfonic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
5:3 FTCA	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
6:2 Fluorotelomer sulfonic acid	<1.70	H cn	4.24	1.70	ng/L		04/04/22 06:59	05/03/22 01:18	1
6:2 FTCA	<0.339	H cn	1.70	0.339	ng/L		04/04/22 06:59	05/03/22 01:18	1
6:2 FTUCA	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
7:3 FTCA	<0.254	H cn	1.70	0.254	ng/L		04/04/22 06:59	05/03/22 01:18	1
8:2 Fluorotelomer sulfonic acid	<0.848	H cn	2.54	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
8:2 FTCA	<0.339	H cn	1.70	0.339	ng/L		04/04/22 06:59	05/03/22 01:18	1
8:2 FTUCA	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
9Cl-PF3ONS	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
DONA	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
EVE Acid	<2.54	H cn	8.48	2.54	ng/L		04/04/22 06:59	05/03/22 01:18	1
HFPODA	<0.424	H cn	2.54	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Hydro-EVE Acid	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
Hydrolyzed PSDA	<0.763	H cn	1.70	0.763	ng/L		04/04/22 06:59	05/03/22 01:18	1
Hydro-PS Acid	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
MTP	<1.70	H cn	4.24	1.70	ng/L		04/04/22 06:59	05/03/22 01:18	1
NEtFOSA	<0.848	H cn	4.24	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
NEtFOSAA	<0.424	H cn	2.54	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
NEtFOSE	<0.848	H cn	2.54	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
NMeFOSA	<0.848	H cn	2.54	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
NMeFOSAA	<0.509	H cn	1.70	0.509	ng/L		04/04/22 06:59	05/03/22 01:18	1
NMeFOSE	<0.848	H cn	2.54	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
NVHOS	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PEPA	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorobutanesulfonic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorobutanoic acid	<1.70	H cn	4.24	1.70	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorodecanesulfonic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorodecanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorododecanesulfonic acid	<0.424	H cn	2.54	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorododecanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoroheptanesulfonic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoroheptanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorohexadecanoic acid	<0.848	H cn	2.54	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorohexanesulfonic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorohexanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorononanesulfonic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorononanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorooctadecanoic acid	<0.848	H cn	2.54	0.848	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorooctanesulfonamide	**0.447**	**J H B cn**	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorooctanesulfonic acid	**0.501**	**J H B cn**	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Client Sample ID: EB-001
Date Collected: 03/21/22 13:53
Date Received: 03/21/22 14:00

Lab Sample ID: 410-75808-2
Matrix: Water

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoropentanesulfonic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoropentanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoropropanesulfonic acid	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorotetradecanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluorotridecanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
Perfluoroundecanoic acid	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFECA A	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFECA B	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFECA F	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFECA G	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFMOAA	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFO2HxA	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFO3OA	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PFO4DA	<0.594	H cn	1.70	0.594	ng/L		04/04/22 06:59	05/03/22 01:18	1
PMPA	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
PPF Acid	<1.70	H cn	4.24	1.70	ng/L		04/04/22 06:59	05/03/22 01:18	1
PS Acid	<2.54	H cn	8.48	2.54	ng/L		04/04/22 06:59	05/03/22 01:18	1
R-EVE	<0.339	H cn	1.70	0.339	ng/L		04/04/22 06:59	05/03/22 01:18	1
R-PSDA	<0.424	H cn	1.70	0.424	ng/L		04/04/22 06:59	05/03/22 01:18	1
R-PSDCA	<0.170	H cn	1.70	0.170	ng/L		04/04/22 06:59	05/03/22 01:18	1
TAF	<1.70	H cn	4.24	1.70	ng/L		04/04/22 06:59	05/03/22 01:18	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
d5-NEtFOSAA	*125*	*cn*	*29 - 195*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
d3-NMeFOSAA	*129*	*cn*	*31 - 174*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C3 HFPO-DA	*121*	*cn*	*17 - 185*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
d7-N-MeFOSE-M	*96*	*cn*	*10 - 178*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
d9-N-EtFOSE-M	*95*	*cn*	*10 - 177*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
M2-6:2 FTS	*128*	*cn*	*17 - 200*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
M2-8:2 FTS	*132*	*cn*	*33 - 200*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C3 PFBS	*140*	*cn*	*16 - 200*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
M2-4:2 FTS	*126*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C5 PFHxA	*101*	*cn*	*24 - 179*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C9 PFNA	*125*	*cn*	*51 - 167*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C6 PFDA	*128*	*cn*	*49 - 163*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C7 PFUnA	*125*	*cn*	*34 - 174*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C3 PFHxS	*128*	*cn*	*28 - 188*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C2-PFDoDA	*115*	*cn*	*17 - 176*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
d5-NEtPFOSA	*53*	*cn*	*10 - 159*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
d3-NMePFOSA	*53*	*cn*	*10 - 155*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C2-2-Perfluorohexylethanoic acid	*80*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C2-2-Perfluorooctylethanoic acid	*99*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C2-2-Perfluorodecylethanoic acid	*78*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*143*	*cn*	*20 - 173*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*141*	*cn*	*21 - 166*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*130*	*cn*	*14 - 166*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C4 PFBA	*128*	*cn*	*42 - 165*	*04/04/22 06:59*	*05/03/22 01:18*	*1*
13C5 PFPeA	*134*	*cn*	*38 - 187*	*04/04/22 06:59*	*05/03/22 01:18*	*1*

Client Sample ID: EB-001
Lab Sample ID: 410-75808-2
Date Collected: 03/21/22 13:53
Matrix: Water
Date Received: 03/21/22 14:00

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFHpA	123	cn	31 - 182	04/04/22 06:59	05/03/22 01:18	1
13C8 PFOA	124	cn	48 - 162	04/04/22 06:59	05/03/22 01:18	1
13C8 PFOS	123	cn	51 - 159	04/04/22 06:59	05/03/22 01:18	1
13C8 FOSA	102	cn	10 - 168	04/04/22 06:59	05/03/22 01:18	1
13C2 PFTeDA	110	cn	10 - 179	04/04/22 06:59	05/03/22 01:18	1

Client Sample Results

Client: TRC Companies, Inc
Job ID: 410-75808-1
Project/Site: Synthetic Turf

Client Sample ID: PP Pad-001
Lab Sample ID: 410-76735-1
Date Collected: 03/16/22 13:30
Matrix: Solid
Date Received: 03/18/22 08:41

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
10:2 FTS	<0.120	cn	0.399	0.120	ng/g		04/04/22 11:19	04/06/22 12:29	1
10:2 FTUCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
11Cl-PF3OUdS	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
3:3 FTCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
4:2 Fluorotelomer sulfonic acid	<0.120	cn	0.399	0.120	ng/g		04/04/22 11:19	04/06/22 12:29	1
5:3 FTCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
6:2 Fluorotelomer sulfonic acid	<0.120	cn	0.399	0.120	ng/g		04/04/22 11:19	04/06/22 12:29	1
6:2 FTCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
6:2 FTUCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
7:3 FTCA	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
8:2 Fluorotelomer sulfonic acid	<0.120	cn	0.599	0.120	ng/g		04/04/22 11:19	04/06/22 12:29	1
8:2 FTCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
8:2 FTUCA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
9Cl-PF3ONS	<0.0399	cn	0.399	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
DONA	<0.0399	cn	0.599	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
EVE Acid	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
HFPODA	<0.0798	cn	0.399	0.0798	ng/g		04/04/22 11:19	04/06/22 12:29	1
Hydro-EVE Acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Hydrolyzed PSDA	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Hydro-PS Acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
MTP	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
NEtFOSA	<0.0998	cn	0.399	0.0998	ng/g		04/04/22 11:19	04/06/22 12:29	1
NEtFOSAA	<0.0399	cn	0.399	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
NEtFOSE	<0.0998	cn	0.399	0.0998	ng/g		04/04/22 11:19	04/06/22 12:29	1
NMeFOSA	<0.0998	cn	0.399	0.0998	ng/g		04/04/22 11:19	04/06/22 12:29	1
NMeFOSAA	<0.0399	cn	0.399	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
NMeFOSE	<0.0998	cn	0.399	0.0998	ng/g		04/04/22 11:19	04/06/22 12:29	1
NVHOS	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PEPA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorobutanesulfonic acid	<0.0798	cn	0.399	0.0798	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorobutanoic acid	<0.160	cn	0.399	0.160	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorodecanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorodecanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorododecanesulfonic acid	<0.0399	cn	0.399	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorododecanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoroheptanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoroheptanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorohexadecanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorohexanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorohexanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorononanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorononanoic acid	**0.0444**	**J cn**	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorooctadecanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorooctanesulfonamide	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorooctanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1

Client Sample ID: PP Pad-001
Date Collected: 03/16/22 13:30
Date Received: 03/18/22 08:41

Lab Sample ID: 410-76735-1
Matrix: Solid

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoropentanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoropentanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoropropanesulfonic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorotetradecanoic acid	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluorotridecanoic acid	**0.0406**	**J cn**	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
Perfluoroundecanoic acid	**0.0538**	**J cn**	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFECA A	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFECA B	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFECA F	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFECA G	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFMOAA	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFO2HxA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFO3OA	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PFO4DA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PMPA	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PPF Acid	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
PS Acid	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
R-EVE	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
R-PSDA	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
R-PSDCA	<0.0399	*- cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1
TAF	<0.0399	cn	0.120	0.0399	ng/g		04/04/22 11:19	04/06/22 12:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
d5-NEtFOSAA	*124*	*cn*	*10 - 193*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
d3-NMeFOSAA	*138*	*cn*	*10 - 178*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C3 HFPO-DA	*145*	*cn*	*10 - 169*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
d7-N-MeFOSE-M	*147*	*cn*	*10 - 179*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
d9-N-EtFOSE-M	*179*	*cn*	*10 - 185*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
M2-6:2 FTS	*198*	*cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
M2-8:2 FTS	*162*	*cn*	*15 - 200*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C3 PFBS	*138*	*cn*	*27 - 179*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
M2-4:2 FTS	*353*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C5 PFHxA	*146*	*cn*	*10 - 174*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C9 PFNA	*154*	*cn*	*26 - 165*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C6 PFDA	*150*	*cn*	*26 - 161*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C7 PFUnA	*120*	*cn*	*12 - 173*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C3 PFHxS	*140*	*cn*	*24 - 171*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C2-PFDoDA	*147*	*cn*	*11 - 166*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
d5-NEtPFOSA	*122*	*cn*	*10 - 180*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
d3-NMePFOSA	*138*	*cn*	*10 - 175*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C2-2-Perfluorohexylethanoic acid	*304*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C2-2-Perfluorooctylethanoic acid	*270*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C2-2-Perfluorodecylethanoic acid	*307*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*134*	*cn*	*10 - 164*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*128*	*cn*	*10 - 162*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*141*	*cn*	*10 - 161*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C4 PFBA	*148*	*cn*	*28 - 153*	*04/04/22 11:19*	*04/06/22 12:29*	*1*
13C5 PFPeA	*164*	**5+ cn*	*24 - 161*	*04/04/22 11:19*	*04/06/22 12:29*	*1*

Client Sample ID: PP Pad-001
Date Collected: 03/16/22 13:30
Date Received: 03/18/22 08:41

Lab Sample ID: 410-76735-1
Matrix: Solid

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFHpA	147	cn	10 - 178	04/04/22 11:19	04/06/22 12:29	1
13C8 PFOA	137	cn	26 - 159	04/04/22 11:19	04/06/22 12:29	1
13C8 PFOS	146	cn	41 - 154	04/04/22 11:19	04/06/22 12:29	1
13C8 FOSA	149	cn	14 - 163	04/04/22 11:19	04/06/22 12:29	1
13C2 PFTeDA	141	cn	10 - 169	04/04/22 11:19	04/06/22 12:29	1

Client Sample ID: PP Pad-001

Lab Sample ID: 410-76735-1

Date Collected: 03/16/22 13:30
Matrix: Solid
Date Received: 03/18/22 08:41

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
10:2 FTS	<0.120	H cn	0.400	0.120	ng/g		05/10/22 10:06	05/12/22 13:13	1
10:2 FTUCA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
11Cl-PF3OUdS	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
3:3 FTCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
4:2 Fluorotelomer sulfonic acid	<0.120	H cn	0.400	0.120	ng/g		05/10/22 10:06	05/12/22 13:13	1
5:3 FTCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
6:2 Fluorotelomer sulfonic acid	**0.162**	**J H I B cn**	0.400	0.120	ng/g		05/10/22 10:06	05/12/22 13:13	1
6:2 FTCA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
6:2 FTUCA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
7:3 FTCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
8:2 Fluorotelomer sulfonic acid	<0.120	H cn	0.600	0.120	ng/g		05/10/22 10:06	05/12/22 13:13	1
8:2 FTCA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
8:2 FTUCA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
9Cl-PF3ONS	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
DONA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
EVE Acid	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
HFPODA	**0.526**	**J H cn**	0.600	0.200	ng/g		05/10/22 10:06	05/12/22 13:13	1
Hydro-EVE Acid	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Hydrolyzed PSDA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Hydro-PS Acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
MTP	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
NEtFOSA	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 13:13	1
NEtFOSAA	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
NEtFOSE	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 13:13	1
NMeFOSA	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 13:13	1
NMeFOSAA	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
NMeFOSE	<0.100	H cn	0.400	0.100	ng/g		05/10/22 10:06	05/12/22 13:13	1
NVHOS	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PEPA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorobutanesulfonic acid	<0.0800	H cn	0.400	0.0800	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorobutanoic acid	<0.160	H cn	0.400	0.160	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorodecanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorodecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorododecanesulfonic acid	<0.0400	H cn	0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorododecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoroheptanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoroheptanoic acid	**0.210**	**H I cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorohexadecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorohexanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorohexanoic acid	**0.160**	**H I cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorononanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorononanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorooctadecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorooctanesulfonamide	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorooctanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1

Client Sample ID: PP Pad-001
Date Collected: 03/16/22 13:30
Date Received: 03/18/22 08:41

Lab Sample ID: 410-76735-1
Matrix: Solid

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoropentanesulfonic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoropentanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoropropanesulfonic acid	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorotetradecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluorotridecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
Perfluoroundecanoic acid	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFECA A	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFECA B	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFECA F	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFECA G	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFMOAA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFO2HxA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFO3OA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PFO4DA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PMPA	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PPF Acid	**0.245**	**H *+ cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
PS Acid	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
R-EVE	**0.136**	**H cn**	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
R-PSDA	<0.0400	H *- cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
R-PSDCA	<0.0400	H cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1
TAF	<0.0400	H *+ cn	0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 13:13	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*321*	**5+ cn*	*10 - 200*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
M2-8:2 FTS	*223*	**5+ cn*	*15 - 200*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C2 PFTeDA	*90*	*cn*	*10 - 169*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C3 HFPO-DA	*75*	*cn*	*10 - 169*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C3 PFBS	*105*	*cn*	*27 - 179*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C4 PFBA	*85*	*cn*	*28 - 153*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C4 PFHpA	*96*	*cn*	*10 - 178*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C5 PFPeA	*81*	*cn*	*24 - 161*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C8 PFOA	*90*	*cn*	*26 - 159*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C8 PFOS	*108*	*cn*	*41 - 154*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
d5-NEtFOSAA	*115*	*cn*	*10 - 193*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
d7-N-MeFOSE-M	*70*	*cn*	*10 - 179*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
d9-N-EtFOSE-M	*65*	*cn*	*10 - 185*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C3 PFHxS	*107*	*cn*	*24 - 171*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C5 PFHxA	*77*	*cn*	*10 - 174*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C6 PFDA	*98*	*cn*	*26 - 161*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C7 PFUnA	*82*	*cn*	*12 - 173*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
d3-NMePFOSA	*56*	*cn*	*10 - 175*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
d5-NEtPFOSA	*50*	*cn*	*10 - 180*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C8 FOSA	*55*	*cn*	*14 - 163*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C2-PFDoDA	*91*	*cn*	*11 - 166*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C9 PFNA	*101*	*cn*	*26 - 165*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C2-2-Perfluorohexylethanoic acid	*40*	**5- cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C2-2-Perfluorooctylethanoic acid	*53*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C2-2-Perfluorodecylethanoic acid	*66*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:13*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*83*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:13*	*1*

Client Sample ID: PP Pad-001
Lab Sample ID: 410-76735-1
Date Collected: 03/16/22 13:30
Matrix: Solid
Date Received: 03/18/22 08:41

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2-2H-Perfluoro-2-decenoic acid	110	cn	50 - 150	05/10/22 10:06	05/12/22 13:13	1
13C2-2H-Perfluoro-2-dodecenoic acid	133	cn	50 - 150	05/10/22 10:06	05/12/22 13:13	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	73	cn	10 - 137	05/10/22 10:06	05/12/22 13:13	1
13C4 PFOA	99	cn	10 - 146	05/10/22 10:06	05/12/22 13:13	1
13C2 PFUnA	90	cn	10 - 143	05/10/22 10:06	05/12/22 13:13	1

Client Sample ID: PP Pad-001
Lab Sample ID: 410-76735-1
Date Collected: 03/16/22 13:30
Matrix: Solid
Date Received: 03/18/22 08:41

Method: Total PFCA-Dif - Total PFCA (Treatment Difference)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PFBA	0.000				ng/g			05/13/22 13:16	1
PFPA	0.000				ng/g			05/13/22 13:16	1
PFHxA	0.160				ng/g			05/13/22 13:16	1
PFHpA	0.210				ng/g			05/13/22 13:16	1
PFOA	0.000				ng/g			05/13/22 13:16	1
PFNA	0.000				ng/g			05/13/22 13:16	1
Total PFCA	0.370				ng/g			05/13/22 13:16	1

Client Sample ID: PP Pad-001
Lab Sample ID: 410-76735-1
Date Collected: 03/16/22 13:30
Matrix: Solid
Date Received: 03/18/22 08:41

Method: Total PFCA-Sum - Total PFCA (Summary) - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	<0.100		0.300	0.100	ng/g			05/13/22 13:14	1

Client Sample Results

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: PP Pad-001

Date Collected: 03/16/22 13:30
Date Received: 03/18/22 08:41

Lab Sample ID: 410-76735-1
Matrix: Solid

Method: Total PFCA-Sum - Total PFCA (Summary) - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	0.370		0.300	0.100	ng/g			05/13/22 13:14	1

Client Sample Results

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: EB-002
Date Collected: 03/21/22 13:53
Date Received: 03/21/22 14:00

Lab Sample ID: 410-76735-2
Matrix: Water

Method: 537 IDA - EPA 537 Isotope Dilution

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
10:2 FTS	<0.999	H cn	5.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
10:2 FTUCA	<0.699	H cn	2.00	0.699	ng/L		04/04/22 06:59	05/03/22 01:29	1
11Cl-PF3OUdS	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
3:3 FTCA	<0.300	H cn	2.00	0.300	ng/L		04/04/22 06:59	05/03/22 01:29	1
4:2 Fluorotelomer sulfonic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
5:3 FTCA	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
6:2 Fluorotelomer sulfonic acid	<2.00	H cn	5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:29	1
6:2 FTCA	<0.400	H cn	2.00	0.400	ng/L		04/04/22 06:59	05/03/22 01:29	1
6:2 FTUCA	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
7:3 FTCA	<0.300	H cn	2.00	0.300	ng/L		04/04/22 06:59	05/03/22 01:29	1
8:2 Fluorotelomer sulfonic acid	<0.999	H cn	3.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
8:2 FTCA	<0.400	H cn	2.00	0.400	ng/L		04/04/22 06:59	05/03/22 01:29	1
8:2 FTUCA	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
9Cl-PF3ONS	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
DONA	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
EVE Acid	<3.00	H cn	9.99	3.00	ng/L		04/04/22 06:59	05/03/22 01:29	1
HFPODA	**0.609**	**J H cn**	3.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Hydro-EVE Acid	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
Hydrolyzed PSDA	<0.899	H cn	2.00	0.899	ng/L		04/04/22 06:59	05/03/22 01:29	1
Hydro-PS Acid	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
MTP	<2.00	H cn	5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:29	1
NEtFOSA	<0.999	H cn	5.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
NEtFOSAA	<0.500	H cn	3.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
NEtFOSE	<0.999	H cn	3.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
NMeFOSA	<0.999	H cn	3.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
NMeFOSAA	<0.600	H cn	2.00	0.600	ng/L		04/04/22 06:59	05/03/22 01:29	1
NMeFOSE	<0.999	H cn	3.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
NVHOS	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PEPA	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorobutanesulfonic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorobutanoic acid	<2.00	H cn	5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorodecanesulfonic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorodecanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorododecanesulfonic acid	<0.500	H cn	3.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorododecanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoroheptanesulfonic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoroheptanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorohexadecanoic acid	<0.999	H cn	3.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorohexanesulfonic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorohexanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorononanesulfonic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorononanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorooctadecanoic acid	<0.999	H cn	3.00	0.999	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorooctanesulfonamide	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorooctanesulfonic acid	**0.804**	**J H B cn**	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1

Client Sample Results

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: EB-002
Date Collected: 03/21/22 13:53
Date Received: 03/21/22 14:00

Lab Sample ID: 410-76735-2
Matrix: Water

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoropentanesulfonic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoropentanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoropropanesulfonic acid	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorotetradecanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluorotridecanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
Perfluoroundecanoic acid	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFECA A	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFECA B	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFECA F	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFECA G	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFMOAA	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFO2HxA	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFO3OA	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PFO4DA	<0.699	H cn	2.00	0.699	ng/L		04/04/22 06:59	05/03/22 01:29	1
PMPA	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
PPF Acid	<2.00	H cn	5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:29	1
PS Acid	<3.00	H cn	9.99	3.00	ng/L		04/04/22 06:59	05/03/22 01:29	1
R-EVE	<0.400	H cn	2.00	0.400	ng/L		04/04/22 06:59	05/03/22 01:29	1
R-PSDA	<0.500	H cn	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:29	1
R-PSDCA	<0.200	H cn	2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:29	1
TAF	<2.00	H cn	5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:29	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
d5-NEtFOSAA	*131*	*cn*	*29 - 195*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
d3-NMeFOSAA	*135*	*cn*	*31 - 174*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C3 HFPO-DA	*109*	*cn*	*17 - 185*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
d7-N-MeFOSE-M	*111*	*cn*	*10 - 178*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
d9-N-EtFOSE-M	*112*	*cn*	*10 - 177*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
M2-6:2 FTS	*130*	*cn*	*17 - 200*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
M2-8:2 FTS	*135*	*cn*	*33 - 200*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C3 PFBS	*128*	*cn*	*16 - 200*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
M2-4:2 FTS	*113*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C5 PFHxA	*116*	*cn*	*24 - 179*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C9 PFNA	*118*	*cn*	*51 - 167*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C6 PFDA	*134*	*cn*	*49 - 163*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C7 PFUnA	*131*	*cn*	*34 - 174*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C3 PFHxS	*126*	*cn*	*28 - 188*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C2-PFDoDA	*125*	*cn*	*17 - 176*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
d5-NEtPFOSA	*108*	*cn*	*10 - 159*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
d3-NMePFOSA	*105*	*cn*	*10 - 155*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C2-2-Perfluorohexylethanoic acid	*79*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C2-2-Perfluorooctylethanoic acid	*103*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C2-2-Perfluorodecylethanoic acid	*86*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*147*	*cn*	*20 - 173*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*165*	*cn*	*21 - 166*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*159*	*cn*	*14 - 166*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C4 PFBA	*124*	*cn*	*42 - 165*	*04/04/22 06:59*	*05/03/22 01:29*	*1*
13C5 PFPeA	*118*	*cn*	*38 - 187*	*04/04/22 06:59*	*05/03/22 01:29*	*1*

Client Sample ID: EB-002
Date Collected: 03/21/22 13:53
Date Received: 03/21/22 14:00

Lab Sample ID: 410-76735-2
Matrix: Water

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C4 PFHpA	117	cn	31 - 182	04/04/22 06:59	05/03/22 01:29	1
13C8 PFOA	120	cn	48 - 162	04/04/22 06:59	05/03/22 01:29	1
13C8 PFOS	118	cn	51 - 159	04/04/22 06:59	05/03/22 01:29	1
13C8 FOSA	113	cn	10 - 168	04/04/22 06:59	05/03/22 01:29	1
13C2 PFTeDA	118	cn	10 - 179	04/04/22 06:59	05/03/22 01:29	1

Client Sample ID: Safeshell #1-3
Date Collected: 03/09/22 15:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-1
Matrix: Solid

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
10:2 FTS	<0.118	cn	0.394	0.118	ng/g		04/04/22 11:19	04/06/22 20:59	1
10:2 FTUCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
11Cl-PF3OUdS	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
3:3 FTCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
4:2 Fluorotelomer sulfonic acid	<0.118	cn	0.394	0.118	ng/g		04/04/22 11:19	04/06/22 20:59	1
5:3 FTCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
6:2 Fluorotelomer sulfonic acid	<0.118	cn	0.394	0.118	ng/g		04/04/22 11:19	04/06/22 20:59	1
6:2 FTCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
6:2 FTUCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
7:3 FTCA	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
8:2 Fluorotelomer sulfonic acid	<0.118	cn	0.591	0.118	ng/g		04/04/22 11:19	04/06/22 20:59	1
8:2 FTCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
8:2 FTUCA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
9Cl-PF3ONS	<0.0394	cn	0.394	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
DONA	<0.0394	cn	0.591	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
EVE Acid	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
HFPODA	<0.0787	cn	0.394	0.0787	ng/g		04/04/22 11:19	04/06/22 20:59	1
Hydro-EVE Acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Hydrolyzed PSDA	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Hydro-PS Acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
MTP	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
NEtFOSA	<0.0984	cn	0.394	0.0984	ng/g		04/04/22 11:19	04/06/22 20:59	1
NEtFOSAA	<0.0394	cn	0.394	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
NEtFOSE	<0.0984	cn	0.394	0.0984	ng/g		04/04/22 11:19	04/06/22 20:59	1
NMeFOSA	<0.0984	cn	0.394	0.0984	ng/g		04/04/22 11:19	04/06/22 20:59	1
NMeFOSAA	<0.0394	cn	0.394	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
NMeFOSE	<0.0984	cn	0.394	0.0984	ng/g		04/04/22 11:19	04/06/22 20:59	1
NVHOS	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PEPA	**0.0687**	**J cn**	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorobutanesulfonic acid	<0.0787	cn	0.394	0.0787	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorobutanoic acid	<0.157	cn	0.394	0.157	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorodecanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorodecanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorododecanesulfonic acid	<0.0394	cn	0.394	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorododecanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoroheptanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoroheptanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorohexadecanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorohexanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorohexanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorononanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorononanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorooctadecanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorooctanesulfonamide	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorooctanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1

Client Sample ID: Safeshell #1-3
Date Collected: 03/09/22 15:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-1
Matrix: Solid

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoropentanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoropentanoic acid	**0.200**	**cn**	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoropropanesulfonic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorotetradecanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluorotridecanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
Perfluoroundecanoic acid	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFECA A	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFECA B	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFECA F	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFECA G	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFMOAA	**5.16**	***- cn**	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFO2HxA	**0.0644**	**J cn**	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFO3OA	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PFO4DA	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PMPA	**0.0461**	**J cn**	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
PS Acid	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
R-EVE	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
R-PSDA	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
R-PSDCA	<0.0394	*- cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1
TAF	<0.0394	cn	0.118	0.0394	ng/g		04/04/22 11:19	04/06/22 20:59	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
d5-NEtFOSAA	*171*	*cn*	*10 - 193*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
d3-NMeFOSAA	*174*	*cn*	*10 - 178*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C3 HFPO-DA	*116*	*cn*	*10 - 169*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
d7-N-MeFOSE-M	*120*	*cn*	*10 - 179*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
d9-N-EtFOSE-M	*108*	*cn*	*10 - 185*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
M2-6:2 FTS	*188*	*cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
M2-8:2 FTS	*241*	**5+ cn*	*15 - 200*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C3 PFBS	*221*	**5+ cn*	*27 - 179*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
M2-4:2 FTS	*230*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C5 PFHxA	*97*	*cn*	*10 - 174*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C9 PFNA	*131*	*cn*	*26 - 165*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C6 PFDA	*131*	*cn*	*26 - 161*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C7 PFUnA	*153*	*cn*	*12 - 173*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C3 PFHxS	*142*	*cn*	*24 - 171*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C2-PFDoDA	*151*	*cn*	*11 - 166*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
d5-NEtPFOSA	*93*	*cn*	*10 - 180*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
d3-NMePFOSA	*103*	*cn*	*10 - 175*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C2-2-Perfluorohexylethanoic acid	*125*	*cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C2-2-Perfluorooctylethanoic acid	*188*	*cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C2-2-Perfluorodecylethanoic acid	*210*	**5+ cn*	*10 - 200*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*68*	*cn*	*10 - 164*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*83*	*cn*	*10 - 162*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*112*	*cn*	*10 - 161*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C4 PFBA	*127*	*cn*	*28 - 153*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C5 PFPeA	*174*	**5+ cn*	*24 - 161*	*04/04/22 11:19*	*04/06/22 20:59*	*1*
13C4 PFHpA	*112*	*cn*	*10 - 178*	*04/04/22 11:19*	*04/06/22 20:59*	*1*

Client Sample ID: Safeshell #1-3
Lab Sample ID: 410-76903-1
Date Collected: 03/09/22 15:00
Matrix: Solid
Date Received: 03/21/22 12:09

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C8 PFOA	118	cn	26 - 159	04/04/22 11:19	04/06/22 20:59	1
13C8 PFOS	129	cn	41 - 154	04/04/22 11:19	04/06/22 20:59	1
13C8 FOSA	119	cn	14 - 163	04/04/22 11:19	04/06/22 20:59	1
13C2 PFTeDA	153	cn	10 - 169	04/04/22 11:19	04/06/22 20:59	1

Client Sample ID: Safeshell #1-3
Lab Sample ID: 410-76903-1
Date Collected: 03/09/22 15:00
Matrix: Solid
Date Received: 03/21/22 12:09

Method: 537 IDA - EPA 537 Isotope Dilution - Pre-Treatment - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PPF Acid	41.0	*-	1.18	0.394	ng/g		04/04/22 11:19	04/06/22 21:10	10

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C4 PFBA	*144*		*28 - 153*	*04/04/22 11:19*	*04/06/22 21:10*	*10*

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: Safeshell #1-3
Date Collected: 03/09/22 15:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-1
Matrix: Solid

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
10:2 FTS	<0.120	H cn	0.399	0.120	ng/g		05/10/22 10:06	05/12/22 13:24	1
10:2 FTUCA	<0.0399	H *- cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
11Cl-PF3OUdS	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
3:3 FTCA	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
4:2 Fluorotelomer sulfonic acid	<0.120	H cn	0.399	0.120	ng/g		05/10/22 10:06	05/12/22 13:24	1
5:3 FTCA	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
6:2 Fluorotelomer sulfonic acid	<0.120	H cn	0.399	0.120	ng/g		05/10/22 10:06	05/12/22 13:24	1
6:2 FTCA	**0.0425**	**J H *+ cn**	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
6:2 FTUCA	**0.149**	**H *- cn**	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
7:3 FTCA	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
8:2 Fluorotelomer sulfonic acid	<0.120	H cn	0.599	0.120	ng/g		05/10/22 10:06	05/12/22 13:24	1
8:2 FTCA	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
8:2 FTUCA	<0.0399	H *- cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
9Cl-PF3ONS	<0.0399	H cn	0.399	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
DONA	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
EVE Acid	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
HFPODA	<0.200	H cn	0.599	0.200	ng/g		05/10/22 10:06	05/12/22 13:24	1
Hydro-EVE Acid	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Hydrolyzed PSDA	<0.0399	H *- cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Hydro-PS Acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
MTP	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
NEtFOSA	<0.0998	H cn	0.399	0.0998	ng/g		05/10/22 10:06	05/12/22 13:24	1
NEtFOSAA	<0.0399	H cn	0.399	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
NEtFOSE	<0.0998	H cn	0.399	0.0998	ng/g		05/10/22 10:06	05/12/22 13:24	1
NMeFOSA	<0.0998	H cn	0.399	0.0998	ng/g		05/10/22 10:06	05/12/22 13:24	1
NMeFOSAA	<0.0399	H cn	0.399	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
NMeFOSE	<0.0998	H cn	0.399	0.0998	ng/g		05/10/22 10:06	05/12/22 13:24	1
NVHOS	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PEPA	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorobutanesulfonic acid	<0.0798	H cn	0.399	0.0798	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorobutanoic acid	<0.160	H cn	0.399	0.160	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorodecanesulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorodecanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorododecanesulfonic acid	<0.0399	H cn	0.399	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorododecanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoroheptanesulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoroheptanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorohexadecanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorohexanesulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorohexanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorononanesulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorononanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorooctadecanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorooctanesulfonamide	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorooctanesulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1

Client Sample Results

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: Safeshell #1-3
Date Collected: 03/09/22 15:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-1
Matrix: Solid

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoropentanesulfonic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoropentanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoropropanesulfonic acid	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorotetradecanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluorotridecanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
Perfluoroundecanoic acid	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFECA A	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFECA B	<0.0399	H *- cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFECA F	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFECA G	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFMOAA	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFO2HxA	**0.308**	**H *+ cn**	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFO3OA	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PFO4DA	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PMPA	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PPF Acid	<0.0399	H *+ cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
PS Acid	<0.0399	H *- cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
R-EVE	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
R-PSDA	<0.0399	H *- cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
R-PSDCA	<0.0399	H cn	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1
TAF	**0.0859**	**J H *+ cn**	0.120	0.0399	ng/g		05/10/22 10:06	05/12/22 13:24	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*587*	**5+ cn*	*10 - 200*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
M2-8:2 FTS	*385*	**5+ cn*	*15 - 200*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C2 PFTeDA	*80*	*cn*	*10 - 169*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C3 HFPO-DA	*78*	*cn*	*10 - 169*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C3 PFBS	*190*	**5+ cn*	*27 - 179*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C4 PFBA	*93*	*cn*	*28 - 153*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C4 PFHpA	*113*	*cn*	*10 - 178*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C5 PFPeA	*125*	*cn*	*24 - 161*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C8 PFOA	*96*	*cn*	*26 - 159*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C8 PFOS	*110*	*cn*	*41 - 154*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
d5-NEtFOSAA	*119*	*cn*	*10 - 193*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
d7-N-MeFOSE-M	*34*	*cn*	*10 - 179*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
d9-N-EtFOSE-M	*53*	*cn*	*10 - 185*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C3 PFHxS	*149*	*cn*	*24 - 171*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C5 PFHxA	*75*	*cn*	*10 - 174*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C6 PFDA	*85*	*cn*	*26 - 161*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C7 PFUnA	*73*	*cn*	*12 - 173*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
d3-NMePFOSA	*41*	*cn*	*10 - 175*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
d5-NEtPFOSA	*45*	*cn*	*10 - 180*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C8 FOSA	*55*	*cn*	*14 - 163*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C2-PFDoDA	*59*	*cn*	*11 - 166*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C9 PFNA	*101*	*cn*	*26 - 165*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C2-2-Perfluorohexylethanoic acid	*54*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C2-2-Perfluorooctylethanoic acid	*48*	**5- cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C2-2-Perfluorodecylethanoic acid	*56*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:24*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*100*	*cn*	*50 - 150*	*05/10/22 10:06*	*05/12/22 13:24*	*1*

Client Sample Results

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: Safeshell #1-3
Date Collected: 03/09/22 15:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-1
Matrix: Solid

Method: 537 TOP - Fluorinated Alkyl Substances - Post-Treatment (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2-2H-Perfluoro-2-decenoic acid	102	cn	50 - 150	05/10/22 10:06	05/12/22 13:24	1
13C2-2H-Perfluoro-2-dodecenoic acid	123	cn	50 - 150	05/10/22 10:06	05/12/22 13:24	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	79	cn	10 - 137	05/10/22 10:06	05/12/22 13:24	1
13C4 PFOA	120	cn	10 - 146	05/10/22 10:06	05/12/22 13:24	1
13C2 PFUnA	119	cn	10 - 143	05/10/22 10:06	05/12/22 13:24	1

Client Sample ID: Safeshell #1-3
Date Collected: 03/09/22 15:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-1
Matrix: Solid

Method: Total PFCA-Dif - Total PFCA (Treatment Difference)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PFBA	0.000				ng/g			05/13/22 13:16	1
PFPA	0.000				ng/g			05/13/22 13:16	1
PFHxA	0.000				ng/g			05/13/22 13:16	1
PFHpA	0.000				ng/g			05/13/22 13:16	1
PFOA	0.000				ng/g			05/13/22 13:16	1
PFNA	0.000				ng/g			05/13/22 13:16	1
Total PFCA	0.000				ng/g			05/13/22 13:16	1

Client Sample ID: Safeshell #1-3
Lab Sample ID: 410-76903-1
Date Collected: 03/09/22 15:00
Matrix: Solid
Date Received: 03/21/22 12:09

Method: Total PFCA-Sum - Total PFCA (Summary) - Pre-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	0.200	J	0.300	0.100	ng/g			05/13/22 13:14	1

Client: TRC Companies, Inc	Job ID: 410-75808-1
Project/Site: Synthetic Turf

Client Sample ID: Safeshell #1-3	**Lab Sample ID: 410-76903-1**
Date Collected: 03/09/22 15:00	**Matrix: Solid**
Date Received: 03/21/22 12:09

Method: Total PFCA-Sum - Total PFCA (Summary) - Post-Treatment

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total PFCA	<0.100		0.300	0.100	ng/g			05/13/22 13:14	1

Client Sample Results

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: EB 003
Date Collected: 03/22/22 00:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-4
Matrix: Water

Method: 537 IDA - EPA 537 Isotope Dilution

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.476	H *- cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
10:2 FTS	<0.952	H cn	4.76	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
10:2 FTUCA	<0.666	H cn	1.90	0.666	ng/L		04/04/22 06:59	05/05/22 08:05	1
11Cl-PF3OUdS	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
3:3 FTCA	<0.285	H cn	1.90	0.285	ng/L		04/04/22 06:59	05/05/22 08:05	1
4:2 Fluorotelomer sulfonic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
5:3 FTCA	<0.190	H *- cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
6:2 Fluorotelomer sulfonic acid	<1.90	H cn	4.76	1.90	ng/L		04/04/22 06:59	05/05/22 08:05	1
6:2 FTCA	<0.381	H *- cn	1.90	0.381	ng/L		04/04/22 06:59	05/05/22 08:05	1
6:2 FTUCA	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
7:3 FTCA	<0.285	H cn	1.90	0.285	ng/L		04/04/22 06:59	05/05/22 08:05	1
8:2 Fluorotelomer sulfonic acid	<0.952	H cn	2.85	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
8:2 FTCA	<0.381	H *- cn	1.90	0.381	ng/L		04/04/22 06:59	05/05/22 08:05	1
8:2 FTUCA	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
9Cl-PF3ONS	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
DONA	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
EVE Acid	<2.85	H *- cn	9.52	2.85	ng/L		04/04/22 06:59	05/05/22 08:05	1
HFPODA	<0.476	H cn	2.85	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Hydro-EVE Acid	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
Hydrolyzed PSDA	<0.856	H cn	1.90	0.856	ng/L		04/04/22 06:59	05/05/22 08:05	1
Hydro-PS Acid	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
MTP	<1.90	H cn	4.76	1.90	ng/L		04/04/22 06:59	05/05/22 08:05	1
NEtFOSA	<0.952	H cn	4.76	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
NEtFOSAA	<0.476	H cn	2.85	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
NEtFOSE	<0.952	H cn	2.85	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
NMeFOSA	<0.952	H cn	2.85	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
NMeFOSAA	<0.571	H cn	1.90	0.571	ng/L		04/04/22 06:59	05/05/22 08:05	1
NMeFOSE	<0.952	H cn	2.85	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
NVHOS	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PEPA	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorobutanesulfonic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorobutanoic acid	<1.90	H cn	4.76	1.90	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorodecanesulfonic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorodecanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorododecanesulfonic acid	<0.476	H cn	2.85	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorododecanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoroheptanesulfonic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoroheptanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorohexadecanoic acid	<0.952	H cn	2.85	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorohexanesulfonic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorohexanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorononanesulfonic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorononanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorooctadecanoic acid	<0.952	H cn	2.85	0.952	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorooctanesulfonamide	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorooctanesulfonic acid	**0.731**	**J H B cn**	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1

Client Sample ID: EB 003
Date Collected: 03/22/22 00:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-4
Matrix: Water

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoropentanesulfonic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoropentanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoropropanesulfonic acid	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorotetradecanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluorotridecanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
Perfluoroundecanoic acid	<0.476	H cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFECA A	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFECA B	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFECA F	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFECA G	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFMOAA	<0.190	H *- cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFO2HxA	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFO3OA	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PFO4DA	<0.666	H cn	1.90	0.666	ng/L		04/04/22 06:59	05/05/22 08:05	1
PMPA	<0.190	H cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
PPF Acid	<1.90	H cn	4.76	1.90	ng/L		04/04/22 06:59	05/05/22 08:05	1
PS Acid	<2.85	H *- cn	9.52	2.85	ng/L		04/04/22 06:59	05/05/22 08:05	1
R-EVE	<0.381	H cn	1.90	0.381	ng/L		04/04/22 06:59	05/05/22 08:05	1
R-PSDA	<0.476	H *- cn	1.90	0.476	ng/L		04/04/22 06:59	05/05/22 08:05	1
R-PSDCA	<0.190	H *- cn	1.90	0.190	ng/L		04/04/22 06:59	05/05/22 08:05	1
TAF	<1.90	H cn	4.76	1.90	ng/L		04/04/22 06:59	05/05/22 08:05	1

Isotope Dilution	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFTeDA	*125*	*cn*	*10 - 179*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*170*	**5+ cn*	*21 - 166*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*156*	*cn*	*14 - 166*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*171*	*cn*	*20 - 173*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C2-2-Perfluorodecylethanoic acid	*114*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C2-2-Perfluorohexylethanoic acid	*98*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C2-2-Perfluorooctylethanoic acid	*133*	*cn*	*10 - 200*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C2-PFDoDA	*127*	*cn*	*17 - 176*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C3 HFPO-DA	*138*	*cn*	*17 - 185*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C3 PFBS	*141*	*cn*	*16 - 200*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C3 PFHxS	*136*	*cn*	*28 - 188*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C4 PFBA	*131*	*cn*	*42 - 165*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C4 PFHpA	*131*	*cn*	*31 - 182*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C5 PFHxA	*124*	*cn*	*24 - 179*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C5 PFPeA	*133*	*cn*	*38 - 187*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C6 PFDA	*133*	*cn*	*49 - 163*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C7 PFUnA	*132*	*cn*	*34 - 174*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C8 FOSA	*119*	*cn*	*10 - 168*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C8 PFOA	*127*	*cn*	*48 - 162*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C8 PFOS	*131*	*cn*	*51 - 159*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
13C9 PFNA	*126*	*cn*	*51 - 167*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
d3-NMeFOSAA	*150*	*cn*	*31 - 174*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
d3-NMePFOSA	*120*	*cn*	*10 - 155*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
d5-NEtFOSAA	*148*	*cn*	*29 - 195*	*04/04/22 06:59*	*05/05/22 08:05*	*1*
d5-NEtPFOSA	*120*	*cn*	*10 - 159*	*04/04/22 06:59*	*05/05/22 08:05*	*1*

Client Sample ID: EB 003 **Lab Sample ID: 410-76903-4**
Date Collected: 03/22/22 00:00 **Matrix: Water**
Date Received: 03/21/22 12:09

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Isotope Dilution	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
d7-N-MeFOSE-M	129	cn	10 - 178	04/04/22 06:59	05/05/22 08:05	1
d9-N-EtFOSE-M	120	cn	10 - 177	04/04/22 06:59	05/05/22 08:05	1
M2-4:2 FTS	141	cn	10 - 200	04/04/22 06:59	05/05/22 08:05	1
M2-6:2 FTS	129	cn	17 - 200	04/04/22 06:59	05/05/22 08:05	1
M2-8:2 FTS	144	cn	33 - 200	04/04/22 06:59	05/05/22 08:05	1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Surrogate Summary

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Method: 537 TOP - Fluorinated Alkyl Substances

Matrix: Solid

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxA (10-137)	PFOA (10-146)	PFUnA (10-143)
LCS 410-253462/3-B	Lab Control Sample	86	120	95
LCSD 410-253462/4-B	Lab Control Sample Dup	115	137	123
MB 410-253462/2-B	Method Blank	101	128	111

Surrogate Legend

PFHxA = 13C2 PFHxA
PFOA = 13C4 PFOA
PFUnA = 13C2 PFUnA

Method: 537 TOP - Fluorinated Alkyl Substances

Matrix: Solid

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxA	PFOA	PFUnA
MB 410-253462/1-B	Method Blank			

Surrogate Legend

PFHxA = 13C2 PFHxA
PFOA = 13C4 PFOA
PFUnA = 13C2 PFUnA

Method: 537 TOP - Fluorinated Alkyl Substances

Matrix: Solid

Prep Type: Post-Treatment

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFHxA (10-137)	PFOA (10-146)	PFUnA (10-143)
410-75808-1	Carpet-001	84 cn	109 cn	109 cn
410-76735-1	PP Pad-001	73 cn	99 cn	90 cn
410-76903-1	Safeshell #1-3	79 cn	120 cn	119 cn

Surrogate Legend

PFHxA = 13C2 PFHxA
PFOA = 13C4 PFOA
PFUnA = 13C2 PFUnA

Isotope Dilution Summary

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Method: 537 IDA - EPA 537 Isotope Dilution

Matrix: Solid

Prep Type: Total/NA

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		HFPODA	C3PFBS	C3PFHS	13C5PHA	PFDoDA	C6PFDA	13C7PUA	MFHEA
Lab Sample ID	Client Sample ID	(10-169)	(27-179)	(24-171)	(10-174)	(11-166)	(26-161)	(12-173)	(10-200)
LCS 410-240631/2-B	Lab Control Sample	137	160	154	148	139	155	150	232 *5+
LCSD 410-240631/3-B	Lab Control Sample Dup	139	153	151	146	133	155	153	258 *5+
MB 410-240631/1-B	Method Blank	129	152	154	139	134	152	147	244 *5+

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		MFOEA	MFDEA	C9PFNA	MFHUEA	d3NMFOS	MFOUEA	d3NMFSA	MFDUEA
Lab Sample ID	Client Sample ID	(10-200)	(10-200)	(26-165)	(10-164)	(10-178)	(10-162)	(10-175)	(10-161)
LCS 410-240631/2-B	Lab Control Sample	237 *5+	218 *5+	154	121	150	126	137	111
LCSD 410-240631/3-B	Lab Control Sample Dup	234 *5+	226 *5+	147	124	139	118	139	113
MB 410-240631/1-B	Method Blank	218 *5+	208 *5+	148	119	132	116	131	102

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		d5NEFOS	PFBA	d5NPFSA	PFPeA	C4PFHA	NMFM	C8PFOA	NEFM
Lab Sample ID	Client Sample ID	(10-193)	(28-153)	(10-180)	(24-161)	(10-178)	(10-179)	(26-159)	(10-185)
LCS 410-240631/2-B	Lab Control Sample	155	147	146	152	153	144	159	137
LCSD 410-240631/3-B	Lab Control Sample Dup	153	143	148	151	150	143	147	133
MB 410-240631/1-B	Method Blank	154	147	141	146	152	133	150	129

		Percent Isotope Dilution Recovery (Acceptance Limits)					
		C8PFOS	M242FTS	M262FTS	PFOSA	M282FTS	PFTDA
Lab Sample ID	Client Sample ID	(41-154)	(10-200)	(10-200)	(14-163)	(15-200)	(10-169)
LCS 410-240631/2-B	Lab Control Sample	146	176	165	155	135	137
LCSD 410-240631/3-B	Lab Control Sample Dup	145	168	160	153	147	130
MB 410-240631/1-B	Method Blank	148	160	161	150	155	125

Surrogate Legend

HFPODA = 13C3 HFPO-DA
C3PFBS = 13C3 PFBS
C3PFHS = 13C3 PFHxS
13C5PHA = 13C5 PFHxA
PFDoDA = 13C2-PFDoDA
C6PFDA = 13C6 PFDA
13C7PUA = 13C7 PFUnA
MFHEA = 13C2-2-Perfluorohexylethanoic acid
MFOEA = 13C2-2-Perfluorooctylethanoic acid
MFDEA = 13C2-2-Perfluorodecylethanoic acid
C9PFNA = 13C9 PFNA
MFHUEA = 13C2-2H-Perfluoro-2-octenoic acid
d3NMFOS = d3-NMeFOSAA
MFOUEA = 13C2-2H-Perfluoro-2-decenoic acid
d3NMFSA = d3-NMePFOSA
MFDUEA = 13C2-2H-Perfluoro-2-dodecenoic acid
d5NEFOS = d5-NEtFOSAA
PFBA = 13C4 PFBA
d5NPFSA = d5-NEtPFOSA
PFPeA = 13C5 PFPeA
C4PFHA = 13C4 PFHpA
NMFM = d7-N-MeFOSE-M
C8PFOA = 13C8 PFOA
NEFM = d9-N-EtFOSE-M
C8PFOS = 13C8 PFOS
M242FTS = M2-4:2 FTS

M262FTS = M2-6:2 FTS

PFOSA = 13C8 FOSA

M282FTS = M2-8:2 FTS

PFTDA = 13C2 PFTeDA

Method: 537 IDA - EPA 537 Isotope Dilution

Matrix: Solid — **Prep Type: Pre-Treatment**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		d5NEFOS	d3NMFOS	HFPODA	NMFM	NEFM	M262FTS	M282FTS	C3PFBS
Lab Sample ID	**Client Sample ID**	(10-193)	(10-178)	(10-169)	(10-179)	(10-185)	(10-200)	(15-200)	(27-179)
410-75808-1	Carpet-001	169 cn	131 cn	138 cn	94 cn	99 cn	197 cn	269 *5+ cn	151 cn
410-76735-1	PP Pad-001	124 cn	138 cn	145 cn	147 cn	179 cn	198 cn	162 cn	138 cn
410-76903-1	Safeshell #1-3	171 cn	174 cn	116 cn	120 cn	108 cn	188 cn	241 *5+ cn	221 *5+ cn
410-76903-1 - DL	Safeshell #1-3								

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		M242FTS	13C5PHA	C9PFNA	C6PFDA	13C7PUA	C3PFHS	PFDoDA	d5NPFSA
Lab Sample ID	**Client Sample ID**	(10-200)	(10-174)	(26-165)	(26-161)	(12-173)	(24-171)	(11-166)	(10-180)
410-75808-1	Carpet-001	330 *5+ cn	149 cn	164 cn	148 cn	137 cn	157 cn	117 cn	85 cn
410-76735-1	PP Pad-001	353 *5+ cn	146 cn	154 cn	150 cn	120 cn	140 cn	147 cn	122 cn
410-76903-1	Safeshell #1-3	230 *5+ cn	97 cn	131 cn	131 cn	153 cn	142 cn	151 cn	93 cn
410-76903-1 - DL	Safeshell #1-3								

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		d3NMFSA	MFHEA	MFOEA	MFDEA	MFHUEA	MFOUEA	MFDUEA	PFBA
Lab Sample ID	**Client Sample ID**	(10-175)	(10-200)	(10-200)	(10-200)	(10-164)	(10-162)	(10-161)	(28-153)
410-75808-1	Carpet-001	83 cn	260 *5+ cn	364 *5+ cn	328 *5+ cn	114 cn	154 cn	157 cn	144 cn
410-76735-1	PP Pad-001	138 cn	304 *5+ cn	270 *5+ cn	307 *5+ cn	134 cn	128 cn	141 cn	148 cn
410-76903-1	Safeshell #1-3	103 cn	125 cn	188 cn	210 *5+ cn	68 cn	83 cn	112 cn	127 cn
410-76903-1 - DL	Safeshell #1-3								144

		Percent Isotope Dilution Recovery (Acceptance Limits)					
		PFPeA	C4PFHA	C8PFOA	C8PFOS	PFOSA	PFTDA
Lab Sample ID	**Client Sample ID**	(24-161)	(10-178)	(26-159)	(41-154)	(14-163)	(10-169)
410-75808-1	Carpet-001	147 cn	146 cn	152 cn	155 *5+ cn	133 cn	129 cn
410-76735-1	PP Pad-001	164 *5+ cn	147 cn	137 cn	146 cn	149 cn	141 cn
410-76903-1	Safeshell #1-3	174 *5+ cn	112 cn	118 cn	129 cn	119 cn	153 cn
410-76903-1 - DL	Safeshell #1-3						

Surrogate Legend

d5NEFOS = d5-NEtFOSAA

d3NMFOS = d3-NMeFOSAA

HFPODA = 13C3 HFPO-DA

NMFM = d7-N-MeFOSE-M

NEFM = d9-N-EtFOSE-M

M262FTS = M2-6:2 FTS

M282FTS = M2-8:2 FTS

C3PFBS = 13C3 PFBS

M242FTS = M2-4:2 FTS

13C5PHA = 13C5 PFHxA

C9PFNA = 13C9 PFNA
C6PFDA = 13C6 PFDA
13C7PUA = 13C7 PFUnA
C3PFHS = 13C3 PFHxS
PFDoDA = 13C2-PFDoDA
d5NPFSA = d5-NEtPFOSA
d3NMFSA = d3-NMePFOSA
MFHEA = 13C2-2-Perfluorohexylethanoic acid
MFOEA = 13C2-2-Perfluorooctylethanoic acid
MFDEA = 13C2-2-Perfluorodecylethanoic acid
MFHUEA = 13C2-2H-Perfluoro-2-octenoic acid
MFOUEA = 13C2-2H-Perfluoro-2-decenoic acid
MFDUEA = 13C2-2H-Perfluoro-2-dodecenoic acid
PFBA = 13C4 PFBA
PFPeA = 13C5 PFPeA
C4PFHA = 13C4 PFHpA
C8PFOA = 13C8 PFOA
C8PFOS = 13C8 PFOS
PFOSA = 13C8 FOSA
PFTDA = 13C2 PFTeDA

Method: 537 IDA - EPA 537 Isotope Dilution

Matrix: Water — **Prep Type: Total/NA**

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	d5NEFOS (29-195)	d3NMFOS (31-174)	HFPODA (17-185)	NMFM (10-178)	NEFM (10-177)	M262FTS (17-200)	M282FTS (33-200)	C3PFBS (16-200)
410-75808-2	EB-001	125 cn	129 cn	121 cn	96 cn	95 cn	128 cn	132 cn	140 cn
410-76735-2	EB-002	131 cn	135 cn	109 cn	111 cn	112 cn	130 cn	135 cn	128 cn
410-76903-4	EB 003	148 cn	150 cn	138 cn	129 cn	120 cn	129 cn	144 cn	141 cn
LCS 410-240479/3-A	Lab Control Sample	128	128	112	102	104	119	109	124
LCSD 410-240479/4-A	Lab Control Sample Dup	131	135	112	103	108	115	128	125
MB 410-240479/1-A	Method Blank	134	134	117	112	111	134	136	128

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M242FTS (10-200)	13C5PHA (24-179)	C9PFNA (51-167)	C6PFDA (49-163)	13C7PUA (34-174)	C3PFHS (28-188)	PFDoDA (17-176)	d5NPFSA (10-159)
410-75808-2	EB-001	126 cn	101 cn	125 cn	128 cn	125 cn	128 cn	115 cn	53 cn
410-76735-2	EB-002	113 cn	116 cn	118 cn	134 cn	131 cn	126 cn	125 cn	108 cn
410-76903-4	EB 003	141 cn	124 cn	126 cn	133 cn	132 cn	136 cn	127 cn	120 cn
LCS 410-240479/3-A	Lab Control Sample	109	116	118	118	118	120	116	85
LCSD 410-240479/4-A	Lab Control Sample Dup	110	112	117	125	121	120	121	98
MB 410-240479/1-A	Method Blank	115	115	119	126	126	129	117	102

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	d3NMFSA (10-155)	MFHEA (10-200)	MFOEA (10-200)	MFDEA (10-200)	MFHUEA (20-173)	MFOUEA (21-166)	MFDUEA (14-166)	PFBA (42-165)
410-75808-2	EB-001	53 cn	80 cn	99 cn	78 cn	143 cn	141 cn	130 cn	128 cn
410-76735-2	EB-002	105 cn	79 cn	103 cn	86 cn	147 cn	165 cn	159 cn	124 cn
410-76903-4	EB 003	120 cn	98 cn	133 cn	114 cn	171 cn	170 *5+ cn	156 cn	131 cn
LCS 410-240479/3-A	Lab Control Sample	84	84	108	103	138	136	134	115
LCSD 410-240479/4-A	Lab Control Sample Dup	96	82	112	102	134	143	136	111
MB 410-240479/1-A	Method Blank	98	77	92	90	156	163	150	124

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFPeA (38-187)	C4PFHA (31-182)	C8PFOA (48-162)	C8PFOS (51-159)	PFOSA (10-168)	PFTDA (10-179)
410-75808-2	EB-001	134 cn	123 cn	124 cn	123 cn	102 cn	110 cn

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Matrix: Water | **Prep Type: Total/NA**

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	PFPeA (38-187)	C4PFHA (31-182)	C8PFOA (48-162)	C8PFOS (51-159)	PFOSA (10-168)	PFTDA (10-179)
410-76735-2	EB-002	118 cn	117 cn	120 cn	118 cn	113 cn	118 cn
410-76903-4	EB 003	133 cn	131 cn	127 cn	131 cn	119 cn	125 cn
LCS 410-240479/3-A	Lab Control Sample	123	118	118	120	105	118
LCSD 410-240479/4-A	Lab Control Sample Dup	105	114	116	122	109	118
MB 410-240479/1-A	Method Blank	126	124	118	127	104	115

Surrogate Legend

d5NEFOS = d5-NEtFOSAA
d3NMFOS = d3-NMeFOSAA
HFPODA = 13C3 HFPO-DA
NMFM = d7-N-MeFOSE-M
NEFM = d9-N-EtFOSE-M
M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS
C3PFBS = 13C3 PFBS
M242FTS = M2-4:2 FTS
13C5PHA = 13C5 PFHxA
C9PFNA = 13C9 PFNA
C6PFDA = 13C6 PFDA
13C7PUA = 13C7 PFUnA
C3PFHS = 13C3 PFHxS
PFDoDA = 13C2-PFDoDA
d5NPFSA = d5-NEtPFOSA
d3NMFSA = d3-NMePFOSA
MFHEA = 13C2-2-Perfluorohexylethanoic acid
MFOEA = 13C2-2-Perfluorooctylethanoic acid
MFDEA = 13C2-2-Perfluorodecylethanoic acid
MFHUEA = 13C2-2H-Perfluoro-2-octenoic acid
MFOUEA = 13C2-2H-Perfluoro-2-decenoic acid
MFDUEA = 13C2-2H-Perfluoro-2-dodecenoic acid
PFBA = 13C4 PFBA
PFPeA = 13C5 PFPeA
C4PFHA = 13C4 PFHpA
C8PFOA = 13C8 PFOA
C8PFOS = 13C8 PFOS
PFOSA = 13C8 FOSA
PFTDA = 13C2 PFTeDA

Method: 537 TOP - Fluorinated Alkyl Substances

Matrix: Solid | **Prep Type: Total/NA**

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M262FTS (10-200)	M282FTS (15-200)	PFTDA (10-169)	HFPODA (10-169)	C3PFBS (27-179)	PFBA (28-153)	C4PFHA (10-178)	PFPeA (24-161)
LCS 410-253462/3-B	Lab Control Sample	211 *5+	167	86	107	166	99	103	136
LCSD 410-253462/4-B	Lab Control Sample Dup	221 *5+	176	110	130	205 *5+	122	129	174 *5+
MB 410-253462/2-B	Method Blank	347 *5+	236 *5+	101	130	139	120	100	122

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	C8PFOA (26-159)	C8PFOS (41-154)	d5NEFOS (10-193)	NMFM (10-179)	NEFM (10-185)	C3PFHS (24-171)	13C5PHA (10-174)	C6PFDA (26-161)
LCS 410-253462/3-B	Lab Control Sample	105	117	109	81	79	114	90	104

Client: TRC Companies, Inc Job ID: 410-75808-1
Project/Site: Synthetic Turf

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Matrix: Solid **Prep Type: Total/NA**

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		C8PFOA	C8PFOS	d5NEFOS	NMFM	NEFM	C3PFHS	13C5PHA	C6PFDA
Lab Sample ID	**Client Sample ID**	(26-159)	(41-154)	(10-193)	(10-179)	(10-185)	(24-171)	(10-174)	(26-161)
LCSD 410-253462/4-B	Lab Control Sample Dup	131	153	135	104	105	134	122	140
MB 410-253462/2-B	Method Blank	122	152	147	98	89	135	110	129

		Percent Isotope Dilution Recovery (Acceptance Limits)							
		13C7PUA	d3NMFSA	d5NPFSA	PFOSA	PFDoDA	C9PFNA	MFHEA	MFOEA
Lab Sample ID	**Client Sample ID**	(12-173)	(10-175)	(10-180)	(14-163)	(11-166)	(26-165)	(50-150)	(50-150)
LCS 410-253462/3-B	Lab Control Sample	87	79	70	79	95	99	72	57
LCSD 410-253462/4-B	Lab Control Sample Dup	114	86	79	111	121	137	95	82
MB 410-253462/2-B	Method Blank	113	77	72	100	123	134	66	90

		Percent Isotope Dilution Recovery (Acceptance Limits)			
		MFDEA	MFHUEA	MFOUEA	MFDUEA
Lab Sample ID	**Client Sample ID**	(50-150)	(50-150)	(50-150)	(50-150)
LCS 410-253462/3-B	Lab Control Sample	63	116	96	118
LCSD 410-253462/4-B	Lab Control Sample Dup	78	148	118	151 *5+
MB 410-253462/2-B	Method Blank	80	113	161 *5+	170 *5+

Surrogate Legend

M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS
PFTDA = 13C2 PFTeDA
HFPODA = 13C3 HFPO-DA
C3PFBS = 13C3 PFBS
PFBA = 13C4 PFBA
C4PFHA = 13C4 PFHpA
PFPeA = 13C5 PFPeA
C8PFOA = 13C8 PFOA
C8PFOS = 13C8 PFOS
d5NEFOS = d5-NEtFOSAA
NMFM = d7-N-MeFOSE-M
NEFM = d9-N-EtFOSE-M
C3PFHS = 13C3 PFHxS
13C5PHA = 13C5 PFHxA
C6PFDA = 13C6 PFDA
13C7PUA = 13C7 PFUnA
d3NMFSA = d3-NMePFOSA
d5NPFSA = d5-NEtPFOSA
PFOSA = 13C8 FOSA
PFDoDA = 13C2-PFDoDA
C9PFNA = 13C9 PFNA
MFHEA = 13C2-2-Perfluorohexylethanoic acid
MFOEA = 13C2-2-Perfluorooctylethanoic acid
MFDEA = 13C2-2-Perfluorodecylethanoic acid
MFHUEA = 13C2-2H-Perfluoro-2-octenoic acid
MFOUEA = 13C2-2H-Perfluoro-2-decenoic acid
MFDUEA = 13C2-2H-Perfluoro-2-dodecenoic acid

Isotope Dilution Summary

Client: TRC Companies, Inc — Job ID: 410-75808-1

Project/Site: Synthetic Turf

Method: 537 TOP - Fluorinated Alkyl Substances

Matrix: Solid — **Prep Type: Post-Treatment**

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	M262FTS (10-200)	M282FTS (15-200)	PFTDA (10-169)	HFPODA (10-169)	C3PFBS (27-179)	PFBA (28-153)	C4PFHA (10-178)	PFPeA (24-161)
410-75808-1	Carpet-001	522 *5+ cn	488 *5+ cn	247 *5+ cn	108 cn	125 cn	99 cn	144 cn	68 cn
410-76735-1	PP Pad-001	321 *5+ cn	223 *5+ cn	90 cn	75 cn	105 cn	85 cn	96 cn	81 cn
410-76903-1	Safeshell #1-3	587 *5+ cn	385 *5+ cn	80 cn	78 cn	190 *5+ cn	93 cn	113 cn	125 cn

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	C8PFOA (26-159)	C8PFOS (41-154)	d5NEFOS (10-193)	NMFM (10-179)	NEFM (10-185)	C3PFHS (24-171)	13C5PHA (10-174)	C6PFDA (26-161)
410-75808-1	Carpet-001	112 cn	138 cn	384 *5+ cn	121 cn	188 *5+ cn	171 cn	92 cn	168 *5+ cn
410-76735-1	PP Pad-001	90 cn	108 cn	115 cn	70 cn	65 cn	107 cn	77 cn	98 cn
410-76903-1	Safeshell #1-3	96 cn	110 cn	119 cn	34 cn	53 cn	149 cn	75 cn	85 cn

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	13C7PUA (12-173)	d3NMFSA (10-175)	d5NPFSA (10-180)	PFOSA (14-163)	PFDoDA (11-166)	C9PFNA (26-165)	MFHEA (50-150)	MFOEA (50-150)
410-75808-1	Carpet-001	213 *5+ cn	106 cn	119 cn	167 *5+ cn	158 cn	110 cn	48 *5- cn	111 cn
410-76735-1	PP Pad-001	82 cn	56 cn	50 cn	55 cn	91 cn	101 cn	40 *5- cn	53 cn
410-76903-1	Safeshell #1-3	73 cn	41 cn	45 cn	55 cn	59 cn	101 cn	54 cn	48 *5- cn

Percent Isotope Dilution Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	MFDEA (50-150)	MFHUEA (50-150)	MFOUEA (50-150)	MFDUEA (50-150)
410-75808-1	Carpet-001	181 *5+ cn	66 cn	199 *5+ cn	265 *5+ cn
410-76735-1	PP Pad-001	66 cn	83 cn	110 cn	133 cn
410-76903-1	Safeshell #1-3	56 cn	100 cn	102 cn	123 cn

Surrogate Legend

M262FTS = M2-6:2 FTS
M282FTS = M2-8:2 FTS
PFTDA = 13C2 PFTeDA
HFPODA = 13C3 HFPO-DA
C3PFBS = 13C3 PFBS
PFBA = 13C4 PFBA
C4PFHA = 13C4 PFHpA
PFPeA = 13C5 PFPeA
C8PFOA = 13C8 PFOA
C8PFOS = 13C8 PFOS
d5NEFOS = d5-NEtFOSAA
NMFM = d7-N-MeFOSE-M
NEFM = d9-N-EtFOSE-M
C3PFHS = 13C3 PFHxS
13C5PHA = 13C5 PFHxA
C6PFDA = 13C6 PFDA
13C7PUA = 13C7 PFUnA
d3NMFSA = d3-NMePFOSA
d5NPFSA = d5-NEtPFOSA
PFOSA = 13C8 FOSA
PFDoDA = 13C2-PFDoDA
C9PFNA = 13C9 PFNA

Isotope Dilution Summary

Client: TRC Companies, Inc
Job ID: 410-75808-1
Project/Site: Synthetic Turf

MFHEA = 13C2-2-Perfluorohexylethanoic acid
MFOEA = 13C2-2-Perfluorooctylethanoic acid
MFDEA = 13C2-2-Perfluorodecylethanoic acid
MFHUEA = 13C2-2H-Perfluoro-2-octenoic acid
MFOUEA = 13C2-2H-Perfluoro-2-decenoic acid
MFDUEA = 13C2-2H-Perfluoro-2-dodecenoic acid

Method: 537 IDA - EPA 537 Isotope Dilution

Lab Sample ID: MB 410-240479/1-A
Matrix: Water
Analysis Batch: 250678

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240479

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
10:2 FTS	<1.00		5.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
10:2 FTUCA	<0.700		2.00	0.700	ng/L		04/04/22 06:59	05/03/22 01:07	1
11Cl-PF3OUdS	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
3:3 FTCA	<0.300		2.00	0.300	ng/L		04/04/22 06:59	05/03/22 01:07	1
4:2 Fluorotelomer sulfonic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
5:3 FTCA	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
6:2 Fluorotelomer sulfonic acid	<2.00		5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
6:2 FTCA	<0.400		2.00	0.400	ng/L		04/04/22 06:59	05/03/22 01:07	1
6:2 FTUCA	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
7:3 FTCA	<0.300		2.00	0.300	ng/L		04/04/22 06:59	05/03/22 01:07	1
8:2 Fluorotelomer sulfonic acid	<1.00		3.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
8:2 FTCA	<0.400		2.00	0.400	ng/L		04/04/22 06:59	05/03/22 01:07	1
8:2 FTUCA	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
9Cl-PF3ONS	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
DONA	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
EVE Acid	<3.00		10.0	3.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
HFPODA	<0.500		3.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Hydro-EVE Acid	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
Hydrolyzed PSDA	<0.900		2.00	0.900	ng/L		04/04/22 06:59	05/03/22 01:07	1
Hydro-PS Acid	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
MTP	<2.00		5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
NEtFOSA	<1.00		5.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
NEtFOSAA	<0.500		3.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
NEtFOSE	<1.00		3.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
NMeFOSA	<1.00		3.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
NMeFOSAA	<0.600		2.00	0.600	ng/L		04/04/22 06:59	05/03/22 01:07	1
NMeFOSE	<1.00		3.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
NVHOS	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PEPA	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorobutanesulfonic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorobutanoic acid	<2.00		5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorodecanesulfonic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorodecanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorododecanesulfonic acid	<0.500		3.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorododecanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoroheptanesulfonic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoroheptanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorohexadecanoic acid	<1.00		3.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorohexanesulfonic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorohexanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorononanesulfonic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorononanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorooctadecanoic acid	<1.00		3.00	1.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorooctanesulfonamide	0.5231	J	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: MB 410-240479/1-A
Matrix: Water
Analysis Batch: 250678

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240479

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorooctanesulfonic acid	0.7280	J	2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorooctanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoropentanesulfonic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoropentanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoropropanesulfonic acid	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorotetradecanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluorotridecanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
Perfluoroundecanoic acid	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFECA A	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFECA B	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFECA F	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFECA G	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFMOAA	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFO2HxA	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFO3OA	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PFO4DA	<0.700		2.00	0.700	ng/L		04/04/22 06:59	05/03/22 01:07	1
PMPA	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
PPF Acid	<2.00		5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
PS Acid	<3.00		10.0	3.00	ng/L		04/04/22 06:59	05/03/22 01:07	1
R-EVE	<0.400		2.00	0.400	ng/L		04/04/22 06:59	05/03/22 01:07	1
R-PSDA	<0.500		2.00	0.500	ng/L		04/04/22 06:59	05/03/22 01:07	1
R-PSDCA	<0.200		2.00	0.200	ng/L		04/04/22 06:59	05/03/22 01:07	1
TAF	<2.00		5.00	2.00	ng/L		04/04/22 06:59	05/03/22 01:07	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*117*		*17 - 185*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C3 PFBS	*128*		*16 - 200*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C3 PFHxS	*129*		*28 - 188*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C5 PFHxA	*115*		*24 - 179*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C2-PFDoDA	*117*		*17 - 176*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C6 PFDA	*126*		*49 - 163*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C7 PFUnA	*126*		*34 - 174*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C2-2-Perfluorohexylethanoic acid	*77*		*10 - 200*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C2-2-Perfluorooctylethanoic acid	*92*		*10 - 200*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C2-2-Perfluorodecylethanoic acid	*90*		*10 - 200*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*156*		*20 - 173*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C9 PFNA	*119*		*51 - 167*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*163*		*21 - 166*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
d3-NMeFOSAA	*134*		*31 - 174*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*150*		*14 - 166*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
d3-NMePFOSA	*98*		*10 - 155*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C4 PFBA	*124*		*42 - 165*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
d5-NEtFOSAA	*134*		*29 - 195*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C5 PFPeA	*126*		*38 - 187*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
d5-NEtPFOSA	*102*		*10 - 159*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C4 PFHpA	*124*		*31 - 182*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
d7-N-MeFOSE-M	*112*		*10 - 178*	*04/04/22 06:59*	*05/03/22 01:07*	*1*
13C8 PFOA	*118*		*48 - 162*	*04/04/22 06:59*	*05/03/22 01:07*	*1*

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: MB 410-240479/1-A
Matrix: Water
Analysis Batch: 250678

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240479

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
d9-N-EtFOSE-M	111		10 - 177	04/04/22 06:59	05/03/22 01:07	1
13C8 PFOS	127		51 - 159	04/04/22 06:59	05/03/22 01:07	1
M2-4:2 FTS	115		10 - 200	04/04/22 06:59	05/03/22 01:07	1
13C8 FOSA	104		10 - 168	04/04/22 06:59	05/03/22 01:07	1
M2-6:2 FTS	134		17 - 200	04/04/22 06:59	05/03/22 01:07	1
13C2 PFTeDA	115		10 - 179	04/04/22 06:59	05/03/22 01:07	1
M2-8:2 FTS	136		33 - 200	04/04/22 06:59	05/03/22 01:07	1

Lab Sample ID: LCS 410-240479/3-A
Matrix: Water
Analysis Batch: 251038

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240479

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
10:2 FTCA	25.6	15.84	*-	ng/L		62	70 - 130
10:2 FTS	24.7	22.12		ng/L		90	50 - 146
10:2 FTUCA	25.6	18.99		ng/L		74	70 - 130
11Cl-PF3OUdS	23.8	18.23		ng/L		77	53 - 139
3:3 FTCA	25.6	19.04		ng/L		74	70 - 130
4:2 Fluorotelomer sulfonic acid	23.9	17.48		ng/L		73	55 - 139
5:3 FTCA	25.6	17.63	*-	ng/L		69	70 - 130
6:2 Fluorotelomer sulfonic acid	24.3	16.33		ng/L		67	28 - 173
6:2 FTCA	25.6	16.75	*-	ng/L		65	70 - 130
6:2 FTUCA	25.6	17.84		ng/L		70	70 - 130
7:3 FTCA	25.6	31.51		ng/L		123	70 - 130
8:2 Fluorotelomer sulfonic acid	24.5	17.71		ng/L		72	55 - 138
8:2 FTCA	25.6	16.34	*-	ng/L		64	70 - 130
8:2 FTUCA	25.6	22.46		ng/L		88	70 - 130
9Cl-PF3ONS	23.8	18.09		ng/L		76	59 - 135
DONA	24.2	18.83		ng/L		78	55 - 143
EVE Acid	25.6	<3.00	*-	ng/L		6	70 - 130
HFPODA	25.6	21.30		ng/L		83	50 - 135
Hydro-EVE Acid	25.6	22.73		ng/L		89	70 - 130
Hydrolyzed PSDA	25.6	22.23		ng/L		87	70 - 130
Hydro-PS Acid	25.6	22.07		ng/L		86	70 - 130
MTP	25.6	21.70		ng/L		85	70 - 130
NEtFOSA	25.6	18.47		ng/L		72	61 - 134
NEtFOSAA	25.6	18.75		ng/L		73	55 - 134
NEtFOSE	25.6	19.77		ng/L		77	60 - 136
NMeFOSA	25.6	18.89		ng/L		74	64 - 143
NMeFOSAA	25.6	18.66		ng/L		73	59 - 140
NMeFOSE	25.6	18.66		ng/L		73	55 - 144
NVHOS	25.6	18.13		ng/L		71	70 - 130
PEPA	25.6	21.33		ng/L		83	70 - 130
Perfluoro (2-ethoxyethane) sulfonic acid	22.8	17.50		ng/L		77	70 - 130
Perfluoro-4-ethylcyclohexanesulfonic acid	23.6	17.58		ng/L		74	70 - 130
Perfluorobutanesulfonic acid	22.7	19.67		ng/L		87	53 - 138
Perfluorobutanoic acid	25.6	18.73		ng/L		73	59 - 136

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCS 410-240479/3-A
Matrix: Water
Analysis Batch: 251038

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240479

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorodecanesulfonic acid	24.7	17.78		ng/L		72	55 - 137
Perfluorodecanoic acid	25.6	20.94		ng/L		82	56 - 138
Perfluorododecanesulfonic acid	24.8	18.13		ng/L		73	48 - 138
Perfluorododecanoic acid	25.6	19.80		ng/L		77	59 - 143
Perfluoroheptanesulfonic acid	24.4	17.80		ng/L		73	56 - 140
Perfluoroheptanoic acid	25.6	19.64		ng/L		77	59 - 145
Perfluorohexadecanoic acid	25.6	21.02		ng/L		82	41 - 158
Perfluorohexanesulfonic acid	23.3	17.38		ng/L		74	58 - 134
Perfluorohexanoic acid	25.6	20.11		ng/L		79	58 - 139
Perfluorononanesulfonic acid	24.6	17.77		ng/L		72	59 - 136
Perfluorononanoic acid	25.6	19.54		ng/L		76	61 - 139
Perfluorooctadecanoic acid	25.6	21.22		ng/L		83	29 - 172
Perfluorooctanesulfonamide	25.6	19.74		ng/L		77	43 - 167
Perfluorooctanesulfonic acid	23.7	19.06		ng/L		80	45 - 150
Perfluorooctanoic acid	25.6	20.92		ng/L		82	51 - 145
Perfluoropentanesulfonic acid	24.0	18.32		ng/L		76	55 - 140
Perfluoropentanoic acid	25.6	19.75		ng/L		77	57 - 141
Perfluoropropanesulfonic acid	23.4	19.84		ng/L		85	70 - 130
Perfluorotetradecanoic acid	25.6	20.17		ng/L		79	62 - 139
Perfluorotridecanoic acid	25.6	19.67		ng/L		77	58 - 146
Perfluoroundecanoic acid	25.6	20.58		ng/L		80	60 - 141
PFECA A	25.6	20.62		ng/L		81	70 - 130
PFECA B	25.6	23.08		ng/L		90	70 - 130
PFECA F	25.6	23.64		ng/L		92	70 - 130
PFECA G	25.6	19.27		ng/L		75	70 - 130
PFMOAA	25.6	17.46	*-	ng/L		68	70 - 130
PFO2HxA	25.6	21.10		ng/L		82	70 - 130
PFO3OA	25.6	20.47		ng/L		80	70 - 130
PFO4DA	25.6	21.96		ng/L		86	70 - 130
PMPA	25.6	20.03		ng/L		78	70 - 130
PPF Acid	25.6	24.44		ng/L		95	70 - 130
PS Acid	25.6	<3.00	*-	ng/L		9	70 - 130
R-EVE	25.6	23.12		ng/L		90	70 - 130
R-PSDA	25.6	17.46	*-	ng/L		68	70 - 130
R-PSDCA	25.6	17.91		ng/L		70	70 - 130
TAF	25.6	20.99		ng/L		82	70 - 130

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*112*		*17 - 185*
13C3 PFBS	*124*		*16 - 200*
13C3 PFHxS	*120*		*28 - 188*
13C5 PFHxA	*116*		*24 - 179*
13C2-PFDoDA	*116*		*17 - 176*
13C6 PFDA	*118*		*49 - 163*
13C7 PFUnA	*118*		*34 - 174*
13C2-2-Perfluorohexylethanoic acid	*84*		*10 - 200*
13C2-2-Perfluorooctylethanoic acid	*108*		*10 - 200*

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCS 410-240479/3-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 251038 — **Prep Batch: 240479**

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C2-2-Perfluorodecylethanoic acid	*103*		*10 - 200*
13C2-2H-Perfluoro-2-octenoic acid	*138*		*20 - 173*
13C9 PFNA	*118*		*51 - 167*
13C2-2H-Perfluoro-2-decenoic acid	*136*		*21 - 166*
d3-NMeFOSAA	*128*		*31 - 174*
13C2-2H-Perfluoro-2-dodecenoic acid	*134*		*14 - 166*
d3-NMePFOSA	*84*		*10 - 155*
13C4 PFBA	*115*		*42 - 165*
d5-NEtFOSAA	*128*		*29 - 195*
13C5 PFPeA	*123*		*38 - 187*
d5-NEtPFOSA	*85*		*10 - 159*
13C4 PFHpA	*118*		*31 - 182*
d7-N-MeFOSE-M	*102*		*10 - 178*
13C8 PFOA	*118*		*48 - 162*
d9-N-EtFOSE-M	*104*		*10 - 177*
13C8 PFOS	*120*		*51 - 159*
M2-4:2 FTS	*109*		*10 - 200*
13C8 FOSA	*105*		*10 - 168*
M2-6:2 FTS	*119*		*17 - 200*
13C2 PFTeDA	*118*		*10 - 179*
M2-8:2 FTS	*109*		*33 - 200*

Lab Sample ID: LCSD 410-240479/4-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 251038 — **Prep Batch: 240479**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
10:2 FTCA	25.6	16.60	*-	ng/L		65	70 - 130	5	30
10:2 FTS	24.7	18.64		ng/L		76	50 - 146	17	30
10:2 FTUCA	25.6	20.04		ng/L		78	70 - 130	5	30
11Cl-PF3OUdS	23.8	18.15		ng/L		76	53 - 139	0	30
3:3 FTCA	25.6	22.17		ng/L		87	70 - 130	15	30
4:2 Fluorotelomer sulfonic acid	23.9	18.36		ng/L		77	55 - 139	5	30
5:3 FTCA	25.6	18.20		ng/L		71	70 - 130	3	30
6:2 Fluorotelomer sulfonic acid	24.3	17.07		ng/L		70	28 - 173	4	30
6:2 FTCA	25.6	17.27	*-	ng/L		67	70 - 130	3	30
6:2 FTUCA	25.6	17.91		ng/L		70	70 - 130	0	30
7:3 FTCA	25.6	32.75		ng/L		128	70 - 130	4	30
8:2 Fluorotelomer sulfonic acid	24.5	15.63		ng/L		64	55 - 138	13	30
8:2 FTCA	25.6	17.13	*-	ng/L		67	70 - 130	5	30
8:2 FTUCA	25.6	21.83		ng/L		85	70 - 130	3	30
9Cl-PF3ONS	23.8	18.54		ng/L		78	59 - 135	2	30
DONA	24.2	18.77		ng/L		78	55 - 143	0	30
EVE Acid	25.6	<3.00	*-	ng/L		8	70 - 130	19	30
HFPODA	25.6	20.26		ng/L		79	50 - 135	5	30
Hydro-EVE Acid	25.6	23.01		ng/L		90	70 - 130	1	30

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCSD 410-240479/4-A
Matrix: Water
Analysis Batch: 251038

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240479

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Hydrolyzed PSDA	25.6	20.83		ng/L		81	70 - 130	6	30
Hydro-PS Acid	25.6	21.05		ng/L		82	70 - 130	5	30
MTP	25.6	20.85		ng/L		81	70 - 130	4	30
NEtFOSA	25.6	18.54		ng/L		72	61 - 134	0	30
NEtFOSAA	25.6	19.65		ng/L		77	55 - 134	5	30
NEtFOSE	25.6	20.30		ng/L		79	60 - 136	3	30
NMeFOSA	25.6	19.89		ng/L		78	64 - 143	5	30
NMeFOSAA	25.6	19.08		ng/L		75	59 - 140	2	30
NMeFOSE	25.6	19.21		ng/L		75	55 - 144	3	30
NVHOS	25.6	18.03		ng/L		70	70 - 130	1	30
PEPA	25.6	21.56		ng/L		84	70 - 130	1	30
Perfluoro (2-ethoxyethane) sulfonic acid	22.8	17.27		ng/L		76	70 - 130	1	30
Perfluoro-4-ethylcyclohexanesulfonic acid	23.6	18.45		ng/L		78	70 - 130	5	30
Perfluorobutanesulfonic acid	22.7	17.99		ng/L		79	53 - 138	9	30
Perfluorobutanoic acid	25.6	19.08		ng/L		75	59 - 136	2	30
Perfluorodecanesulfonic acid	24.7	17.85		ng/L		72	55 - 137	0	30
Perfluorodecanoic acid	25.6	20.00		ng/L		78	56 - 138	5	30
Perfluorododecanesulfonic acid	24.8	18.98		ng/L		77	48 - 138	5	30
Perfluorododecanoic acid	25.6	19.48		ng/L		76	59 - 143	2	30
Perfluoroheptanesulfonic acid	24.4	18.00		ng/L		74	56 - 140	1	30
Perfluoroheptanoic acid	25.6	20.54		ng/L		80	59 - 145	4	30
Perfluorohexadecanoic acid	25.6	21.29		ng/L		83	41 - 158	1	30
Perfluorohexanesulfonic acid	23.3	17.96		ng/L		77	58 - 134	3	30
Perfluorohexanoic acid	25.6	20.84		ng/L		81	58 - 139	4	30
Perfluorononanesulfonic acid	24.6	18.32		ng/L		75	59 - 136	3	30
Perfluorononanoic acid	25.6	20.39		ng/L		80	61 - 139	4	30
Perfluorooctadecanoic acid	25.6	22.47		ng/L		88	29 - 172	6	30
Perfluorooctanesulfonamide	25.6	19.92		ng/L		78	43 - 167	1	30
Perfluorooctanesulfonic acid	23.7	19.51		ng/L		82	45 - 150	2	30
Perfluorooctanoic acid	25.6	21.75		ng/L		85	51 - 145	4	30
Perfluoropentanesulfonic acid	24.0	18.01		ng/L		75	55 - 140	2	30
Perfluoropentanoic acid	25.6	14.63		ng/L		57	57 - 141	30	30
Perfluoropropanesulfonic acid	23.4	20.37		ng/L		87	70 - 130	3	30
Perfluorotetradecanoic acid	25.6	20.24		ng/L		79	62 - 139	0	30
Perfluorotridecanoic acid	25.6	20.58		ng/L		80	58 - 146	5	30
Perfluoroundecanoic acid	25.6	21.71		ng/L		85	60 - 141	5	30
PFECA A	25.6	20.10		ng/L		79	70 - 130	3	30
PFECA B	25.6	21.80		ng/L		85	70 - 130	6	30
PFECA F	25.6	23.82		ng/L		93	70 - 130	1	30
PFECA G	25.6	19.31		ng/L		75	70 - 130	0	30
PFMOAA	25.6	17.62	*-	ng/L		69	70 - 130	1	30
PFO2HxA	25.6	22.24		ng/L		87	70 - 130	5	30
PFO3OA	25.6	21.60		ng/L		84	70 - 130	5	30
PFO4DA	25.6	21.85		ng/L		85	70 - 130	0	30
PMPA	25.6	19.12		ng/L		75	70 - 130	5	30
PPF Acid	25.6	24.15		ng/L		94	70 - 130	1	30
PS Acid	25.6	<3.00	*-	ng/L		9	70 - 130	7	30

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCSD 410-240479/4-A
Matrix: Water
Analysis Batch: 251038

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240479

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
R-EVE	25.6	21.31		ng/L		83	70 - 130	8	30
R-PSDA	25.6	15.61	*-	ng/L		61	70 - 130	11	30
R-PSDCA	25.6	17.21	*-	ng/L		67	70 - 130	4	30
TAF	25.6	21.26		ng/L		83	70 - 130	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*112*		*17 - 185*
13C3 PFBS	*125*		*16 - 200*
13C3 PFHxS	*120*		*28 - 188*
13C5 PFHxA	*112*		*24 - 179*
13C2-PFDoDA	*121*		*17 - 176*
13C6 PFDA	*125*		*49 - 163*
13C7 PFUnA	*121*		*34 - 174*
13C2-2-Perfluorohexylethanoic acid	*82*		*10 - 200*
13C2-2-Perfluorooctylethanoic acid	*112*		*10 - 200*
13C2-2-Perfluorodecylethanoic acid	*102*		*10 - 200*
13C2-2H-Perfluoro-2-octenoic acid	*134*		*20 - 173*
13C9 PFNA	*117*		*51 - 167*
13C2-2H-Perfluoro-2-decenoic acid	*143*		*21 - 166*
d3-NMeFOSAA	*135*		*31 - 174*
13C2-2H-Perfluoro-2-dodecenoic acid	*136*		*14 - 166*
d3-NMePFOSA	*96*		*10 - 155*
13C4 PFBA	*111*		*42 - 165*
d5-NEtFOSAA	*131*		*29 - 195*
13C5 PFPeA	*105*		*38 - 187*
d5-NEtPFOSA	*98*		*10 - 159*
13C4 PFHpA	*114*		*31 - 182*
d7-N-MeFOSE-M	*103*		*10 - 178*
13C8 PFOA	*116*		*48 - 162*
d9-N-EtFOSE-M	*108*		*10 - 177*
13C8 PFOS	*122*		*51 - 159*
M2-4:2 FTS	*110*		*10 - 200*
13C8 FOSA	*109*		*10 - 168*
M2-6:2 FTS	*115*		*17 - 200*
13C2 PFTeDA	*118*		*10 - 179*
M2-8:2 FTS	*128*		*33 - 200*

Lab Sample ID: MB 410-240631/1-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240631

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
10:2 FTS	<0.120		0.400	0.120	ng/g		04/04/22 11:19	04/06/22 11:45	1

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: MB 410-240631/1-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240631

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTUCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
11Cl-PF3OUdS	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
3:3 FTCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
4:2 Fluorotelomer sulfonic acid	<0.120		0.400	0.120	ng/g		04/04/22 11:19	04/06/22 11:45	1
5:3 FTCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
6:2 Fluorotelomer sulfonic acid	<0.120		0.400	0.120	ng/g		04/04/22 11:19	04/06/22 11:45	1
6:2 FTCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
6:2 FTUCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
7:3 FTCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
8:2 Fluorotelomer sulfonic acid	<0.120		0.600	0.120	ng/g		04/04/22 11:19	04/06/22 11:45	1
8:2 FTCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
8:2 FTUCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
9Cl-PF3ONS	<0.0400		0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
DONA	<0.0400		0.600	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
EVE Acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
HFPODA	<0.0800		0.400	0.0800	ng/g		04/04/22 11:19	04/06/22 11:45	1
Hydro-EVE Acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Hydrolyzed PSDA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Hydro-PS Acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
MTP	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
NEtFOSA	<0.100		0.400	0.100	ng/g		04/04/22 11:19	04/06/22 11:45	1
NEtFOSAA	<0.0400		0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
NEtFOSE	<0.100		0.400	0.100	ng/g		04/04/22 11:19	04/06/22 11:45	1
NMeFOSA	<0.100		0.400	0.100	ng/g		04/04/22 11:19	04/06/22 11:45	1
NMeFOSAA	<0.0400		0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
NMeFOSE	<0.100		0.400	0.100	ng/g		04/04/22 11:19	04/06/22 11:45	1
NVHOS	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PEPA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorobutanesulfonic acid	<0.0800		0.400	0.0800	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorobutanoic acid	<0.160		0.400	0.160	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorodecanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorodecanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorododecanesulfonic acid	<0.0400		0.400	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorododecanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluoroheptanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluoroheptanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorohexadecanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorohexanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorohexanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorononanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorononanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorooctadecanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorooctanesulfonamide	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorooctanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorooctanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: MB 410-240631/1-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240631

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoropentanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluoropentanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluoropropanesulfonic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorotetradecanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluorotridecanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
Perfluoroundecanoic acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFECA A	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFECA B	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFECA F	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFECA G	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFMOAA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFO2HxA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFO3OA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PFO4DA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PMPA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PPF Acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
PS Acid	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
R-EVE	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
R-PSDA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
R-PSDCA	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1
TAF	<0.0400		0.120	0.0400	ng/g		04/04/22 11:19	04/06/22 11:45	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*129*		*10 - 169*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C3 PFBS	*152*		*27 - 179*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C3 PFHxS	*154*		*24 - 171*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C5 PFHxA	*139*		*10 - 174*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2-PFDoDA	*134*		*11 - 166*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C6 PFDA	*152*		*26 - 161*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C7 PFUnA	*147*		*12 - 173*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2-2-Perfluorohexylethanoic acid	*244*	**5+*	*10 - 200*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2-2-Perfluorooctylethanoic acid	*218*	**5+*	*10 - 200*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2-2-Perfluorodecylethanoic acid	*208*	**5+*	*10 - 200*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2-2H-Perfluoro-2-octenoic acid	*119*		*10 - 164*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C9 PFNA	*148*		*26 - 165*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2-2H-Perfluoro-2-decenoic acid	*116*		*10 - 162*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
d3-NMeFOSAA	*132*		*10 - 178*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2-2H-Perfluoro-2-dodecenoic acid	*102*		*10 - 161*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
d3-NMePFOSA	*131*		*10 - 175*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C4 PFBA	*147*		*28 - 153*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
d5-NEtFOSAA	*154*		*10 - 193*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C5 PFPeA	*146*		*24 - 161*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
d5-NEtPFOSA	*141*		*10 - 180*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C4 PFHpA	*152*		*10 - 178*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
d7-N-MeFOSE-M	*133*		*10 - 179*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C8 PFOA	*150*		*26 - 159*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
d9-N-EtFOSE-M	*129*		*10 - 185*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C8 PFOS	*148*		*41 - 154*	*04/04/22 11:19*	*04/06/22 11:45*	*1*

Client: TRC Companies, Inc | Job ID: 410-75808-1
Project/Site: Synthetic Turf

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: MB 410-240631/1-B | **Client Sample ID: Method Blank**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 241603 | **Prep Batch: 240631**

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-4:2 FTS	*160*		*10 - 200*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C8 FOSA	*150*		*14 - 163*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
M2-6:2 FTS	*161*		*10 - 200*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
13C2 PFTeDA	*125*		*10 - 169*	*04/04/22 11:19*	*04/06/22 11:45*	*1*
M2-8:2 FTS	*155*		*15 - 200*	*04/04/22 11:19*	*04/06/22 11:45*	*1*

Lab Sample ID: LCS 410-240631/2-B | **Client Sample ID: Lab Control Sample**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 241603 | **Prep Batch: 240631**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
10:2 FTCA	5.00	4.032		ng/g		81	70 - 130
10:2 FTS	4.82	3.815		ng/g		79	46 - 143
10:2 FTUCA	5.00	4.082		ng/g		82	70 - 130
11Cl-PF3OUdS	4.65	3.767		ng/g		81	55 - 135
3:3 FTCA	5.00	3.749		ng/g		75	70 - 130
4:2 Fluorotelomer sulfonic acid	4.67	3.136		ng/g		67	58 - 131
5:3 FTCA	5.00	3.959		ng/g		79	70 - 130
6:2 Fluorotelomer sulfonic acid	4.74	3.262		ng/g		69	59 - 135
6:2 FTCA	5.00	4.368		ng/g		87	70 - 130
6:2 FTUCA	5.00	3.966		ng/g		79	70 - 130
7:3 FTCA	5.00	2.692	*-	ng/g		54	70 - 130
8:2 Fluorotelomer sulfonic acid	4.79	4.141		ng/g		86	55 - 133
8:2 FTCA	5.00	4.160		ng/g		83	70 - 130
8:2 FTUCA	5.00	3.641		ng/g		73	70 - 130
9Cl-PF3ONS	4.65	4.004		ng/g		86	62 - 130
DONA	4.73	3.756		ng/g		79	57 - 137
EVE Acid	5.00	0.2785	*-	ng/g		6	70 - 130
HFPODA	5.00	4.392		ng/g		88	49 - 135
Hydro-EVE Acid	5.00	3.972		ng/g		79	70 - 130
Hydrolyzed PSDA	5.00	3.430	*-	ng/g		69	70 - 130
Hydro-PS Acid	5.00	3.694		ng/g		74	70 - 130
MTP	5.00	2.987	*-	ng/g		60	70 - 130
NEtFOSA	5.00	3.782		ng/g		76	60 - 123
NEtFOSAA	5.00	3.389		ng/g		68	57 - 127
NEtFOSE	5.00	4.146		ng/g		83	60 - 126
NMeFOSA	5.00	4.005		ng/g		80	60 - 129
NMeFOSAA	5.00	3.471		ng/g		69	60 - 134
NMeFOSE	5.00	3.931		ng/g		79	60 - 130
NVHOS	5.00	3.590		ng/g		72	70 - 130
PEPA	5.00	4.333		ng/g		87	70 - 130
Perfluoro (2-ethoxyethane) sulfonic acid	4.45	3.163		ng/g		71	70 - 130
Perfluoro-4-ethylcyclohexanesulfonic acid	4.61	3.710		ng/g		80	70 - 130
Perfluorobutanesulfonic acid	4.43	3.388		ng/g		77	54 - 130
Perfluorobutanoic acid	5.00	3.974		ng/g		79	60 - 128
Perfluorodecanesulfonic acid	4.82	3.468		ng/g		72	57 - 132
Perfluorodecanoic acid	5.00	3.670		ng/g		73	56 - 133

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCS 410-240631/2-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240631

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Perfluorododecanesulfonic acid	4.84	3.836		ng/g		79	38 - 145
Perfluorododecanoic acid	5.00	3.838		ng/g		77	60 - 135
Perfluoroheptanesulfonic acid	4.76	3.666		ng/g		77	59 - 132
Perfluoroheptanoic acid	5.00	3.828		ng/g		77	59 - 137
Perfluorohexadecanoic acid	5.00	3.775		ng/g		76	38 - 147
Perfluorohexanesulfonic acid	4.56	3.601		ng/g		79	59 - 129
Perfluorohexanoic acid	5.00	3.985		ng/g		80	59 - 132
Perfluorononanesulfonic acid	4.80	3.601		ng/g		75	60 - 132
Perfluorononanoic acid	5.00	3.539		ng/g		71	61 - 134
Perfluorooctadecanoic acid	5.00	3.261		ng/g		65	16 - 160
Perfluorooctanesulfonamide	5.00	3.695		ng/g		74	47 - 149
Perfluorooctanesulfonic acid	4.63	3.586		ng/g		78	61 - 126
Perfluorooctanoic acid	5.00	3.532		ng/g		71	59 - 131
Perfluoropentanesulfonic acid	4.69	3.323		ng/g		71	57 - 133
Perfluoropentanoic acid	5.00	3.370		ng/g		67	58 - 134
Perfluoropropanesulfonic acid	4.58	3.903		ng/g		85	70 - 130
Perfluorotetradecanoic acid	5.00	3.888		ng/g		78	62 - 134
Perfluorotridecanoic acid	5.00	3.894		ng/g		78	53 - 143
Perfluoroundecanoic acid	5.00	3.923		ng/g		78	60 - 134
PFECA A	5.00	3.706		ng/g		74	70 - 130
PFECA B	5.00	3.796		ng/g		76	70 - 130
PFECA F	5.00	4.552		ng/g		91	70 - 130
PFECA G	5.00	3.336	*-	ng/g		67	70 - 130
PFMOAA	5.00	2.695	*-	ng/g		54	70 - 130
PFO2HxA	5.00	3.877		ng/g		78	70 - 130
PFO3OA	5.00	3.347	*-	ng/g		67	70 - 130
PFO4DA	5.00	3.611		ng/g		72	70 - 130
PMPA	5.00	3.552		ng/g		71	70 - 130
PPF Acid	5.00	3.466	*-	ng/g		69	70 - 130
PS Acid	5.00	0.2898	*-	ng/g		6	70 - 130
R-EVE	5.00	2.675	*-	ng/g		54	70 - 130
R-PSDA	5.00	2.523	*-	ng/g		50	70 - 130
R-PSDCA	5.00	2.871	*-	ng/g		57	70 - 130
TAF	5.00	3.531		ng/g		71	70 - 130

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*137*		*10 - 169*
13C3 PFBS	*160*		*27 - 179*
13C3 PFHxS	*154*		*24 - 171*
13C5 PFHxA	*148*		*10 - 174*
13C2-PFDoDA	*139*		*11 - 166*
13C6 PFDA	*155*		*26 - 161*
13C7 PFUnA	*150*		*12 - 173*
13C2-2-Perfluorohexylethanoic acid	*232*	**5+*	*10 - 200*
13C2-2-Perfluorooctylethanoic acid	*237*	**5+*	*10 - 200*
13C2-2-Perfluorodecylethanoic acid	*218*	**5+*	*10 - 200*

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCS 410-240631/2-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240631

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
13C2-2H-Perfluoro-2-octenoic acid	121		10 - 164
13C9 PFNA	154		26 - 165
13C2-2H-Perfluoro-2-decenoic acid	126		10 - 162
d3-NMeFOSAA	150		10 - 178
13C2-2H-Perfluoro-2-dodecenoic acid	111		10 - 161
d3-NMePFOSA	137		10 - 175
13C4 PFBA	147		28 - 153
d5-NEtFOSAA	155		10 - 193
13C5 PFPeA	152		24 - 161
d5-NEtPFOSA	146		10 - 180
13C4 PFHpA	153		10 - 178
d7-N-MeFOSE-M	144		10 - 179
13C8 PFOA	159		26 - 159
d9-N-EtFOSE-M	137		10 - 185
13C8 PFOS	146		41 - 154
M2-4:2 FTS	176		10 - 200
13C8 FOSA	155		14 - 163
M2-6:2 FTS	165		10 - 200
13C2 PFTeDA	137		10 - 169
M2-8:2 FTS	135		15 - 200

Lab Sample ID: LCSD 410-240631/3-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240631

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
10:2 FTCA	5.00	3.638		ng/g		73	70 - 130	10	30
10:2 FTS	4.82	3.463		ng/g		72	46 - 143	10	30
10:2 FTUCA	5.00	3.829		ng/g		77	70 - 130	6	30
11Cl-PF3OUdS	4.65	3.549		ng/g		76	55 - 135	6	30
3:3 FTCA	5.00	3.921		ng/g		78	70 - 130	4	30
4:2 Fluorotelomer sulfonic acid	4.67	3.213		ng/g		69	58 - 131	2	30
5:3 FTCA	5.00	4.056		ng/g		81	70 - 130	2	30
6:2 Fluorotelomer sulfonic acid	4.74	3.294		ng/g		69	59 - 135	1	30
6:2 FTCA	5.00	4.024		ng/g		80	70 - 130	8	30
6:2 FTUCA	5.00	3.842		ng/g		77	70 - 130	3	30
7:3 FTCA	5.00	2.372	*-	ng/g		47	70 - 130	13	30
8:2 Fluorotelomer sulfonic acid	4.79	3.950		ng/g		82	55 - 133	5	30
8:2 FTCA	5.00	4.236		ng/g		85	70 - 130	2	30
8:2 FTUCA	5.00	3.907		ng/g		78	70 - 130	7	30
9Cl-PF3ONS	4.65	3.672		ng/g		79	62 - 130	9	30
DONA	4.73	3.851		ng/g		82	57 - 137	2	30
EVE Acid	5.00	0.2270	*-	ng/g		5	70 - 130	20	30
HFPODA	5.00	4.383		ng/g		88	49 - 135	0	30
Hydro-EVE Acid	5.00	3.806		ng/g		76	70 - 130	4	30
Hydrolyzed PSDA	5.00	3.363	*-	ng/g		67	70 - 130	2	30
Hydro-PS Acid	5.00	3.681		ng/g		74	70 - 130	0	30

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCSD 410-240631/3-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240631

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
MTP	5.00	3.095	*-	ng/g		62	70 - 130	4	30
NEtFOSA	5.00	3.766		ng/g		75	60 - 123	0	30
NEtFOSAA	5.00	3.458		ng/g		69	57 - 127	2	30
NEtFOSE	5.00	4.177		ng/g		84	60 - 126	1	30
NMeFOSA	5.00	4.008		ng/g		80	60 - 129	0	30
NMeFOSAA	5.00	3.840		ng/g		77	60 - 134	10	30
NMeFOSE	5.00	4.013		ng/g		80	60 - 130	2	30
NVHOS	5.00	3.659		ng/g		73	70 - 130	2	30
PEPA	5.00	4.336		ng/g		87	70 - 130	0	30
Perfluoro (2-ethoxyethane) sulfonic acid	4.45	3.206		ng/g		72	70 - 130	1	30
Perfluoro-4-ethylcyclohexanesulfonic acid	4.61	3.616		ng/g		78	70 - 130	3	30
Perfluorobutanesulfonic acid	4.43	3.454		ng/g		78	54 - 130	2	30
Perfluorobutanoic acid	5.00	3.997		ng/g		80	60 - 128	1	30
Perfluorodecanesulfonic acid	4.82	3.405		ng/g		71	57 - 132	2	30
Perfluorodecanoic acid	5.00	3.709		ng/g		74	56 - 133	1	30
Perfluorododecanesulfonic acid	4.84	3.795		ng/g		78	38 - 145	1	30
Perfluorododecanoic acid	5.00	3.865		ng/g		77	60 - 135	1	30
Perfluoroheptanesulfonic acid	4.76	3.564		ng/g		75	59 - 132	3	30
Perfluoroheptanoic acid	5.00	4.131		ng/g		83	59 - 137	8	30
Perfluorohexadecanoic acid	5.00	3.471		ng/g		69	38 - 147	8	30
Perfluorohexanesulfonic acid	4.56	3.737		ng/g		82	59 - 129	4	30
Perfluorohexanoic acid	5.00	3.930		ng/g		79	59 - 132	1	30
Perfluorononanesulfonic acid	4.80	3.560		ng/g		74	60 - 132	1	30
Perfluorononanoic acid	5.00	3.606		ng/g		72	61 - 134	2	30
Perfluorooctadecanoic acid	5.00	3.333		ng/g		67	16 - 160	2	30
Perfluorooctanesulfonamide	5.00	3.579		ng/g		72	47 - 149	3	30
Perfluorooctanesulfonic acid	4.63	3.550		ng/g		77	61 - 126	1	30
Perfluorooctanoic acid	5.00	3.681		ng/g		74	59 - 131	4	30
Perfluoropentanesulfonic acid	4.69	3.532		ng/g		75	57 - 133	6	30
Perfluoropentanoic acid	5.00	3.429		ng/g		69	58 - 134	2	30
Perfluoropropanesulfonic acid	4.58	3.728		ng/g		81	70 - 130	5	30
Perfluorotetradecanoic acid	5.00	3.783		ng/g		76	62 - 134	3	30
Perfluorotridecanoic acid	5.00	3.798		ng/g		76	53 - 143	2	30
Perfluoroundecanoic acid	5.00	3.680		ng/g		74	60 - 134	6	30
PFECA A	5.00	3.715		ng/g		74	70 - 130	0	30
PFECA B	5.00	3.855		ng/g		77	70 - 130	2	30
PFECA F	5.00	4.665		ng/g		93	70 - 130	2	30
PFECA G	5.00	3.291	*-	ng/g		66	70 - 130	1	30
PFMOAA	5.00	2.768	*-	ng/g		55	70 - 130	3	30
PFO2HxA	5.00	3.931		ng/g		79	70 - 130	1	30
PFO3OA	5.00	3.435	*-	ng/g		69	70 - 130	3	30
PFO4DA	5.00	3.600		ng/g		72	70 - 130	0	30
PMPA	5.00	3.590		ng/g		72	70 - 130	1	30
PPF Acid	5.00	3.394	*-	ng/g		68	70 - 130	2	30
PS Acid	5.00	0.2500	*-	ng/g		5	70 - 130	15	30
R-EVE	5.00	2.620	*-	ng/g		52	70 - 130	2	30
R-PSDA	5.00	2.479	*-	ng/g		50	70 - 130	2	30

Method: 537 IDA - EPA 537 Isotope Dilution (Continued)

Lab Sample ID: LCSD 410-240631/3-B
Matrix: Solid
Analysis Batch: 241603

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240631

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
R-PSDCA	5.00	2.820	*-	ng/g		56	70 - 130	2	30
TAF	5.00	3.552		ng/g		71	70 - 130	1	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*139*		*10 - 169*
13C3 PFBS	*153*		*27 - 179*
13C3 PFHxS	*151*		*24 - 171*
13C5 PFHxA	*146*		*10 - 174*
13C2-PFDoDA	*133*		*11 - 166*
13C6 PFDA	*155*		*26 - 161*
13C7 PFUnA	*153*		*12 - 173*
13C2-2-Perfluorohexylethanoic acid	*258*	**5+*	*10 - 200*
13C2-2-Perfluorooctylethanoic acid	*234*	**5+*	*10 - 200*
13C2-2-Perfluorodecylethanoic acid	*226*	**5+*	*10 - 200*
13C2-2H-Perfluoro-2-octenoic acid	*124*		*10 - 164*
13C9 PFNA	*147*		*26 - 165*
13C2-2H-Perfluoro-2-decenoic acid	*118*		*10 - 162*
d3-NMeFOSAA	*139*		*10 - 178*
13C2-2H-Perfluoro-2-dodecenoic acid	*113*		*10 - 161*
d3-NMePFOSA	*139*		*10 - 175*
13C4 PFBA	*143*		*28 - 153*
d5-NEtFOSAA	*153*		*10 - 193*
13C5 PFPeA	*151*		*24 - 161*
d5-NEtPFOSA	*148*		*10 - 180*
13C4 PFHpA	*150*		*10 - 178*
d7-N-MeFOSE-M	*143*		*10 - 179*
13C8 PFOA	*147*		*26 - 159*
d9-N-EtFOSE-M	*133*		*10 - 185*
13C8 PFOS	*145*		*41 - 154*
M2-4:2 FTS	*168*		*10 - 200*
13C8 FOSA	*153*		*14 - 163*
M2-6:2 FTS	*160*		*10 - 200*
13C2 PFTeDA	*130*		*10 - 169*
M2-8:2 FTS	*147*		*15 - 200*

Method: 537 TOP - Fluorinated Alkyl Substances

Lab Sample ID: MB 410-253462/1-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 253462

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C2 PFHxA				*05/10/22 10:06*	*05/12/22 12:07*	*1*
13C4 PFOA				*05/10/22 10:06*	*05/12/22 12:07*	*1*

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 410-253462/1-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 253462

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFUnA				05/10/22 10:06	05/12/22 12:07	1

Lab Sample ID: MB 410-253462/2-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 253462

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
10:2 FTCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
10:2 FTS	<0.120		0.400	0.120	ng/g		05/10/22 10:06	05/12/22 12:18	1
10:2 FTUCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
11Cl-PF3OUdS	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
3:3 FTCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
4:2 Fluorotelomer sulfonic acid	<0.120		0.400	0.120	ng/g		05/10/22 10:06	05/12/22 12:18	1
5:3 FTCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
6:2 Fluorotelomer sulfonic acid	0.1366	J	0.400	0.120	ng/g		05/10/22 10:06	05/12/22 12:18	1
6:2 FTCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
6:2 FTUCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
7:3 FTCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
8:2 Fluorotelomer sulfonic acid	<0.120		0.600	0.120	ng/g		05/10/22 10:06	05/12/22 12:18	1
8:2 FTCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
8:2 FTUCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
9Cl-PF3ONS	<0.0400		0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
DONA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
EVE Acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
HFPODA	<0.200		0.600	0.200	ng/g		05/10/22 10:06	05/12/22 12:18	1
Hydro-EVE Acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Hydrolyzed PSDA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Hydro-PS Acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
MTP	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
NEtFOSA	<0.100		0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:18	1
NEtFOSAA	<0.0400		0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
NEtFOSE	<0.100		0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:18	1
NMeFOSA	<0.100		0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:18	1
NMeFOSAA	<0.0400		0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
NMeFOSE	<0.100		0.400	0.100	ng/g		05/10/22 10:06	05/12/22 12:18	1
NVHOS	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PEPA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoro (2-ethoxyethane) sulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoro-4-ethylcyclohexanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorobutanesulfonic acid	<0.0800		0.400	0.0800	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorobutanoic acid	<0.160		0.400	0.160	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorodecanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorodecanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorododecanesulfonic acid	<0.0400		0.400	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorododecanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoroheptanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoroheptanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 410-253462/2-B
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 254465
Prep Batch: 253462

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluorohexadecanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorohexanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorohexanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorononanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorononanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorooctadecanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorooctanesulfonamide	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorooctanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorooctanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoropentanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoropentanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoropropanesulfonic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorotetradecanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluorotridecanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
Perfluoroundecanoic acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFECA A	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFECA B	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFECA F	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFECA G	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFMOAA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFO2HxA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFO3OA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PFO4DA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PMPA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PPF Acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
PS Acid	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
R-EVE	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
R-PSDA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
R-PSDCA	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1
TAF	<0.0400		0.120	0.0400	ng/g		05/10/22 10:06	05/12/22 12:18	1

Isotope Dilution	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
M2-6:2 FTS	*347*	**5+*	*10 - 200*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
M2-8:2 FTS	*236*	**5+*	*15 - 200*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C2 PFTeDA	*101*		*10 - 169*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C3 HFPO-DA	*130*		*10 - 169*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C3 PFBS	*139*		*27 - 179*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C4 PFBA	*120*		*28 - 153*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C4 PFHpA	*100*		*10 - 178*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C5 PFPeA	*122*		*24 - 161*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C8 PFOA	*122*		*26 - 159*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C8 PFOS	*152*		*41 - 154*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
d5-NEtFOSAA	*147*		*10 - 193*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
d7-N-MeFOSE-M	*98*		*10 - 179*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
d9-N-EtFOSE-M	*89*		*10 - 185*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C3 PFHxS	*135*		*24 - 171*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C5 PFHxA	*110*		*10 - 174*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C6 PFDA	*129*		*26 - 161*	*05/10/22 10:06*	*05/12/22 12:18*	*1*
13C7 PFUnA	*113*		*12 - 173*	*05/10/22 10:06*	*05/12/22 12:18*	*1*

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: MB 410-253462/2-B
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 254465
Prep Batch: 253462

Isotope Dilution	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
d3-NMePFOSA	77		10 - 175	05/10/22 10:06	05/12/22 12:18	1
d5-NEtPFOSA	72		10 - 180	05/10/22 10:06	05/12/22 12:18	1
13C8 FOSA	100		14 - 163	05/10/22 10:06	05/12/22 12:18	1
13C2-PFDoDA	123		11 - 166	05/10/22 10:06	05/12/22 12:18	1
13C9 PFNA	134		26 - 165	05/10/22 10:06	05/12/22 12:18	1
13C2-2-Perfluorohexylethanoic acid	66		50 - 150	05/10/22 10:06	05/12/22 12:18	1
13C2-2-Perfluorooctylethanoic acid	90		50 - 150	05/10/22 10:06	05/12/22 12:18	1
13C2-2-Perfluorodecylethanoic acid	80		50 - 150	05/10/22 10:06	05/12/22 12:18	1
13C2-2H-Perfluoro-2-octenoic acid	113		50 - 150	05/10/22 10:06	05/12/22 12:18	1
13C2-2H-Perfluoro-2-decenoic acid	161	*5+	50 - 150	05/10/22 10:06	05/12/22 12:18	1
13C2-2H-Perfluoro-2-dodecenoic acid	170	*5+	50 - 150	05/10/22 10:06	05/12/22 12:18	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
13C2 PFHxA	101		10 - 137	05/10/22 10:06	05/12/22 12:18	1
13C4 PFOA	128		10 - 146	05/10/22 10:06	05/12/22 12:18	1
13C2 PFUnA	111		10 - 143	05/10/22 10:06	05/12/22 12:18	1

Lab Sample ID: LCS 410-253462/3-B
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: Total/NA
Analysis Batch: 254465
Prep Batch: 253462

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
10:2 FTCA	10.0	15.01	*+	ng/g		150	70 - 130
10:2 FTS	9.64	9.544		ng/g		99	46 - 143
10:2 FTUCA	10.0	5.156	*-	ng/g		52	70 - 130
11Cl-PF3OUdS	9.30	7.140		ng/g		77	55 - 135
3:3 FTCA	10.0	9.301		ng/g		93	70 - 130
4:2 Fluorotelomer sulfonic acid	9.34	5.937		ng/g		64	58 - 131
5:3 FTCA	10.0	7.645		ng/g		76	70 - 130
6:2 Fluorotelomer sulfonic acid	9.48	8.032	I	ng/g		85	59 - 135
6:2 FTCA	10.0	15.15	*+	ng/g		152	70 - 130
6:2 FTUCA	10.0	6.489	*-	ng/g		65	70 - 130
7:3 FTCA	10.0	10.91		ng/g		109	70 - 130
8:2 Fluorotelomer sulfonic acid	9.58	7.579		ng/g		79	55 - 133
8:2 FTCA	10.0	15.10	*+	ng/g		151	70 - 130
8:2 FTUCA	10.0	5.904	*-	ng/g		59	70 - 130
9Cl-PF3ONS	9.30	7.672		ng/g		82	62 - 130
DONA	9.45	5.776		ng/g		61	57 - 137
EVE Acid	10.0	10.86		ng/g		109	70 - 130
HFPODA	10.0	8.060		ng/g		81	49 - 135
Hydro-EVE Acid	10.0	13.06	*+	ng/g		131	70 - 130
Hydrolyzed PSDA	10.0	6.717	*-	ng/g		67	70 - 130
Hydro-PS Acid	10.0	8.772		ng/g		88	70 - 130
MTP	10.0	13.00		ng/g		130	70 - 130
NEtFOSA	10.0	8.087		ng/g		81	60 - 123
NEtFOSAA	10.0	7.654		ng/g		77	57 - 127
NEtFOSE	10.0	7.925		ng/g		79	60 - 126
NMeFOSA	10.0	9.111		ng/g		91	60 - 129

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 410-253462/3-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 253462

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
NMeFOSAA	10.0	7.897		ng/g		79	60 - 134
NMeFOSE	10.0	8.663		ng/g		87	60 - 130
NVHOS	10.0	9.059		ng/g		91	70 - 130
PEPA	10.0	13.58	*+	ng/g		136	70 - 130
Perfluoro (2-ethoxyethane) sulfonic acid	8.90	8.566		ng/g		96	70 - 130
Perfluoro-4-ethylcyclohexanesul fonic acid	9.22	7.650		ng/g		83	70 - 130
Perfluorobutanesulfonic acid	8.85	8.515		ng/g		96	54 - 130
Perfluorobutanoic acid	10.0	10.17		ng/g		102	60 - 128
Perfluorodecanesulfonic acid	9.64	7.421		ng/g		77	57 - 132
Perfluorodecanoic acid	10.0	10.11		ng/g		101	56 - 133
Perfluorododecanesulfonic acid	9.68	7.025		ng/g		73	38 - 145
Perfluorododecanoic acid	10.0	10.03		ng/g		100	60 - 135
Perfluoroheptanesulfonic acid	9.52	8.841		ng/g		93	59 - 132
Perfluoroheptanoic acid	10.0	8.063		ng/g		81	59 - 137
Perfluorohexadecanoic acid	10.0	11.37		ng/g		114	38 - 147
Perfluorohexanesulfonic acid	9.12	7.780		ng/g		85	59 - 129
Perfluorohexanoic acid	10.0	10.00		ng/g		100	59 - 132
Perfluorononanesulfonic acid	9.60	7.595		ng/g		79	60 - 132
Perfluorononanoic acid	10.0	9.804		ng/g		98	61 - 134
Perfluorooctadecanoic acid	10.0	8.622		ng/g		86	16 - 160
Perfluorooctanesulfonamide	10.0	8.481		ng/g		85	47 - 149
Perfluorooctanesulfonic acid	9.26	7.131		ng/g		77	61 - 126
Perfluorooctanoic acid	10.0	10.61		ng/g		106	59 - 131
Perfluoropentanesulfonic acid	9.38	9.043		ng/g		96	57 - 133
Perfluoropentanoic acid	10.0	9.226		ng/g		92	58 - 134
Perfluoropropanesulfonic acid	9.16	14.90	*+	ng/g		163	70 - 130
Perfluorotetradecanoic acid	10.0	9.796		ng/g		98	62 - 134
Perfluorotridecanoic acid	10.0	8.489		ng/g		85	53 - 143
Perfluoroundecanoic acid	10.0	11.62		ng/g		116	60 - 134
PFECA A	10.0	7.758		ng/g		78	70 - 130
PFECA B	10.0	6.389	*-	ng/g		64	70 - 130
PFECA F	10.0	13.42	*+	ng/g		134	70 - 130
PFECA G	10.0	11.06		ng/g		111	70 - 130
PFMOAA	10.0	14.27	*+	ng/g		143	70 - 130
PFO2HxA	10.0	15.15	*+	ng/g		152	70 - 130
PFO3OA	10.0	13.22	*+	ng/g		132	70 - 130
PFO4DA	10.0	16.24	*+	ng/g		162	70 - 130
PMPA	10.0	14.70	*+	ng/g		147	70 - 130
PPF Acid	10.0	13.46	*+	ng/g		135	70 - 130
PS Acid	10.0	5.698	*-	ng/g		57	70 - 130
R-EVE	10.0	7.937		ng/g		79	70 - 130
R-PSDA	10.0	5.532	*-	ng/g		55	70 - 130
R-PSDCA	10.0	8.890		ng/g		89	70 - 130
TAF	10.0	15.71	*+	ng/g		157	70 - 130

Isotope Dilution	*LCS %Recovery*	*LCS Qualifier*	*Limits*
M2-6:2 FTS	*211*	**5+*	*10 - 200*

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCS 410-253462/3-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 253462

Isotope Dilution	LCS %Recovery	LCS Qualifier	Limits
M2-8:2 FTS	167		15 - 200
13C2 PFTeDA	86		10 - 169
13C3 HFPO-DA	107		10 - 169
13C3 PFBS	166		27 - 179
13C4 PFBA	99		28 - 153
13C4 PFHpA	103		10 - 178
13C5 PFPeA	136		24 - 161
13C8 PFOA	105		26 - 159
13C8 PFOS	117		41 - 154
d5-NEtFOSAA	109		10 - 193
d7-N-MeFOSE-M	81		10 - 179
d9-N-EtFOSE-M	79		10 - 185
13C3 PFHxS	114		24 - 171
13C5 PFHxA	90		10 - 174
13C6 PFDA	104		26 - 161
13C7 PFUnA	87		12 - 173
d3-NMePFOSA	79		10 - 175
d5-NEtPFOSA	70		10 - 180
13C8 FOSA	79		14 - 163
13C2-PFDoDA	95		11 - 166
13C9 PFNA	99		26 - 165
13C2-2-Perfluorohexylethanoic acid	72		50 - 150
13C2-2-Perfluorooctylethanoic acid	57		50 - 150
13C2-2-Perfluorodecylethanoic acid	63		50 - 150
13C2-2H-Perfluoro-2-octenoic acid	116		50 - 150
13C2-2H-Perfluoro-2-decenoic acid	96		50 - 150
13C2-2H-Perfluoro-2-dodecenoic acid	118		50 - 150

Surrogate	LCS %Recovery	LCS Qualifier	Limits
13C2 PFHxA	86		10 - 137
13C4 PFOA	120		10 - 146
13C2 PFUnA	95		10 - 143

Lab Sample ID: LCSD 410-253462/4-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 253462

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
10:2 FTCA	10.0	16.87	*+	ng/g		169	70 - 130	12	30
10:2 FTS	9.64	10.17		ng/g		105	46 - 143	6	30
10:2 FTUCA	10.0	5.480	*-	ng/g		55	70 - 130	6	30
11Cl-PF3OUdS	9.30	7.470		ng/g		80	55 - 135	5	30
3:3 FTCA	10.0	9.508		ng/g		95	70 - 130	2	30
4:2 Fluorotelomer sulfonic acid	9.34	7.425		ng/g		79	58 - 131	22	30

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 410-253462/4-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 253462

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
5:3 FTCA	10.0	7.768		ng/g		78	70 - 130	2	30
6:2 Fluorotelomer sulfonic acid	9.48	8.488	I	ng/g		90	59 - 135	6	30
6:2 FTCA	10.0	13.97	*+	ng/g		140	70 - 130	8	30
6:2 FTUCA	10.0	6.303	*-	ng/g		63	70 - 130	3	30
7:3 FTCA	10.0	9.743		ng/g		97	70 - 130	11	30
8:2 Fluorotelomer sulfonic acid	9.58	8.239		ng/g		86	55 - 133	8	30
8:2 FTCA	10.0	14.69	*+	ng/g		147	70 - 130	3	30
8:2 FTUCA	10.0	6.229	*-	ng/g		62	70 - 130	5	30
9Cl-PF3ONS	9.30	7.640		ng/g		82	62 - 130	0	30
DONA	9.45	5.386		ng/g		57	57 - 137	7	30
EVE Acid	10.0	14.12	*+	ng/g		141	70 - 130	26	30
HFPODA	10.0	8.845		ng/g		88	49 - 135	9	30
Hydro-EVE Acid	10.0	12.94		ng/g		129	70 - 130	1	30
Hydrolyzed PSDA	10.0	6.384	*-	ng/g		64	70 - 130	5	30
Hydro-PS Acid	10.0	8.841		ng/g		88	70 - 130	1	30
MTP	10.0	13.30	*+	ng/g		133	70 - 130	2	30
NEtFOSA	10.0	7.704		ng/g		77	60 - 123	5	30
NEtFOSAA	10.0	8.283	E	ng/g		83	57 - 127	8	30
NEtFOSE	10.0	7.731		ng/g		77	60 - 126	2	30
NMeFOSA	10.0	9.454		ng/g		95	60 - 129	4	30
NMeFOSAA	10.0	8.254	E	ng/g		83	60 - 134	4	30
NMeFOSE	10.0	9.294		ng/g		93	60 - 130	7	30
NVHOS	10.0	9.239		ng/g		92	70 - 130	2	30
PEPA	10.0	13.65	*+	ng/g		137	70 - 130	1	30
Perfluoro (2-ethoxyethane) sulfonic acid	8.90	8.762		ng/g		98	70 - 130	2	30
Perfluoro-4-ethylcyclohexanesul fonic acid	9.22	8.382		ng/g		91	70 - 130	9	30
Perfluorobutanesulfonic acid	8.85	8.411		ng/g		95	54 - 130	1	30
Perfluorobutanoic acid	10.0	10.43		ng/g		104	60 - 128	3	30
Perfluorodecanesulfonic acid	9.64	7.418		ng/g		77	57 - 132	0	30
Perfluorodecanoic acid	10.0	9.594		ng/g		96	56 - 133	5	30
Perfluorododecanesulfonic acid	9.68	7.530		ng/g		78	38 - 145	7	30
Perfluorododecanoic acid	10.0	9.921		ng/g		99	60 - 135	1	30
Perfluoroheptanesulfonic acid	9.52	9.169		ng/g		96	59 - 132	4	30
Perfluoroheptanoic acid	10.0	8.460		ng/g		85	59 - 137	5	30
Perfluorohexadecanoic acid	10.0	11.32		ng/g		113	38 - 147	0	30
Perfluorohexanesulfonic acid	9.12	7.925		ng/g		87	59 - 129	2	30
Perfluorohexanoic acid	10.0	9.946		ng/g		99	59 - 132	1	30
Perfluorononanesulfonic acid	9.60	8.222		ng/g		86	60 - 132	8	30
Perfluorononanoic acid	10.0	10.35		ng/g		104	61 - 134	5	30
Perfluorooctadecanoic acid	10.0	9.282		ng/g		93	16 - 160	7	30
Perfluorooctanesulfonamide	10.0	8.166		ng/g		82	47 - 149	4	30
Perfluorooctanesulfonic acid	9.26	7.469		ng/g		81	61 - 126	5	30
Perfluorooctanoic acid	10.0	10.79		ng/g		108	59 - 131	2	30
Perfluoropentanesulfonic acid	9.38	9.020		ng/g		96	57 - 133	0	30
Perfluoropentanoic acid	10.0	9.793		ng/g		98	58 - 134	6	30
Perfluoropropanesulfonic acid	9.16	15.38	*+	ng/g		168	70 - 130	3	30
Perfluorotetradecanoic acid	10.0	10.02		ng/g		100	62 - 134	2	30

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 410-253462/4-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 253462

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Perfluorotridecanoic acid	10.0	9.078		ng/g		91	53 - 143	7	30
Perfluoroundecanoic acid	10.0	11.08		ng/g		111	60 - 134	5	30
PFECA A	10.0	8.062		ng/g		81	70 - 130	4	30
PFECA B	10.0	6.949	*-	ng/g		69	70 - 130	8	30
PFECA F	10.0	13.90	*+	ng/g		139	70 - 130	3	30
PFECA G	10.0	10.32		ng/g		103	70 - 130	7	30
PFMOAA	10.0	15.01	*+	ng/g		150	70 - 130	5	30
PFO2HxA	10.0	15.62	*+	ng/g		156	70 - 130	3	30
PFO3OA	10.0	15.05	*+	ng/g		150	70 - 130	13	30
PFO4DA	10.0	17.34	*+	ng/g		173	70 - 130	7	30
PMPA	10.0	15.34	*+	ng/g		153	70 - 130	4	30
PPF Acid	10.0	14.36	*+	ng/g		144	70 - 130	6	30
PS Acid	10.0	6.849	*-	ng/g		68	70 - 130	18	30
R-EVE	10.0	8.480	E	ng/g		85	70 - 130	7	30
R-PSDA	10.0	5.838	*-	ng/g		58	70 - 130	5	30
R-PSDCA	10.0	8.997		ng/g		90	70 - 130	1	30
TAF	10.0	16.01	*+	ng/g		160	70 - 130	2	30

Isotope Dilution	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
M2-6:2 FTS	*221*	**5+*	*10 - 200*
M2-8:2 FTS	*176*		*15 - 200*
13C2 PFTeDA	*110*		*10 - 169*
13C3 HFPO-DA	*130*		*10 - 169*
13C3 PFBS	*205*	**5+*	*27 - 179*
13C4 PFBA	*122*		*28 - 153*
13C4 PFHpA	*129*		*10 - 178*
13C5 PFPeA	*174*	**5+*	*24 - 161*
13C8 PFOA	*131*		*26 - 159*
13C8 PFOS	*153*		*41 - 154*
d5-NEtFOSAA	*135*		*10 - 193*
d7-N-MeFOSE-M	*104*		*10 - 179*
d9-N-EtFOSE-M	*105*		*10 - 185*
13C3 PFHxS	*134*		*24 - 171*
13C5 PFHxA	*122*		*10 - 174*
13C6 PFDA	*140*		*26 - 161*
13C7 PFUnA	*114*		*12 - 173*
d3-NMePFOSA	*86*		*10 - 175*
d5-NEtPFOSA	*79*		*10 - 180*
13C8 FOSA	*111*		*14 - 163*
13C2-PFDoDA	*121*		*11 - 166*
13C9 PFNA	*137*		*26 - 165*
13C2-2-Perfluorohexylethanoic acid	*95*		*50 - 150*
13C2-2-Perfluorooctylethanoic acid	*82*		*50 - 150*
13C2-2-Perfluorodecylethanoic acid	*78*		*50 - 150*
13C2-2H-Perfluoro-2-octenoic acid	*148*		*50 - 150*

Method: 537 TOP - Fluorinated Alkyl Substances (Continued)

Lab Sample ID: LCSD 410-253462/4-B
Matrix: Solid
Analysis Batch: 254465

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 253462

Isotope Dilution	LCSD %Recovery	LCSD Qualifier	Limits
13C2-2H-Perfluoro-2-decenoic acid	118		50 - 150
13C2-2H-Perfluoro-2-dodecenoic acid	151	*5+	50 - 150

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
13C2 PFHxA	115		10 - 137
13C4 PFOA	137		10 - 146
13C2 PFUnA	123		10 - 143

LCMS

Prep Batch: 240479

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-2	EB-001	Total/NA	Water	537 IDA	
410-76735-2	EB-002	Total/NA	Water	537 IDA	
410-76903-4	EB 003	Total/NA	Water	537 IDA	
MB 410-240479/1-A	Method Blank	Total/NA	Water	537 IDA	
LCS 410-240479/3-A	Lab Control Sample	Total/NA	Water	537 IDA	
LCSD 410-240479/4-A	Lab Control Sample Dup	Total/NA	Water	537 IDA	

Prep Batch: 240631

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1	Carpet-001	Pre-Treatment	Solid	TOP Pre-Prep	
410-76735-1	PP Pad-001	Pre-Treatment	Solid	TOP Pre-Prep	
410-76903-1 - DL	Safeshell #1-3	Pre-Treatment	Solid	TOP Pre-Prep	
410-76903-1	Safeshell #1-3	Pre-Treatment	Solid	TOP Pre-Prep	
MB 410-240631/1-B	Method Blank	Total/NA	Solid	TOP Pre-Prep	
LCS 410-240631/2-B	Lab Control Sample	Total/NA	Solid	TOP Pre-Prep	
LCSD 410-240631/3-B	Lab Control Sample Dup	Total/NA	Solid	TOP Pre-Prep	

Cleanup Batch: 241190

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1	Carpet-001	Pre-Treatment	Solid	Extract Aliquot	240631
410-76735-1	PP Pad-001	Pre-Treatment	Solid	Extract Aliquot	240631
410-76903-1 - DL	Safeshell #1-3	Pre-Treatment	Solid	Extract Aliquot	240631
410-76903-1	Safeshell #1-3	Pre-Treatment	Solid	Extract Aliquot	240631
MB 410-240631/1-B	Method Blank	Total/NA	Solid	Extract Aliquot	240631
LCS 410-240631/2-B	Lab Control Sample	Total/NA	Solid	Extract Aliquot	240631
LCSD 410-240631/3-B	Lab Control Sample Dup	Total/NA	Solid	Extract Aliquot	240631

Analysis Batch: 241603

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1	Carpet-001	Pre-Treatment	Solid	537 IDA	241190
410-76735-1	PP Pad-001	Pre-Treatment	Solid	537 IDA	241190
410-76903-1	Safeshell #1-3	Pre-Treatment	Solid	537 IDA	241190
410-76903-1 - DL	Safeshell #1-3	Pre-Treatment	Solid	537 IDA	241190
MB 410-240631/1-B	Method Blank	Total/NA	Solid	537 IDA	241190
LCS 410-240631/2-B	Lab Control Sample	Total/NA	Solid	537 IDA	241190
LCSD 410-240631/3-B	Lab Control Sample Dup	Total/NA	Solid	537 IDA	241190

Analysis Batch: 250678

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-2	EB-001	Total/NA	Water	537 IDA	240479
410-76735-2	EB-002	Total/NA	Water	537 IDA	240479
MB 410-240479/1-A	Method Blank	Total/NA	Water	537 IDA	240479

Analysis Batch: 251038

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 410-240479/3-A	Lab Control Sample	Total/NA	Water	537 IDA	240479
LCSD 410-240479/4-A	Lab Control Sample Dup	Total/NA	Water	537 IDA	240479

Analysis Batch: 251322

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-76903-4	EB 003	Total/NA	Water	537 IDA	240479

LCMS

Prep Batch: 253462

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1	Carpet-001	Post-Treatment	Solid	TOP Post-Prep	
410-75808-1 - RA	Carpet-001	Post-Treatment	Solid	TOP Post-Prep	
410-76735-1	PP Pad-001	Post-Treatment	Solid	TOP Post-Prep	
410-76903-1 - RA	Safeshell #1-3	Post-Treatment	Solid	TOP Post-Prep	
410-76903-1	Safeshell #1-3	Post-Treatment	Solid	TOP Post-Prep	
MB 410-253462/1-B	Method Blank	Total/NA	Solid	TOP Post-Prep	
MB 410-253462/2-B	Method Blank	Total/NA	Solid	TOP Post-Prep	
LCS 410-253462/3-B	Lab Control Sample	Total/NA	Solid	TOP Post-Prep	
LCSD 410-253462/4-B	Lab Control Sample Dup	Total/NA	Solid	TOP Post-Prep	

Cleanup Batch: 254035

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1 - RA	Carpet-001	Post-Treatment	Solid	Extract Aliquot	253462
410-75808-1	Carpet-001	Post-Treatment	Solid	Extract Aliquot	253462
410-76735-1	PP Pad-001	Post-Treatment	Solid	Extract Aliquot	253462
410-76903-1	Safeshell #1-3	Post-Treatment	Solid	Extract Aliquot	253462
410-76903-1 - RA	Safeshell #1-3	Post-Treatment	Solid	Extract Aliquot	253462
MB 410-253462/1-B	Method Blank	Total/NA	Solid	Extract Aliquot	253462
MB 410-253462/2-B	Method Blank	Total/NA	Solid	Extract Aliquot	253462
LCS 410-253462/3-B	Lab Control Sample	Total/NA	Solid	Extract Aliquot	253462
LCSD 410-253462/4-B	Lab Control Sample Dup	Total/NA	Solid	Extract Aliquot	253462

Analysis Batch: 254465

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1	Carpet-001	Post-Treatment	Solid	537 TOP	254035
410-75808-1 - RA	Carpet-001	Post-Treatment	Solid	537 TOP	254035
410-76735-1	PP Pad-001	Post-Treatment	Solid	537 TOP	254035
410-76903-1	Safeshell #1-3	Post-Treatment	Solid	537 TOP	254035
410-76903-1 - RA	Safeshell #1-3	Post-Treatment	Solid	537 TOP	254035
MB 410-253462/1-B	Method Blank	Total/NA	Solid	537 TOP	254035
MB 410-253462/2-B	Method Blank	Total/NA	Solid	537 TOP	254035
LCS 410-253462/3-B	Lab Control Sample	Total/NA	Solid	537 TOP	254035
LCSD 410-253462/4-B	Lab Control Sample Dup	Total/NA	Solid	537 TOP	254035

Analysis Batch: 255026

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1	Carpet-001	Post-Treatment	Solid	Total PFCA-Sum	
410-75808-1	Carpet-001	Pre-Treatment	Solid	Total PFCA-Sum	
410-76735-1	PP Pad-001	Post-Treatment	Solid	Total PFCA-Sum	
410-76735-1	PP Pad-001	Pre-Treatment	Solid	Total PFCA-Sum	
410-76903-1	Safeshell #1-3	Post-Treatment	Solid	Total PFCA-Sum	
410-76903-1	Safeshell #1-3	Pre-Treatment	Solid	Total PFCA-Sum	

Analysis Batch: 255030

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-75808-1	Carpet-001	Total/NA	Solid	Total PFCA-Dif	
410-76735-1	PP Pad-001	Total/NA	Solid	Total PFCA-Dif	
410-76903-1	Safeshell #1-3	Total/NA	Solid	Total PFCA-Dif	

Lab Chronicle

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Client Sample ID: Carpet-001

Lab Sample ID: 410-75808-1
Date Collected: 03/08/22 17:12
Matrix: Solid
Date Received: 03/11/22 10:17

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Pre-Treatment	Prep	TOP Pre-Prep			240631	04/04/22 11:19	S7AC	ELLE
Pre-Treatment	Cleanup	Extract Aliquot			241190	04/05/22 12:39	S7AC	ELLE
Pre-Treatment	Analysis	537 IDA		1	241603	04/06/22 12:18	UUV6	ELLE
Post-Treatment	Prep	TOP Post-Prep			253462	05/10/22 10:06	S7AC	ELLE
Post-Treatment	Cleanup	Extract Aliquot			254035	05/11/22 11:49	S7AC	ELLE
Post-Treatment	Analysis	537 TOP		1	254465	05/12/22 12:51	MT26	ELLE
Post-Treatment	Prep	TOP Post-Prep	RA		253462	05/10/22 10:06	S7AC	ELLE
Post-Treatment	Cleanup	Extract Aliquot	RA		254035	05/11/22 11:49	S7AC	ELLE
Post-Treatment	Analysis	537 TOP	RA	1	254465	05/12/22 13:02	MT26	ELLE
Total/NA	Analysis	Total PFCA-Dif		1	255030	05/13/22 13:16	MT26	ELLE
Post-Treatment	Analysis	Total PFCA-Sum		1	255026	05/13/22 13:14	MT26	ELLE
Pre-Treatment	Analysis	Total PFCA-Sum		1	255026	05/13/22 13:14	MT26	ELLE

Client Sample ID: EB-001

Lab Sample ID: 410-75808-2
Date Collected: 03/21/22 13:53
Matrix: Water
Date Received: 03/21/22 14:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 IDA			240479	04/04/22 06:59	RC3V	ELLE
Total/NA	Analysis	537 IDA		1	250678	05/03/22 01:18	MT26	ELLE

Client Sample ID: PP Pad-001

Lab Sample ID: 410-76735-1
Date Collected: 03/16/22 13:30
Matrix: Solid
Date Received: 03/18/22 08:41

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Pre-Treatment	Prep	TOP Pre-Prep			240631	04/04/22 11:19	S7AC	ELLE
Pre-Treatment	Cleanup	Extract Aliquot			241190	04/05/22 12:39	S7AC	ELLE
Pre-Treatment	Analysis	537 IDA		1	241603	04/06/22 12:29	UUV6	ELLE
Post-Treatment	Prep	TOP Post-Prep			253462	05/10/22 10:06	S7AC	ELLE
Post-Treatment	Cleanup	Extract Aliquot			254035	05/11/22 11:49	S7AC	ELLE
Post-Treatment	Analysis	537 TOP		1	254465	05/12/22 13:13	MT26	ELLE
Total/NA	Analysis	Total PFCA-Dif		1	255030	05/13/22 13:16	MT26	ELLE
Post-Treatment	Analysis	Total PFCA-Sum		1	255026	05/13/22 13:14	MT26	ELLE
Pre-Treatment	Analysis	Total PFCA-Sum		1	255026	05/13/22 13:14	MT26	ELLE

Client Sample ID: EB-002

Lab Sample ID: 410-76735-2
Date Collected: 03/21/22 13:53
Matrix: Water
Date Received: 03/21/22 14:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 IDA			240479	04/04/22 06:59	RC3V	ELLE
Total/NA	Analysis	537 IDA		1	250678	05/03/22 01:29	MT26	ELLE

Client Sample ID: Safeshell #1-3
Date Collected: 03/09/22 15:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Pre-Treatment	Prep	TOP Pre-Prep			240631	04/04/22 11:19	S7AC	ELLE
Pre-Treatment	Cleanup	Extract Aliquot			241190	04/05/22 12:39	S7AC	ELLE
Pre-Treatment	Analysis	537 IDA		1	241603	04/06/22 20:59	UUV6	ELLE
Pre-Treatment	Prep	TOP Pre-Prep	DL		240631	04/04/22 11:19	S7AC	ELLE
Pre-Treatment	Cleanup	Extract Aliquot	DL		241190	04/05/22 12:39	S7AC	ELLE
Pre-Treatment	Analysis	537 IDA	DL	10	241603	04/06/22 21:10	UUV6	ELLE
Post-Treatment	Prep	TOP Post-Prep			253462	05/10/22 10:06	S7AC	ELLE
Post-Treatment	Cleanup	Extract Aliquot			254035	05/11/22 11:49	S7AC	ELLE
Post-Treatment	Analysis	537 TOP		1	254465	05/12/22 13:24	MT26	ELLE
Post-Treatment	Prep	TOP Post-Prep	RA		253462	05/10/22 10:06	S7AC	ELLE
Post-Treatment	Cleanup	Extract Aliquot	RA		254035	05/11/22 11:49	S7AC	ELLE
Post-Treatment	Analysis	537 TOP	RA	1	254465	05/12/22 13:35	MT26	ELLE
Total/NA	Analysis	Total PFCA-Dif		1	255030	05/13/22 13:16	MT26	ELLE
Post-Treatment	Analysis	Total PFCA-Sum		1	255026	05/13/22 13:14	MT26	ELLE
Pre-Treatment	Analysis	Total PFCA-Sum		1	255026	05/13/22 13:14	MT26	ELLE

Client Sample ID: EB 003
Date Collected: 03/22/22 00:00
Date Received: 03/21/22 12:09

Lab Sample ID: 410-76903-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	537 IDA			240479	04/04/22 06:59	RC3V	ELLE
Total/NA	Analysis	537 IDA		1	251322	05/05/22 08:05	UCD3	ELLE

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Non-targeted analysis (NTA) of turf samples by qToF

Analytical procedure for PFAS analysis

UPLC Methods

PFAS were analyzed in negative ionization mode using a UPLC-QToF-HRMS (AB Sciex X500R QTOF system) equipped with a Phenomenex Gemini C18 column (3 mm x 50 mm, 3 µm) in TOF MSMS and information dependent acquisition (IDA) mode. A gradient solvent program was operated with 20 mM sodium acetate in MilliQ water (solution A) and 20mM sodium acetate in LC-MS grade methanol having 0.5% water (solution B). The details of the gradient method are provided in Table S2. Signals were acquired between the 0.1 and 11.5 minutes with total run time of 12 minutes.

Table 1. Gradient solvent program for the UPLC

Time (min)	Flowrate (mL/min)	%A	%B
0.0	0.5	95	5
0.5	0.5	95	5
1.5	0.5	40	60
3.0	0.5	5	95
9.0	0.5	5	95
9.2	0.5	95	5
12.0	0.5	95	5

Mass spectroscopy method

Three samples were run in negative and positive mode collision energy in IDA mode. Sample's analytes were fragmented at 25V (±10V) in both TOF MS and TOF MSMS. Source and gas parameters were kept constant, where ion source gas 1 and 2 kept at 30 psi, curtain gas 25 psi, CAD gas 7 psi, temperature 300°C, spray voltage and delustering potential (DP) were -4100 V and

-80V (DP spread 20 V). For other IDA criteria, maximum candidate ions 10, intensity threshold exceeds 200 cps and dynamic background subtraction were used. Mass range was set at 100 to 1000 Da with accumulation time 0.08s and 0.25s in MS and MSMS, respectively.

Non-targeted analysis (NTA)

Data were processed with SCIEX LibraryView deconvolution software. This software extracts the raw chromatograms across a defined mass range from 0-5000AMU and examines peaks of interest utilizing exact mass and MS/MS fragmentation. The peaks are compared to the 5070 unique PFAS compounds from Fluoros 2.5, in house ClPFPECA (Chlorofluoro ether carboxylic acids), Fluorochemical_HR_MS and Labeled PFAS library where the software algorithm assigns possible matches to each peak, or feature. The features were then evaluated to confirm ample signal-to-noise as well as confirming the compound fit to the library match. The precursor mass tolerance ±0.2 Da and fragment mass tolerance ±0.1 Da was used. The reported results include only peaks with a signal-to-noise greater than 10:1 and that have a library confidence of less than 5ppm error. These are the recommended settings provided by the manufacturer. One thing the software cannot account for are isomers. For the molecular formula determination C_{0-20}, H_{0-5}, F_{0-60}, N_{0-1}, O_{0-16} and S_{0-2} was used. Post data generation, a filtering algorithm was used to reduce the m/z signals of the blank (methanol) from each sample with a filter of mass error of 5 ppm and RT window of 1 min.

Results

Results are presented in separate file for each sample and labeled as 240_156265_A-1-A_Pos, 240_156265_A-1-A_Neg and 240_156265_A-1-A_Neg_lowCE for data acquired in positive, negative and negative ionization of low CE, respectively.

Compiled data for all the samples are reported in excel files “NTA_data” and “NTA_data_5ppm” for all the screened ions and unique ions with 5 ppm mass error, respectively.

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Massachusetts	State	M-PA009	06-30-22

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
537 IDA	537 IDA	Water	10:2 FTCA
537 IDA	537 IDA	Water	10:2 FTS
537 IDA	537 IDA	Water	10:2 FTUCA
537 IDA	537 IDA	Water	11Cl-PF3OUdS
537 IDA	537 IDA	Water	3:3 FTCA
537 IDA	537 IDA	Water	4:2 Fluorotelomer sulfonic acid
537 IDA	537 IDA	Water	5:3 FTCA
537 IDA	537 IDA	Water	6:2 Fluorotelomer sulfonic acid
537 IDA	537 IDA	Water	6:2 FTCA
537 IDA	537 IDA	Water	6:2 FTUCA
537 IDA	537 IDA	Water	7:3 FTCA
537 IDA	537 IDA	Water	8:2 Fluorotelomer sulfonic acid
537 IDA	537 IDA	Water	8:2 FTCA
537 IDA	537 IDA	Water	8:2 FTUCA
537 IDA	537 IDA	Water	9Cl-PF3ONS
537 IDA	537 IDA	Water	DONA
537 IDA	537 IDA	Water	EVE Acid
537 IDA	537 IDA	Water	HFPODA
537 IDA	537 IDA	Water	Hydro-EVE Acid
537 IDA	537 IDA	Water	Hydrolyzed PSDA
537 IDA	537 IDA	Water	Hydro-PS Acid
537 IDA	537 IDA	Water	MTP
537 IDA	537 IDA	Water	NEtFOSA
537 IDA	537 IDA	Water	NEtFOSAA
537 IDA	537 IDA	Water	NEtFOSE
537 IDA	537 IDA	Water	NMeFOSA
537 IDA	537 IDA	Water	NMeFOSAA
537 IDA	537 IDA	Water	NMeFOSE
537 IDA	537 IDA	Water	NVHOS
537 IDA	537 IDA	Water	PEPA
537 IDA	537 IDA	Water	Perfluoro (2-ethoxyethane) sulfonic acid
537 IDA	537 IDA	Water	Perfluoro-4-ethylcyclohexanesulfonic acid
537 IDA	537 IDA	Water	Perfluorobutanesulfonic acid
537 IDA	537 IDA	Water	Perfluorobutanoic acid
537 IDA	537 IDA	Water	Perfluorodecanesulfonic acid
537 IDA	537 IDA	Water	Perfluorodecanoic acid
537 IDA	537 IDA	Water	Perfluorododecanesulfonic acid
537 IDA	537 IDA	Water	Perfluorododecanoic acid
537 IDA	537 IDA	Water	Perfluoroheptanesulfonic acid
537 IDA	537 IDA	Water	Perfluoroheptanoic acid
537 IDA	537 IDA	Water	Perfluorohexadecanoic acid
537 IDA	537 IDA	Water	Perfluorohexanesulfonic acid
537 IDA	537 IDA	Water	Perfluorohexanoic acid
537 IDA	537 IDA	Water	Perfluorononanesulfonic acid
537 IDA	537 IDA	Water	Perfluorononanoic acid

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
537 IDA	537 IDA	Water	Perfluorooctadecanoic acid
537 IDA	537 IDA	Water	Perfluorooctanesulfonamide
537 IDA	537 IDA	Water	Perfluorooctanesulfonic acid
537 IDA	537 IDA	Water	Perfluorooctanoic acid
537 IDA	537 IDA	Water	Perfluoropentanesulfonic acid
537 IDA	537 IDA	Water	Perfluoropentanoic acid
537 IDA	537 IDA	Water	Perfluoropropanesulfonic acid
537 IDA	537 IDA	Water	Perfluorotetradecanoic acid
537 IDA	537 IDA	Water	Perfluorotridecanoic acid
537 IDA	537 IDA	Water	Perfluoroundecanoic acid
537 IDA	537 IDA	Water	PFECA A
537 IDA	537 IDA	Water	PFECA B
537 IDA	537 IDA	Water	PFECA F
537 IDA	537 IDA	Water	PFECA G
537 IDA	537 IDA	Water	PFMOAA
537 IDA	537 IDA	Water	PFO2HxA
537 IDA	537 IDA	Water	PFO3OA
537 IDA	537 IDA	Water	PFO4DA
537 IDA	537 IDA	Water	PMPA
537 IDA	537 IDA	Water	PPF Acid
537 IDA	537 IDA	Water	PS Acid
537 IDA	537 IDA	Water	R-EVE
537 IDA	537 IDA	Water	R-PSDA
537 IDA	537 IDA	Water	R-PSDCA
537 IDA	537 IDA	Water	TAF
537 IDA	TOP Pre-Prep	Solid	10:2 FTCA
537 IDA	TOP Pre-Prep	Solid	10:2 FTS
537 IDA	TOP Pre-Prep	Solid	10:2 FTUCA
537 IDA	TOP Pre-Prep	Solid	11Cl-PF3OUdS
537 IDA	TOP Pre-Prep	Solid	3:3 FTCA
537 IDA	TOP Pre-Prep	Solid	4:2 Fluorotelomer sulfonic acid
537 IDA	TOP Pre-Prep	Solid	5:3 FTCA
537 IDA	TOP Pre-Prep	Solid	6:2 Fluorotelomer sulfonic acid
537 IDA	TOP Pre-Prep	Solid	6:2 FTCA
537 IDA	TOP Pre-Prep	Solid	6:2 FTUCA
537 IDA	TOP Pre-Prep	Solid	7:3 FTCA
537 IDA	TOP Pre-Prep	Solid	8:2 Fluorotelomer sulfonic acid
537 IDA	TOP Pre-Prep	Solid	8:2 FTCA
537 IDA	TOP Pre-Prep	Solid	8:2 FTUCA
537 IDA	TOP Pre-Prep	Solid	9Cl-PF3ONS
537 IDA	TOP Pre-Prep	Solid	DONA
537 IDA	TOP Pre-Prep	Solid	EVE Acid
537 IDA	TOP Pre-Prep	Solid	HFPODA
537 IDA	TOP Pre-Prep	Solid	Hydro-EVE Acid
537 IDA	TOP Pre-Prep	Solid	Hydrolyzed PSDA
537 IDA	TOP Pre-Prep	Solid	Hydro-PS Acid
537 IDA	TOP Pre-Prep	Solid	MTP

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
537 IDA	TOP Pre-Prep	Solid	NEtFOSA
537 IDA	TOP Pre-Prep	Solid	NEtFOSAA
537 IDA	TOP Pre-Prep	Solid	NEtFOSE
537 IDA	TOP Pre-Prep	Solid	NMeFOSA
537 IDA	TOP Pre-Prep	Solid	NMeFOSAA
537 IDA	TOP Pre-Prep	Solid	NMeFOSE
537 IDA	TOP Pre-Prep	Solid	NVHOS
537 IDA	TOP Pre-Prep	Solid	PEPA
537 IDA	TOP Pre-Prep	Solid	Perfluoro (2-ethoxyethane) sulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluoro-4-ethylcyclohexanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorobutanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorobutanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorodecanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorodecanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorododecanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorododecanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluoroheptanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluoroheptanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorohexadecanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorohexanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorohexanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorononanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorononanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorooctadecanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorooctanesulfonamide
537 IDA	TOP Pre-Prep	Solid	Perfluorooctanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorooctanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluoropentanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluoropentanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluoropropanesulfonic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorotetradecanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluorotridecanoic acid
537 IDA	TOP Pre-Prep	Solid	Perfluoroundecanoic acid
537 IDA	TOP Pre-Prep	Solid	PFECA A
537 IDA	TOP Pre-Prep	Solid	PFECA B
537 IDA	TOP Pre-Prep	Solid	PFECA F
537 IDA	TOP Pre-Prep	Solid	PFECA G
537 IDA	TOP Pre-Prep	Solid	PFMOAA
537 IDA	TOP Pre-Prep	Solid	PFO2HxA
537 IDA	TOP Pre-Prep	Solid	PFO3OA
537 IDA	TOP Pre-Prep	Solid	PFO4DA
537 IDA	TOP Pre-Prep	Solid	PMPA
537 IDA	TOP Pre-Prep	Solid	PPF Acid
537 IDA	TOP Pre-Prep	Solid	PS Acid
537 IDA	TOP Pre-Prep	Solid	R-EVE
537 IDA	TOP Pre-Prep	Solid	R-PSDA
537 IDA	TOP Pre-Prep	Solid	R-PSDCA

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
537 IDA	TOP Pre-Prep	Solid	TAF
537 TOP	TOP Post-Prep	Solid	10:2 FTCA
537 TOP	TOP Post-Prep	Solid	10:2 FTS
537 TOP	TOP Post-Prep	Solid	10:2 FTUCA
537 TOP	TOP Post-Prep	Solid	11Cl-PF3OUdS
537 TOP	TOP Post-Prep	Solid	3:3 FTCA
537 TOP	TOP Post-Prep	Solid	4:2 Fluorotelomer sulfonic acid
537 TOP	TOP Post-Prep	Solid	5:3 FTCA
537 TOP	TOP Post-Prep	Solid	6:2 Fluorotelomer sulfonic acid
537 TOP	TOP Post-Prep	Solid	6:2 FTCA
537 TOP	TOP Post-Prep	Solid	6:2 FTUCA
537 TOP	TOP Post-Prep	Solid	7:3 FTCA
537 TOP	TOP Post-Prep	Solid	8:2 Fluorotelomer sulfonic acid
537 TOP	TOP Post-Prep	Solid	8:2 FTCA
537 TOP	TOP Post-Prep	Solid	8:2 FTUCA
537 TOP	TOP Post-Prep	Solid	9Cl-PF3ONS
537 TOP	TOP Post-Prep	Solid	DONA
537 TOP	TOP Post-Prep	Solid	EVE Acid
537 TOP	TOP Post-Prep	Solid	HFPODA
537 TOP	TOP Post-Prep	Solid	Hydro-EVE Acid
537 TOP	TOP Post-Prep	Solid	Hydrolyzed PSDA
537 TOP	TOP Post-Prep	Solid	Hydro-PS Acid
537 TOP	TOP Post-Prep	Solid	MTP
537 TOP	TOP Post-Prep	Solid	NEtFOSA
537 TOP	TOP Post-Prep	Solid	NEtFOSAA
537 TOP	TOP Post-Prep	Solid	NEtFOSE
537 TOP	TOP Post-Prep	Solid	NMeFOSA
537 TOP	TOP Post-Prep	Solid	NMeFOSAA
537 TOP	TOP Post-Prep	Solid	NMeFOSE
537 TOP	TOP Post-Prep	Solid	NVHOS
537 TOP	TOP Post-Prep	Solid	PEPA
537 TOP	TOP Post-Prep	Solid	Perfluoro (2-ethoxyethane) sulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluoro-4-ethylcyclohexanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorobutanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorobutanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluorodecanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorodecanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluorododecanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorododecanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluoroheptanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluoroheptanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluorohexadecanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluorohexanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorohexanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluorononanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorononanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluorooctadecanoic acid

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC (Continued)

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
537 TOP	TOP Post-Prep	Solid	Perfluorooctanesulfonamide
537 TOP	TOP Post-Prep	Solid	Perfluorooctanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorooctanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluoropentanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluoropentanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluoropropanesulfonic acid
537 TOP	TOP Post-Prep	Solid	Perfluorotetradecanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluorotridecanoic acid
537 TOP	TOP Post-Prep	Solid	Perfluoroundecanoic acid
537 TOP	TOP Post-Prep	Solid	PFECA A
537 TOP	TOP Post-Prep	Solid	PFECA B
537 TOP	TOP Post-Prep	Solid	PFECA F
537 TOP	TOP Post-Prep	Solid	PFECA G
537 TOP	TOP Post-Prep	Solid	PFMOAA
537 TOP	TOP Post-Prep	Solid	PFO2HxA
537 TOP	TOP Post-Prep	Solid	PFO3OA
537 TOP	TOP Post-Prep	Solid	PFO4DA
537 TOP	TOP Post-Prep	Solid	PMPA
537 TOP	TOP Post-Prep	Solid	PPF Acid
537 TOP	TOP Post-Prep	Solid	PS Acid
537 TOP	TOP Post-Prep	Solid	R-EVE
537 TOP	TOP Post-Prep	Solid	R-PSDA
537 TOP	TOP Post-Prep	Solid	R-PSDCA
537 TOP	TOP Post-Prep	Solid	TAF
Total PFCA-Dif		Solid	PFBA
Total PFCA-Dif		Solid	PFHpA
Total PFCA-Dif		Solid	PFHxA
Total PFCA-Dif		Solid	PFNA
Total PFCA-Dif		Solid	PFOA
Total PFCA-Dif		Solid	PFPA
Total PFCA-Dif		Solid	Total PFCA
Total PFCA-Sum		Solid	Total PFCA

Method Summary

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Method	Method Description	Protocol	Laboratory
537 IDA	EPA 537 Isotope Dilution	EPA	ELLE
537 TOP	Fluorinated Alkyl Substances	EPA	ELLE
Total PFCA-Dif	Total PFCA (Treatment Difference)	TAL SOP	ELLE
Total PFCA-Sum	Total PFCA (Summary)	TAL SOP	ELLE
537 IDA	EPA 537 Isotope Dilution	EPA	ELLE
Extract Aliquot	Preparation, Extract Aliquot	None	ELLE
TOP Post-Prep	Shake Extraction with Ultrasonic Bath Extraction	SW846	ELLE
TOP Pre-Prep	Shake Extraction with Ultrasonic Bath Extraction	SW846	ELLE

Protocol References:

EPA = US Environmental Protection Agency

None = None

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL SOP = TestAmerica Laboratories, Standard Operating Procedure

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Sample Summary

Client: TRC Companies, Inc
Project/Site: Synthetic Turf

Job ID: 410-75808-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
410-75808-1	Carpet-001	Solid	03/08/22 17:12	03/11/22 10:17
410-75808-2	EB-001	Water	03/21/22 13:53	03/21/22 14:00
410-76735-1	PP Pad-001	Solid	03/16/22 13:30	03/18/22 08:41
410-76735-2	EB-002	Water	03/21/22 13:53	03/21/22 14:00
410-76903-1	Safeshell #1-3	Solid	03/09/22 15:00	03/21/22 12:09
410-76903-4	EB 003	Water	03/22/22 00:00	03/21/22 12:09

410-75808 Chain of Custody

LC

Chain of Custody Record

eurofins | Environment Testing America

	Sampler: Iris Lopez	Lab PM: Marrissa Williams	Carrier Tracking No(s): 5615-2349-5387 FedEx	COC No:
Client Contact: Elizabeth Denly	Phone: 706-383-5844	E-Mail: Rex.Young@fieldturf.com	State of Origin: Georgia	Page: 1
Company: TRC	PWSID: NA	Analysis Requested		Job #:

Address:650 Suffolk Street	Due Date Requested: see below
City:Lowell	TAT Requested (days): 70 PFAS & TOP Assay: 15 business days; Non-target analysis: 25 business days
State, Zip: MA, 01854	Compliance Project: Δ Yes Δ No
Phone: 978-656-3577	PO #: 178559
Email: edenly@trccompanies.com	WO #: NA
Project Name: Synthetic Turf	Project #: 474501
Site: NA	SSOW#: NA

Preservation Codes:

A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD	PFAS Target List of 70 PFAS: See quote 41009406 - 1 & SAP	TOP Assay PFAS: See quote 41009406 - 1 & SAP	Non-target PFAS: See quote 41009406 - 1 & SAP	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
Carpet-001	3/8/22	5:12 pm	G	S			X	X	X		See SAP for homogenization requirements

Possible Hazard Identification
■ *Non-Hazard* □ *Flammable* □ *Skin Irritant* □ *Poison B* □ *Unknown* □ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
□ *Return To Client* ■ *Disposal By Lab* □ *Archive For* ________ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) **Level IV and EQuIS EDD**

Special Instructions/QC Requirements: **See SAP for lab-generated equipment blank requirements**

Empty Kit Relinquished by: NA	Date: NA	Time: NA	FedEx Express

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Rex Young	3/9/22	Field Turf			
			[signature]	3/11/22 10:17	ELE

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: 15.5

TAR

Ver: 01/16/2019

410-76735 Chain of Custody

Chain of Custody Record

eurofins Environment Testing America

Client Information	Sampler: Phil Jauregui -- Schmitz Foam Products	Lab PM: Marrissa Williams	Carrier Tracking No(s): 1ZR63A500344491382	COC No:
Client Contact: Elizabeth Denly	Phone: (517) 781-6620	E-Mail: p.jauregui@schmitzfoam.com	State of Origin: Michigan	Page: 1
Company: TRC	PWSID: NA	Analysis Requested		Job #:
Address: 650 Suffolk Street	Due Date Requested: see below			
City: Lowell	TAT Requested (days): 70 PFAS & TOP Assay: 15 business days; Non-target analysis: 25 business days			
State, Zip: MA, 01854	Compliance Project: Δ Yes Δ No			
Phone: 978-656-3577	PO #: 178559			
Email: edenly@trccompanies.com	WO #: NA			
Project Name: Synthetic Turf	Project #: 474501			
Site: NA	SSOW#: NA			

Preservation Codes:

A - HCL; B - NaOH; C - Zn Acetate; D - Nitric Acid; E - NaHSO4; F - MeOH; G - Amchlor; H - Ascorbic Acid; I - Ice; J - DI Water; K - EDTA; L - EDA

M - Hexane; N - None; O - AsNaO2; P - Na2O4S; Q - Na2SO3; R - Na2S2O3; S - H2SO4; T - TSP Dodecahydrate; U - Acetone; V - MCAA; W - pH 4-5; Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFAS Target List of 70 PFAS: See quote 41009406 - 1 & SAP	TOP Assay PFAS: See quote 41009406 - 1 & SAP	Non-target PFAS: See quote 41009406 - 1 & SAP	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
PP Pad-001	3/16/22	1:30 PM	G	S			X	X	X		See SAP for homogenization requirements

Possible Hazard Identification
■ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ■ Disposal By Lab ☐ Archive For ______ Months

Deliverable Requested: I, II, III, IV, Other (specify) **Level IV and EQuIS EDD**

Special Instructions/QC Requirements: **See SAP for lab-generated equipment blank requirements**

Empty Kit Relinquished by: NA	Date: NA	Time: NA	Method of Shipment: UPS Ground

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Phil Jauregui	3/16/2022, 1:30 PM	Schmitz Foam Products			
			[illegible signature]	3/18/22 8:11	[illegible]

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 16.1

Ver: 01/16/2019

5/13/2022

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410-76903 Chain of Custody

Chain of Custody Record

eurofins Environment Testing America

Clie	Sampler: Adam Coleman	Lab PM: Marrissa Williams	Carrier Tracking No(s):	COC No:
Client Contact: Elizabeth Denly	Phone: 513.313.1584	E-Mail: acoleman@usgreentech.com	State of Origin: Arkansas	Page: 1
Company: TRC	PWSID: NA	Analysis Requested		Job #:

Address: 650 Suffolk Street	Due Date Requested: see below
City: Lowell	TAT Requested (days): 70 PFAS & TOP Assay: 15 business days; Non-target analysis: 25 business days
State, Zip: MA, 01854	Compliance Project: Δ Yes Δ No
Phone: 978-656-3577	PO #: 178559
Email: edenly@trccompanies.com	WO #: NA
Project Name: Synthetic Turf	Project #: 474501
Site: NA	SSOW#: NA

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	PFAS Target List of 70 PFAS: See quote 41009406 - 1 & SAP	TOP Assay PFAS: See quote 41009406 - 1 & SAP	Non-target PFAS: See quote 41009406 - 1 & SAP	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
Safeshell #1	3/9/22	15:00 EST	G	S			X	X	X		See SAP for homogenization requirements
Safeshell #2	3/9/22	15:00 EST	G	S			X	X	X		See SAP for homogenization requirements
Safeshell #3	3/9/22	15:00 EST	G	S			X	X	X		See SAP for homogenization requirements

Possible Hazard Identification
■ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ■ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) **Level IV and EQuIS EDD**

Special Instructions/QC Requirements: **See SAP for lab-generated equipment blank requirements**

Empty Kit Relinquished by: NA	Date: NA	Time: NA	Method of Shipment: Fedex

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Adam Coleman — Adam Coleman	3/15/2022	USGreentech			
				3/21/22 12:09	Ellet

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 17.2

DAB

Ver: 01/16/2019

5/13/2022

Login Sample Receipt Checklist

Client: TRC Companies, Inc

Job Number: 410-75808-1

Login Number: 75808

List Source: Eurofins Lancaster Laboratories Environment Testing, LLC

List Number: 1

Creator: Bryan, Debra A

Question	Answer	Comment
The cooler's custody seal is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	No ice present, no attempt to chill
Cooler Temperature is acceptable (</=6C, not frozen).	False	Thermal preservation not required.
Cooler Temperature is recorded.	True	
WV: Container Temperature is acceptable (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Sample containers have legible labels.	False	Refer to Job Narrative for details.
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Is the Field Sampler's name present on COC?	True	
Sample custody seals are intact.	N/A	

Login Sample Receipt Checklist

Client: TRC Companies, Inc

Job Number: 410-75808-1

Login Number: 76735

List Source: Eurofins Lancaster Laboratories Environment Testing, LLC

List Number: 1

Creator: McCaskey, Jonathan

Question	Answer	Comment
The cooler's custody seal is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	No ice present, no attempt to chill
Cooler Temperature is acceptable (</=6C, not frozen).	False	Thermal preservation not required.
Cooler Temperature is recorded.	True	
WV: Container Temperature is acceptable (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Is the Field Sampler's name present on COC?	True	
Sample custody seals are intact.	N/A	

Login Sample Receipt Checklist

Client: TRC Companies, Inc

Job Number: 410-75808-1

Login Number: 76903

List Source: Eurofins Lancaster Laboratories Environment Testing, LLC

List Number: 1

Creator: Bryan, Debra A

Question	Answer	Comment
The cooler's custody seal is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	No ice present, no attempt to chill
Cooler Temperature is acceptable (</=6C, not frozen).	False	Refer to Job Narrative for details.
Cooler Temperature is recorded.	True	
WV: Container Temperature is acceptable (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Is the Field Sampler's name present on COC?	True	
Sample custody seals are intact.	N/A	

Eurofins Environment Testing America

NON-TARGETED ANALYSIS (NTA) SUMMARY REPORT

Eurofins Environmental Testing America
Eurofins Lancaster Laboratories Environmental LLC
2425 New Holland Pike
Lancaster, PA, 17601, USA
Tel: (717) 556 7231

Laboratory Job ID: 410-75808-1, 410-76735-1, 76903-1

Client: TRC

Project: Synthetic Turf

For: Elizabeth Denly

Authorized for release by: Charles Neslund,

Scientific Officer and PFAS Practice Leader

Table of Contents

This report summarizes the results of the NTA (Non-Target Analysis) performed on the three samples submitted to Eurofins Lancaster Laboratories Environment Testing. The three samples are detailed below;

ELLET Job #	Client Description
Job# 410-75808-1	Carpet-001
Job# 410-76735-1	PP Pad-001
Job# 410-76903-1	Safeshell #1-3

The analysis was performed using UPLC-QToF-MS (ultra performance liquid chromatography quadrapole time-of-flight-mass spectroscopy). The results summarized in the attached tables represent qualitative estimations of presumptive positives. As such, Eurofins Lancaster Laboratories Environment Testing did not have available purified analytical standards to confirm results for each presumptive positive.

Sample Preparation

The samples did not present any issues during preparation. The extract generated from the extraction and analysis of each sample for a targeted list of PFAS, by LC/MS/MS, was used for NTA analysis and analyzed without dilution.

Analytical methods

UPLC Methods

PFAS were analyzed in negative ionization mode using a UPLC-QToF-HRMS (AB Sciex X500R QTOF system) equipped with a Phenomenex Gemini C18 column (3 mm x 50 mm, 3 µm) in TOF MSMS and information dependent acquisition (IDA) mode. A gradient solvent program was operated with 20 mM sodium acetate in MilliQ water (solution A) and 20mM sodium acetate in LC-MS grade methanol having 0.5% water (solution B). The details of the gradient method are provided in Table 1. Signals were acquired between the 0.1 and 11.5 minutes with total run time of 12 minutes.

Table 1. Gradient solvent program for the UPLC

Time (min)	Flowrate (mL/min)	%A	%B
0.0	0.5	95	5
0.5	0.5	95	5
1.5	0.5	40	60
3.0	0.5	5	95
9.0	0.5	5	95
9.2	0.5	95	5
12.0	0.5	95	5

Mass spectroscopy method

Three samples were acquired with negative and positive mode collision energy in IDA mode. Each sample's analytes were fragmented at 25V (±10V) in both TOF MS and TOF MSMS. Source and gas parameters were kept constant, where ion source gas 1 and 2 kept at 30 psi, curtain gas 25 psi, CAD gas 7 psi, temperature 300°C, spray voltage and delustering potential (DP) were -4100 V and -80V (DP spread 20 V). For other IDA criteria, maximum candidate ions 10, intensity threshold exceeds 200 cps and dynamic background subtraction were used. Mass range was set at 100 to 1000 Da with accumulation time 0.08s and 0.25s in MS and MSMS, respectively.

Non-targeted analysis (NTA)

Data were processed with SCIEX LibraryView deconvolution software. This software extracts the raw chromatograms across a defined mass range from 0-1500AMU and examines peaks of interest utilizing exact mass and MS/MS fragmentation. The peaks are compared to the 5,070 unique PFAS compounds from different fluorinated compounds library where the software algorithm assigns possible matches to each peak, or feature. The features were then evaluated to confirm ample signal-to-noise as well as confirming the compound fit to the library match. The precursor mass tolerance ±0.2 Da and fragment mass tolerance ±0.1 Da was used. The reported results include only peaks with a signal-to-noise greater than 10:1, absolute intensity more than 1000 and that have a library confidence of less than 5ppm error. These are the recommended settings provided by the manufacturer. One thing the software cannot account for are isomers. For the molecular formula determination, settings of $C_{0\text{-}20}$, $H_{0\text{-}5}$, $F_{0\text{-}60}$, $N_{0\text{-}1}$, $O_{0\text{-}16}$ and $S_{0\text{-}2}$ were used, where the subscript values represent the allowable number of that specific element that could be present in any proposed emipirical formula. Post data generation, a filtering algorithm was used to subtract the m/z signals of the blank (methanol) from each sample.

Results

These data are qualitative in nature. While qualitative compounds do have different areas/intensities, this does not always correlate to more or less abundance in the sample. Vastly different ionization efficiencies of NTA compounds can occur which impacts estimation and speculation about relative concentrations.

Results are presented in separate tables for each sample and labeled as 75808_Neg, 75808_Pos, 76735_Neg, 76735_Pos, 76903_Neg and 76903_Pos. "Neg" and "Pos" represent for data acquired in positive and negative ionization, respectively.

410-75808-1

Table 2. NTA results for sample "75808_Neg" acquired in negative polarity

S.N.	Compound Formula	Compound Name	Area	Retention Time	Adduct / Charge	Precursor Mass	Found At Mass	Mass Error (ppm)
1	{222.16131}	unknown	7.57E+05	4.15	[M-H]-	221.1546	221.1535	-4.97
2	{224.14073}	unknown	5.23E+04	4.15	[M-H_2O-H]-	205.1234	205.1232	-0.97
3	{220.18219}	unknown	5.57E+04	4.25	[M-H]-	219.1755	219.175	-2.28
4	{375.25069}	unknown	6.19E+05	4.26	[M-H]-	374.244	374.2432	-2.14
5	{184.14566}	unknown	3.43E+04	4.26	[M-H]-	183.1389	183.1387	-1.09
6	C9H4F14O3	Bis(2,2,3,3,4,4,4-heptafluorobutyl) carbonate	8.41E+04	4.66	[M+H]+	427.001	426.9992	-4.2
7	{250.15980}	unknown	2.14E+05	4.67	[M-H]-	249.1531	249.1523	-3.21
8	{276.20765}	unknown	1.14E+04	5.14	[M-H]-	275.2009	275.2009	0
9	{454.30651}	unknown	1.34E+06	6.21	[M+Cl]-	489.2765	489.276	-1.02
10	{282.25479}	unknown	1.28E+07	8.34	[M-H]-	281.2481	281.2472	-3.20
11	{656.42655}	unknown	9.67E+05	8.49	[M-H]-	655.4198	655.4191	-1.06
12	{490.26753}	unknown	2.12E+05	8.86	[M-H]-	489.2608	489.261	0.40
13	{270.25560}	unknown	5.17E+05	8.98	[M-H]-	269.2489	269.2481	-2.97

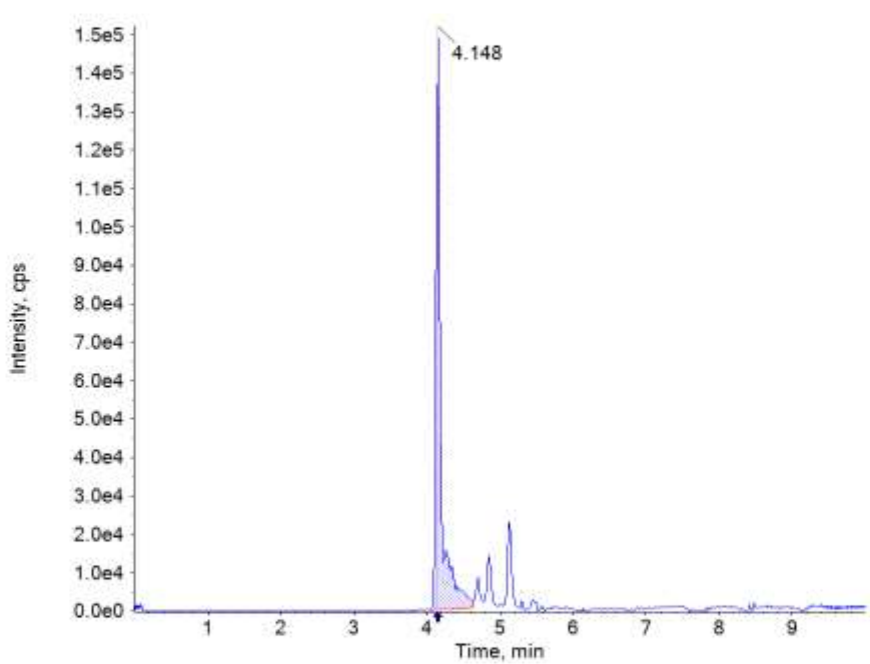
Table 3. NTA results for sample "75808_Pos" acquired in positive polarity

S.N.	Compound Formula	Compound Name	Area	Retention Time	Adduct / Charge	Precursor Mass	Found At Mass	Mass Error (ppm)
1	{692.24754}	unknown	1.38E+04	5.4	[M-H]-	691.2408	691.2405	-0.43
2	{656.41163}	unknown	1.03E+06	6.06	[M-H]-	655.4049	655.4041	-1.22
3	{178.10490}	unknown	2.87E+05	9.4	[M-H]-	177.0982	177.0974	-4.52

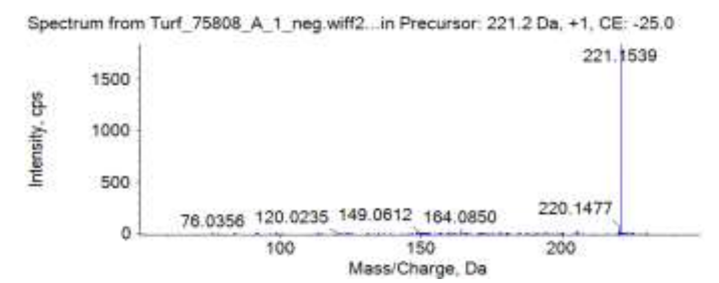
Compounds chromatographs and mass spectra for sample “75808_neg” acquired in negative polarity

1. 221.1535 / 4.14 (Library/Formula)

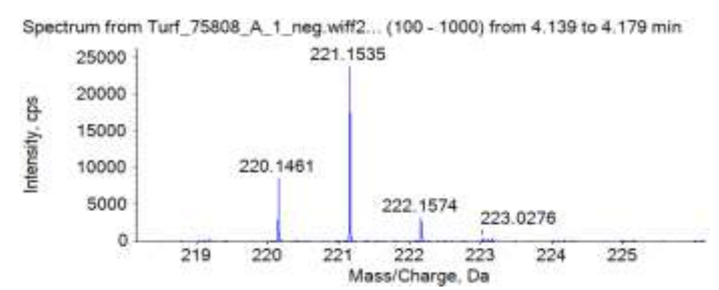
Retention Time: 4.15 minutes **Precursor m/z :** 221.1546 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 221.1535 / 4.14



Acquired / Library MSMS



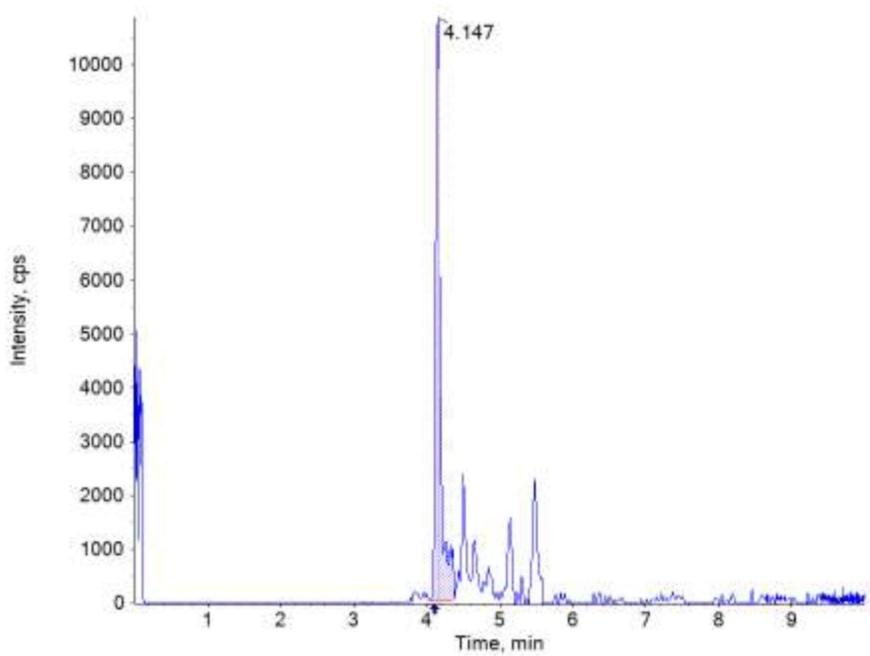
Acquired / Theoretical MS



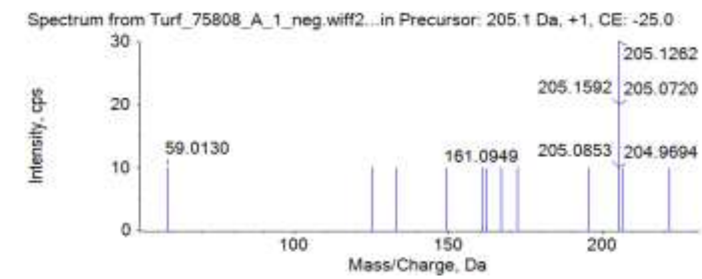
2. 205.1223 / 4.10 [M-H2O-H]- (Library/Formula)

Retention Time: 4.15 minutes
Precursor m/z : 205.1234
Fit (%) N/A **RFit (%)** N/A

Analyte Name:
205.1223 / 4.10 [M-H2O-H]-



Acquired / Library MSMS



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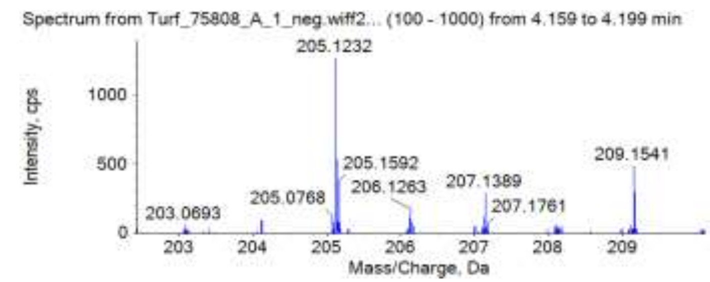
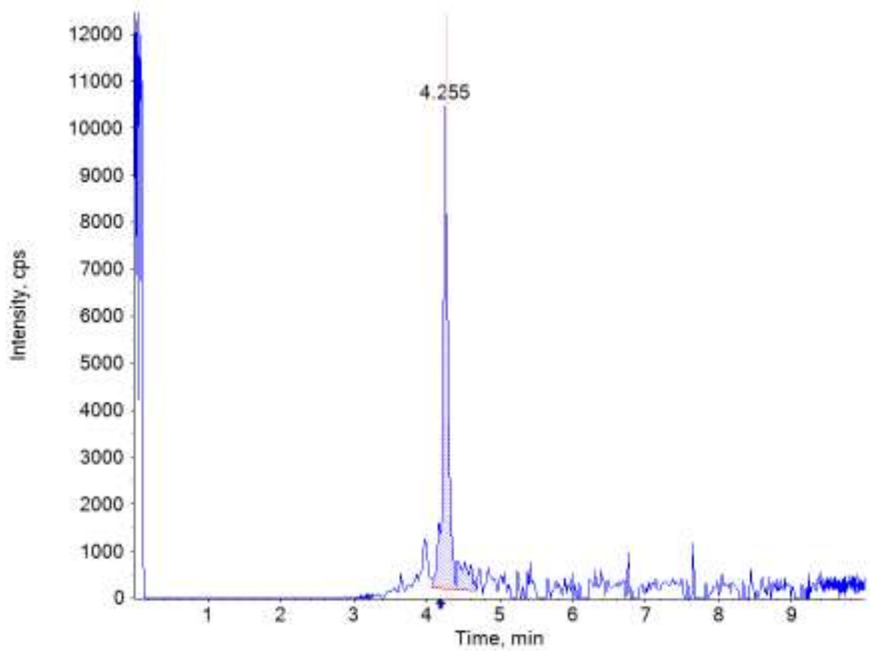


3. 219.1744 / 4.18 (Library/Formula)

Retention Time: 4.25 minutes
Precursor m/z : 219.1755
Fit (%) N/A **RFit (%)** N/A

Analyte Name:
219.1744 / 4.18



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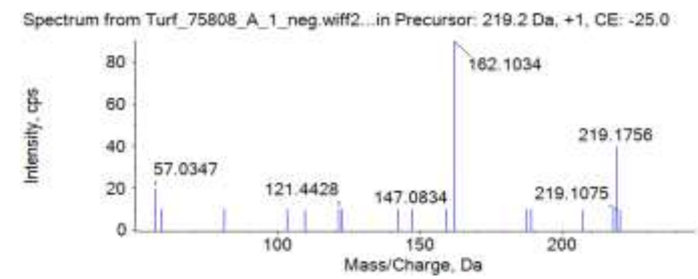
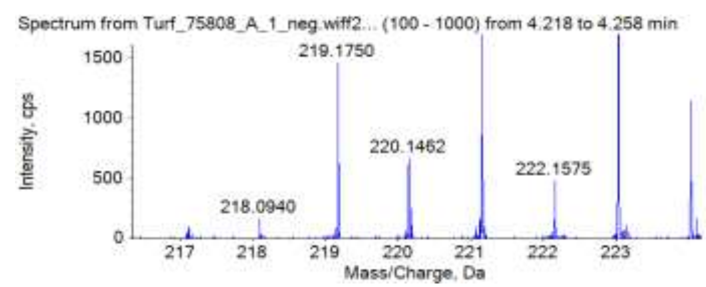
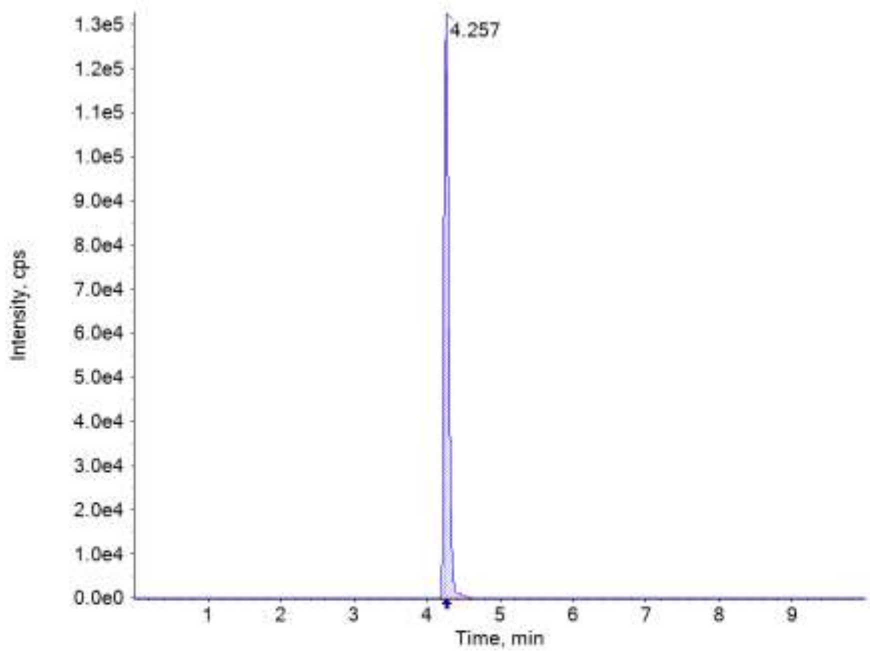


Acquired / Theoretical MS



4. 374.2429 / 4.26 (Library/Formula)

Retention Time: 4.26 minutes **Precursor m/z :** 374.2440 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 374.2429 / 4.26



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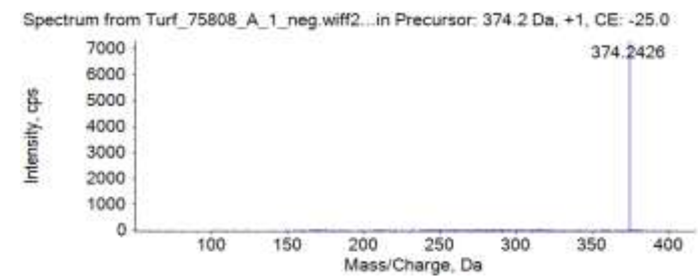

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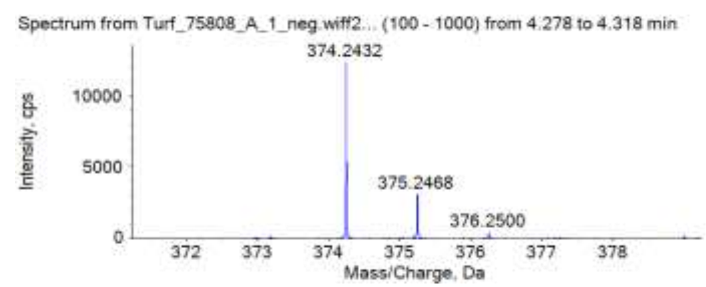
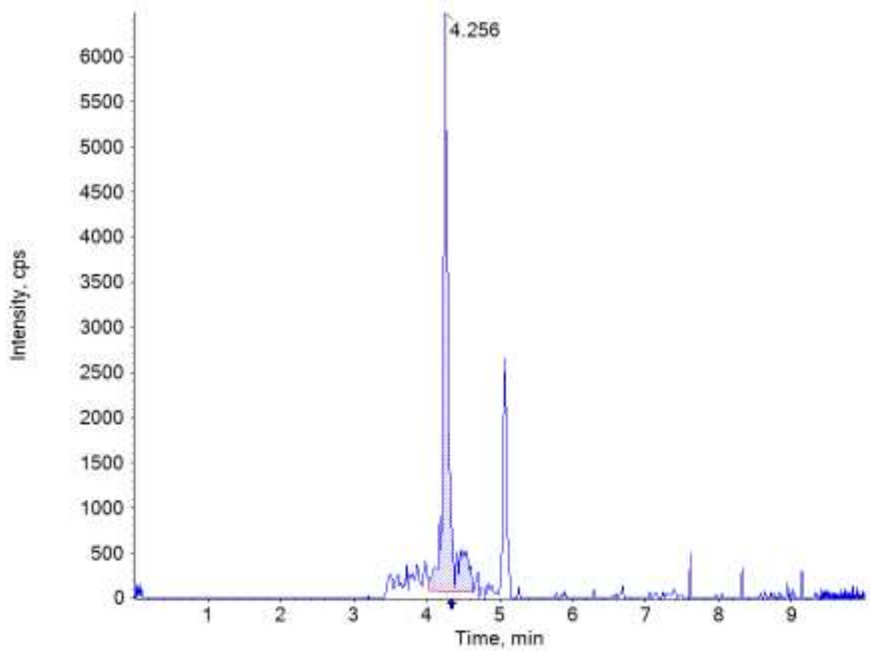


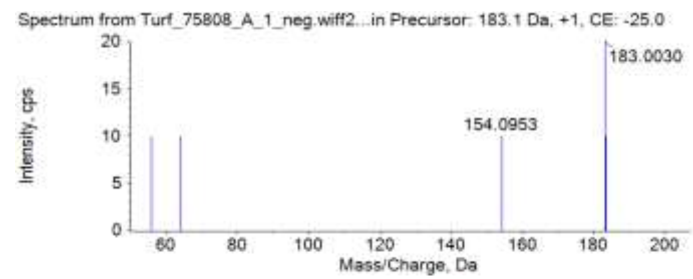
5. 183.1378 / 4.33 (Library/Formula)

Retention Time: 4.26 minutes
Precursor m/z : 183.1389
Fit (%) N/A **RFit (%)** N/A

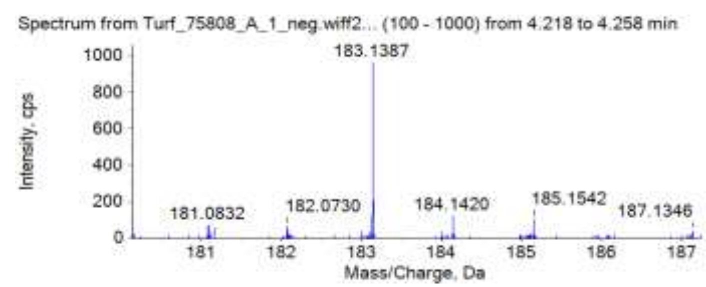
Analyte Name:
183.1378 / 4.33



Acquired / Library MSMS



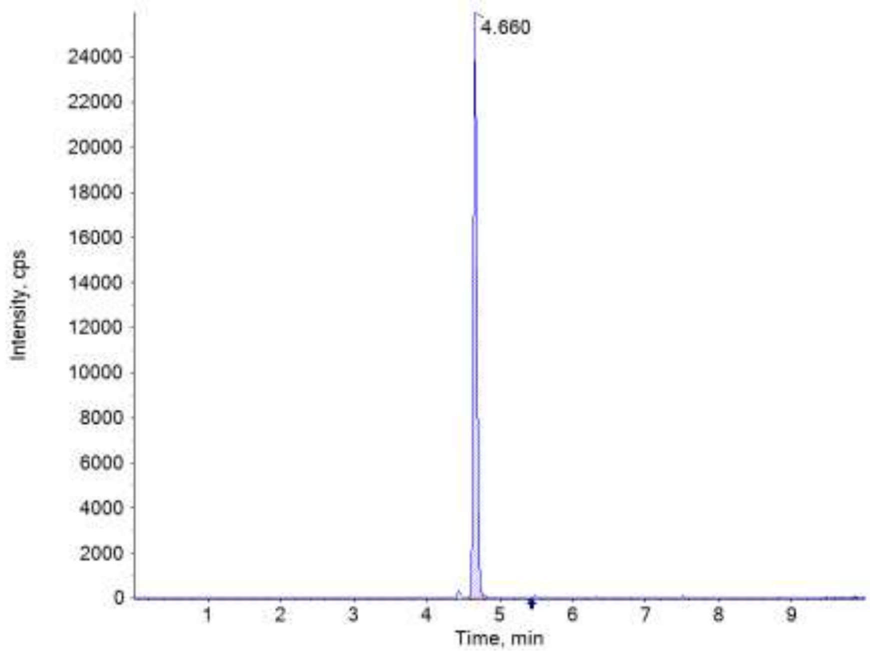
Acquired / Theoretical MS



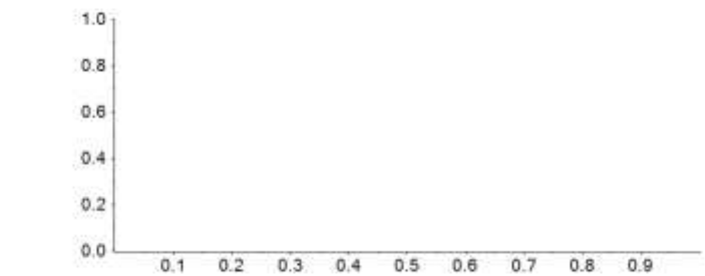
6. Bis(2,2,3,3,4,4,4-heptafluorobutyl) carbonate (Library/Formula)

Retention Time: 4.66 minutes
Precursor m/z : 427.0010
Fit (%) N/A **RFit (%)** N/A

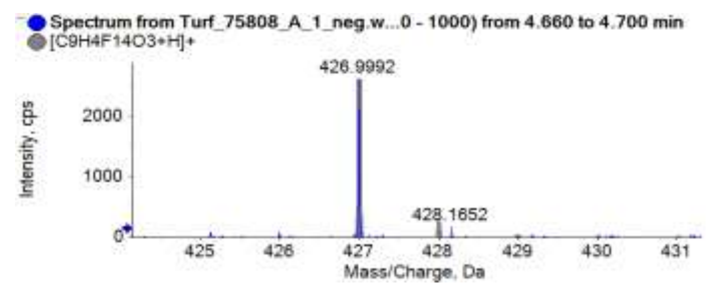
Analyte Name:
Bis(2,2,3,3,4,4,4-heptafluorobutyl) carbonate



Acquired / Library MSMS

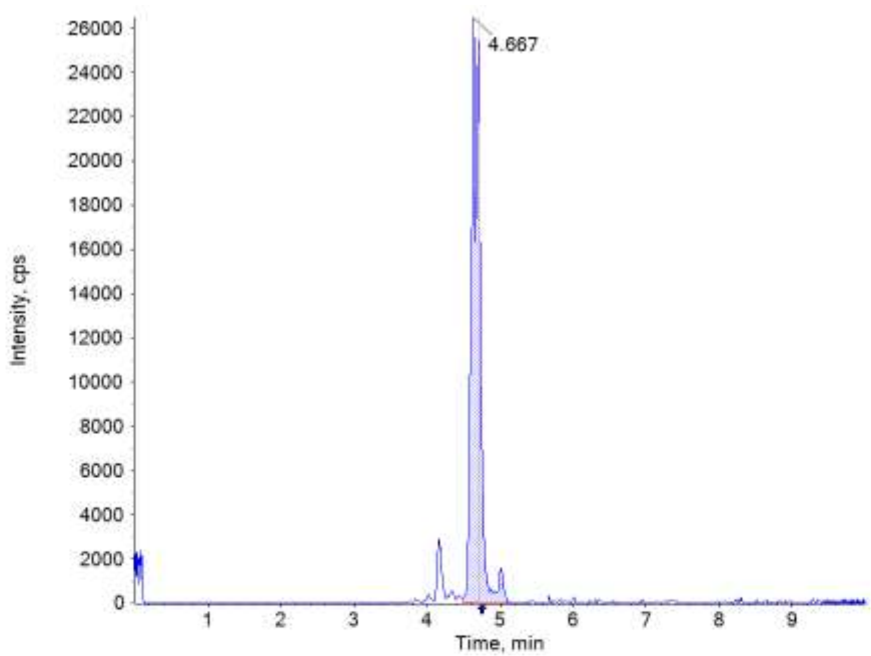


Acquired / Theoretical MS

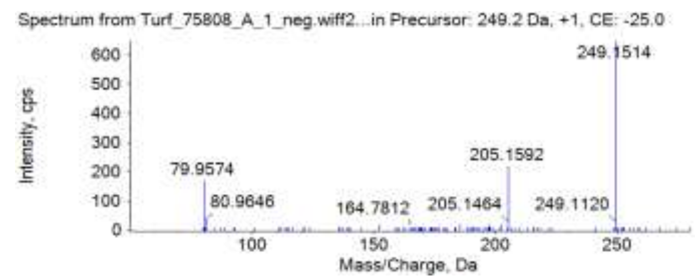


7. 249.1520 / 4.75 (Library/Formula)

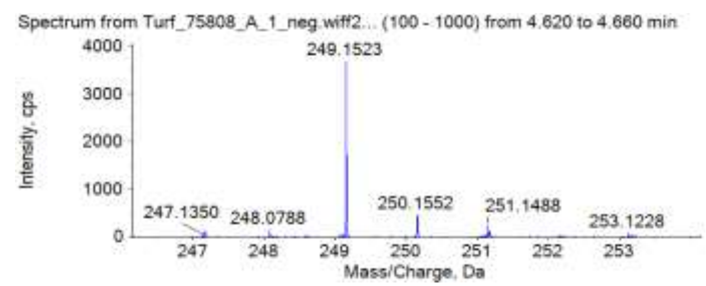
Retention Time: 4.67 minutes **Precursor m/z :** 249.1531 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 249.1520 / 4.75



Acquired / Library MSMS



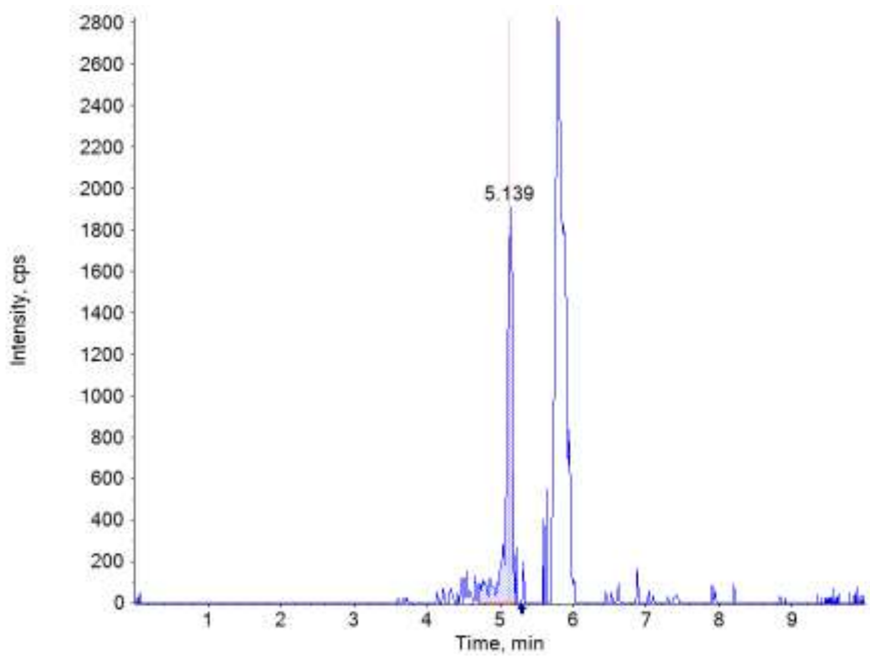
Acquired / Theoretical MS



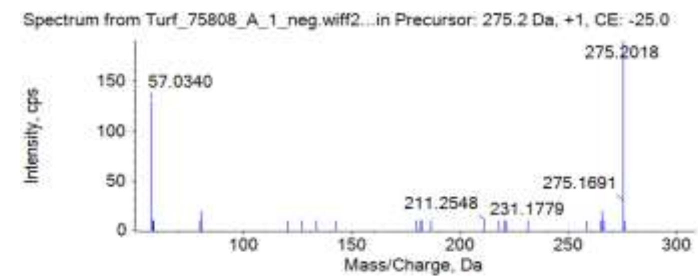
8. 275.1998 / 5.29 (Library/Formula)

Retention Time: 5.14 minutes
Precursor m/z : 275.2009
Fit (%) N/A **RFit (%)** N/A

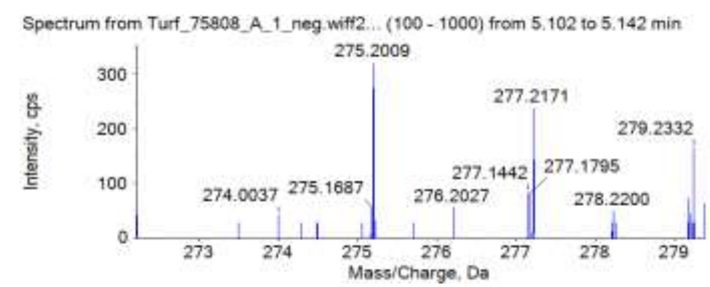
Analyte Name:
275.1998 / 5.29



Acquired / Library MSMS

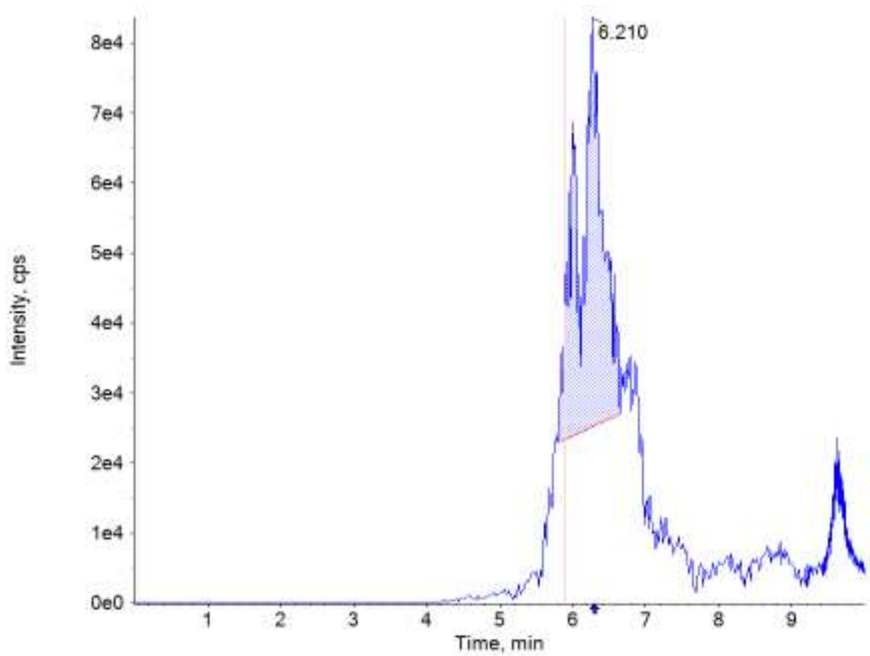


Acquired / Theoretical MS

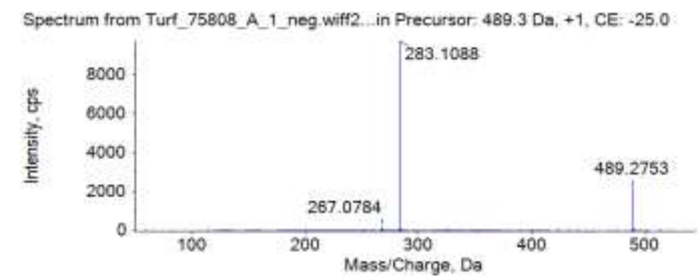


9. 489.2754 / 6.29 [M+Cl]- (Library/Formula)

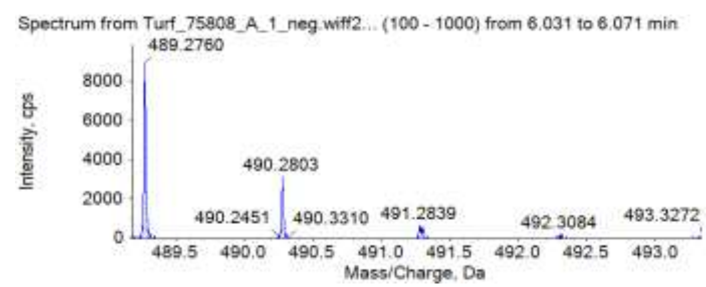
Retention Time: 6.21 minutes **Precursor m/z :** 489.2765 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 489.2754 / 6.29 [M+Cl]-



Acquired / Library MSMS



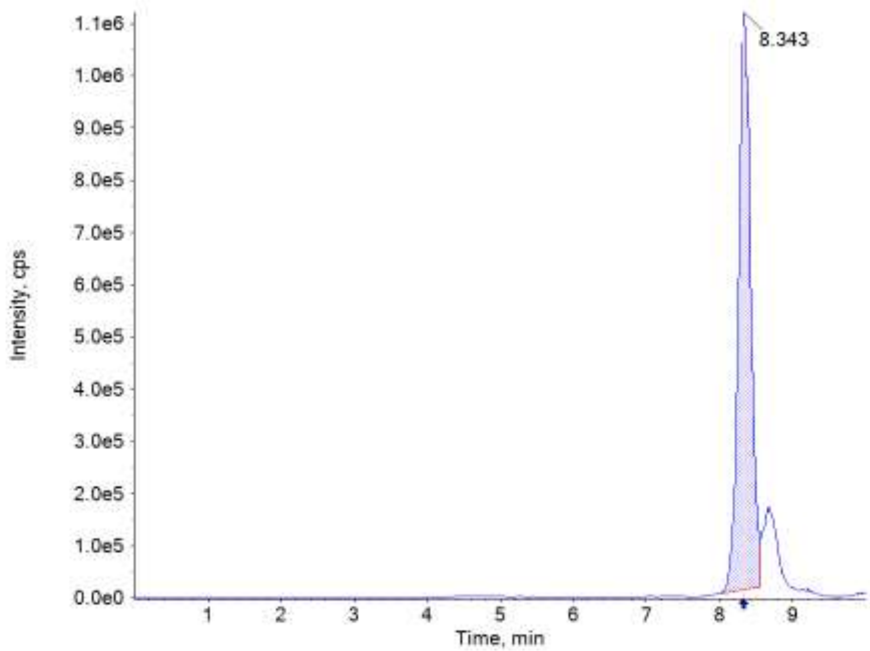
Acquired / Theoretical MS



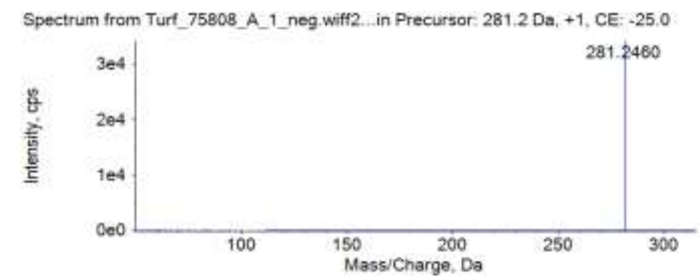
10. 281.2470 / 8.32 (Library/Formula)

Retention Time: 8.34 minutes
Precursor m/z : 281.2481
Fit (%) N/A **RFit (%)** N/A

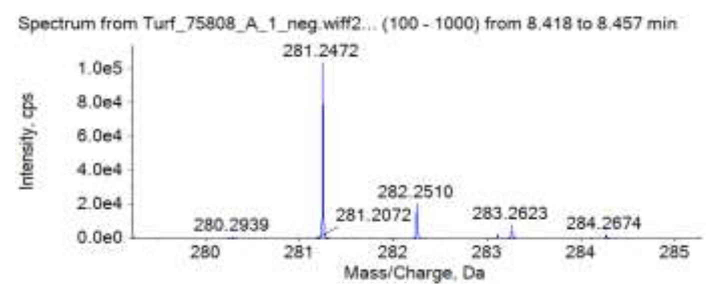
Analyte Name:
281.2470 / 8.32



Acquired / Library MSMS

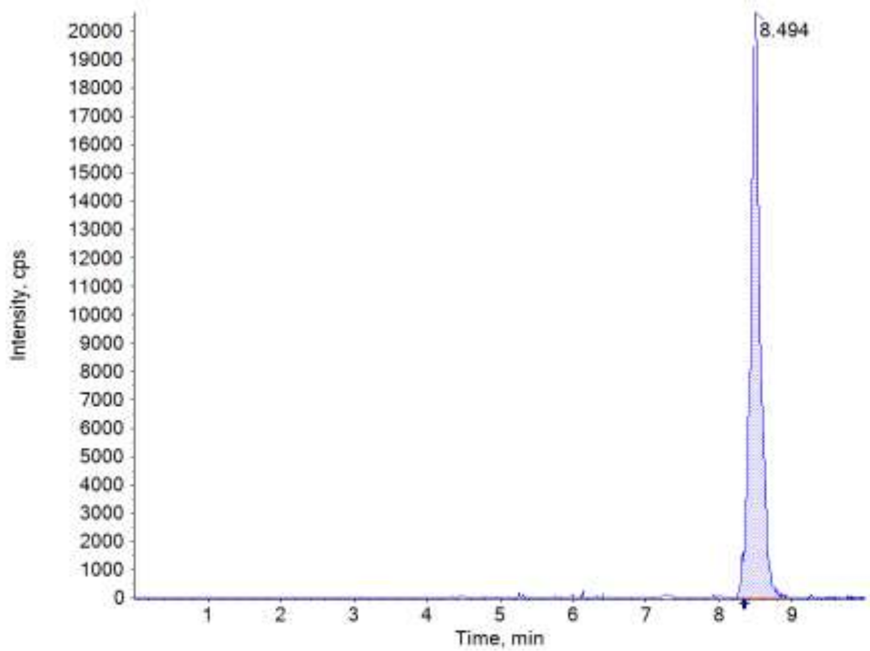


Acquired / Theoretical MS

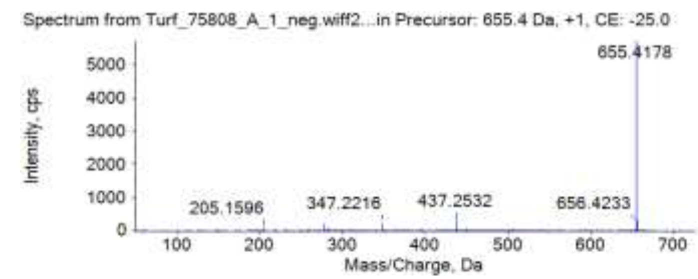


11. 655.4394 / 8.34 (Library/Formula)

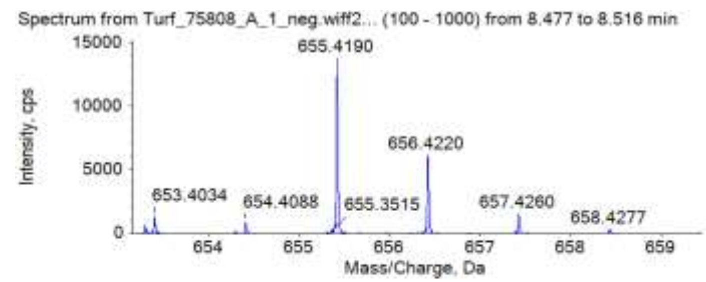
Retention Time: 8.49 minutes **Precursor m/z :** 655.4405 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 655.4394 / 8.34



Acquired / Library MSMS



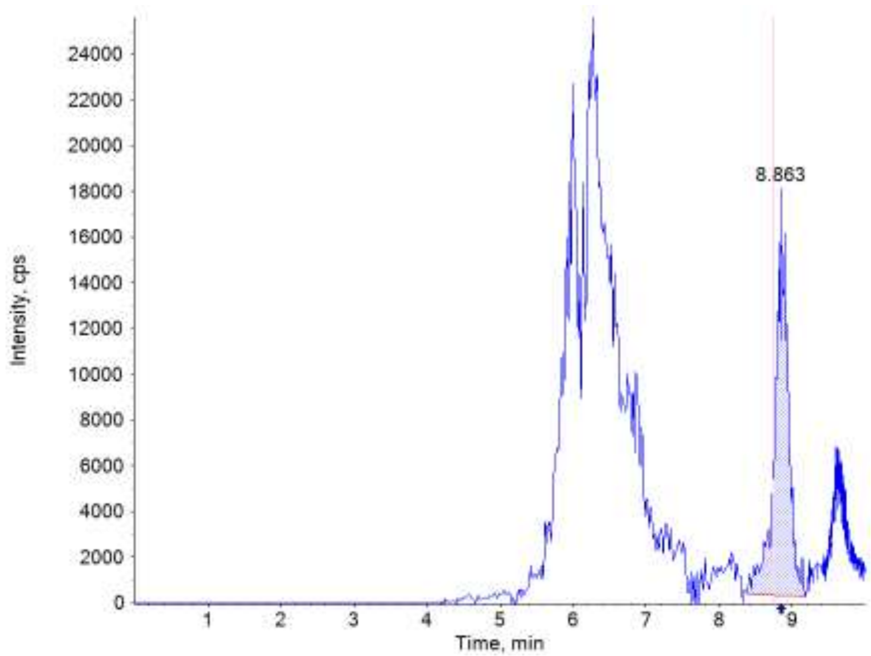
Acquired / Theoretical MS



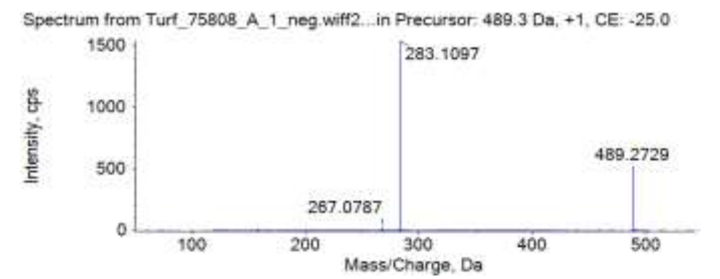
12. 489.2597 / 8.85 (Library/Formula)

Retention Time: 8.86 minutes
Precursor m/z : 489.2608
Fit (%) N/A **RFit (%)** N/A

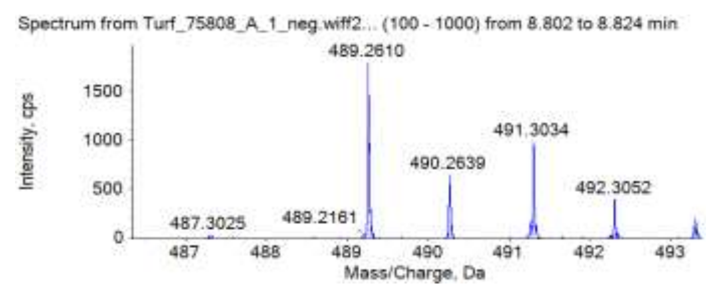
Analyte Name:
489.2597 / 8.85



Acquired / Library MSMS



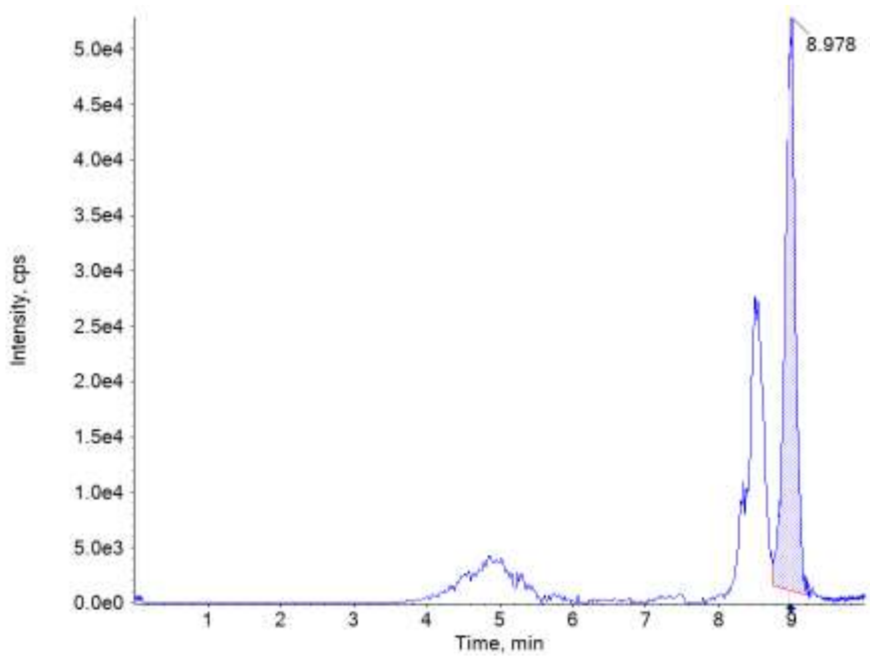
Acquired / Theoretical MS



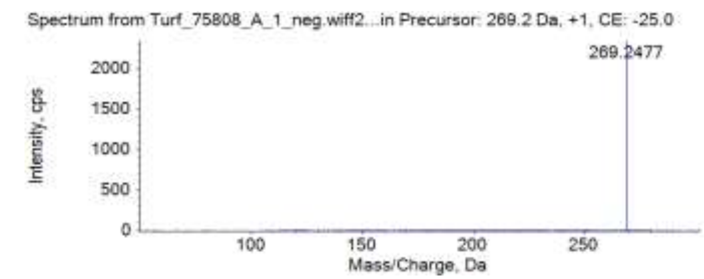
13. 269.2478 / 8.98 (Library/Formula)

Retention Time: 8.98 minutes
Precursor m/z : 269.2489
Fit (%) N/A **RFit (%)** N/A

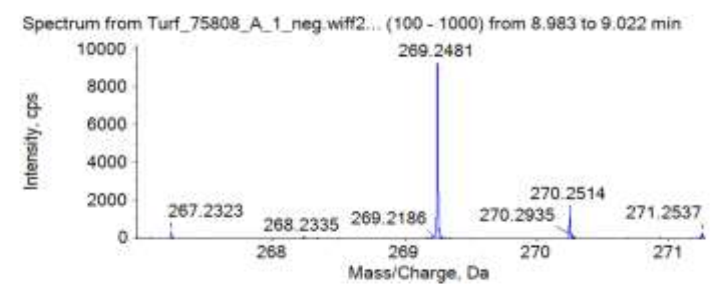
Analyte Name:
269.2478 / 8.98



Acquired / Library MSMS



Acquired / Theoretical MS

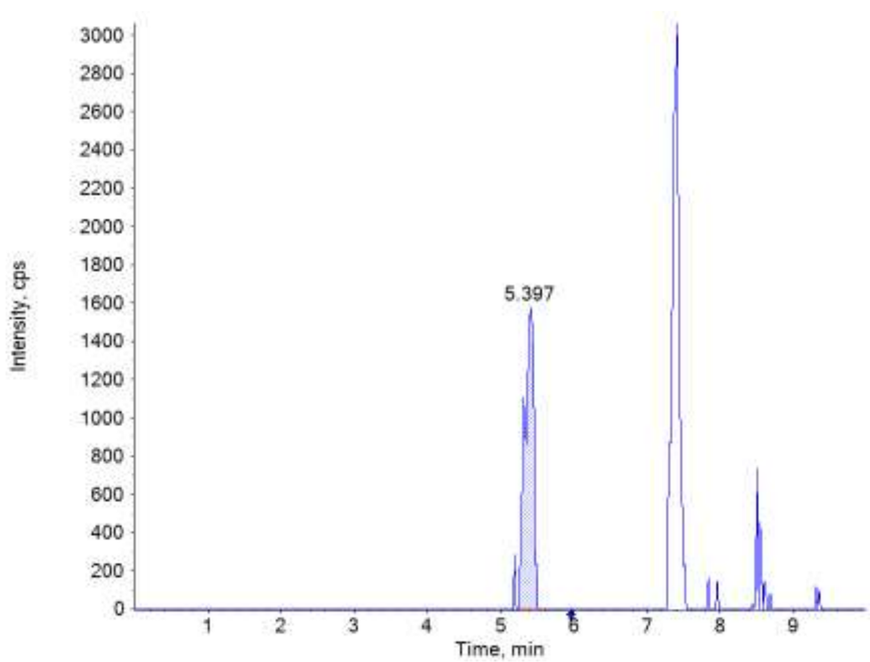


Compounds chromatographs and mass spectra for sample “75808_pos” acquired in positive polarity

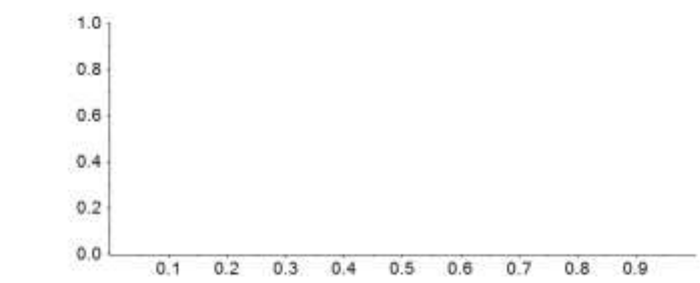
1. 691.2397 / 5.96 (Library/Formula)

Retention Time: 5.40 minutes
Precursor m/z : 691.2408
Fit (%) N/A **RFit (%)** N/A

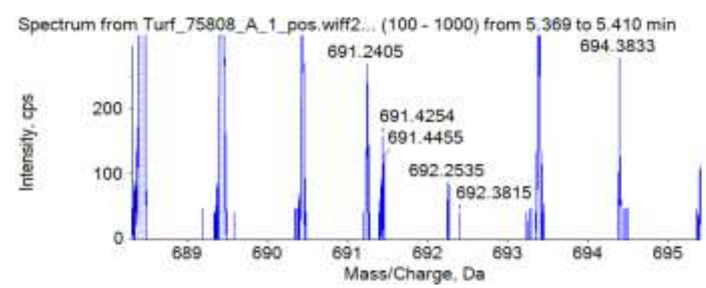
Analyte Name:
691.2397 / 5.96



Acquired / Library MSMS

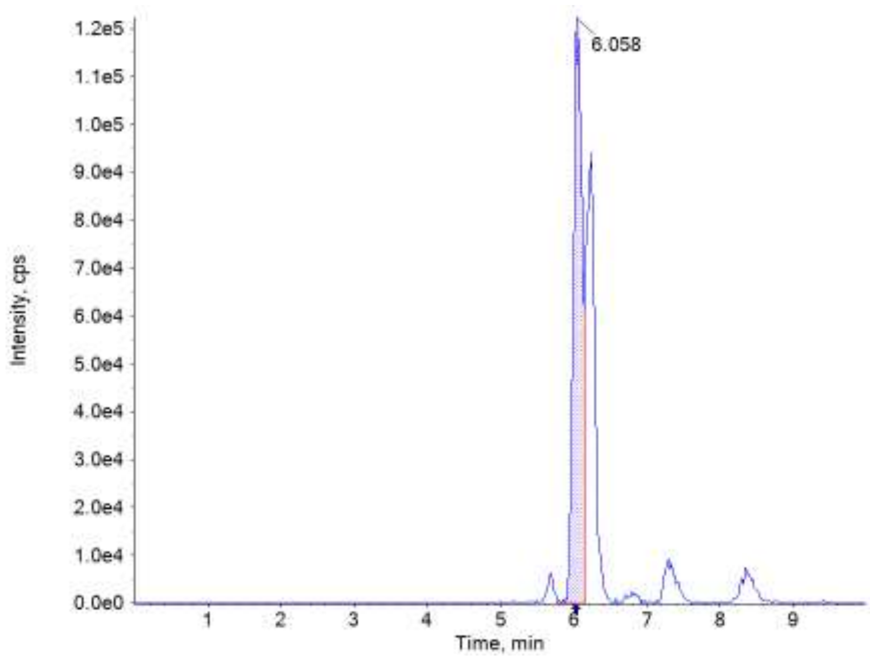


Acquired / Theoretical MS

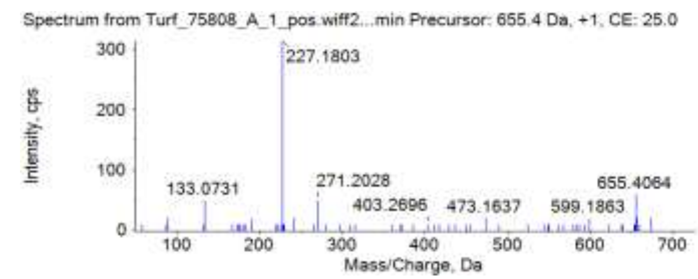


2. 655.4038 / 6.03 (Library/Formula)

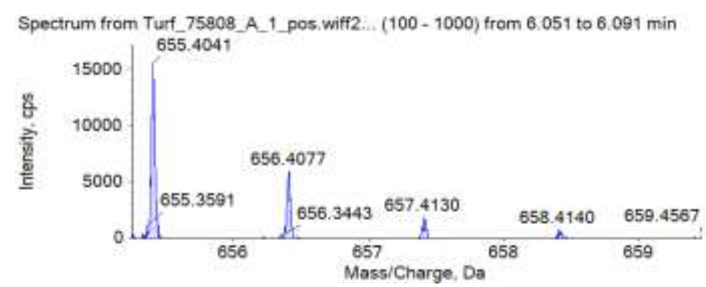
Retention Time: 6.06 minutes **Precursor m/z :** 655.4049 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 655.4038 / 6.03



Acquired / Library MSMS



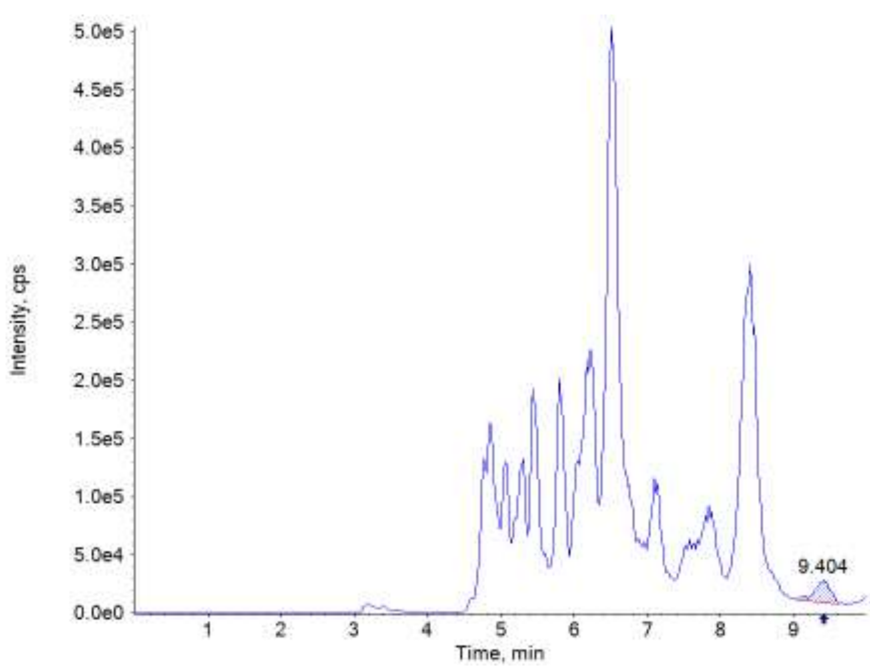
Acquired / Theoretical MS



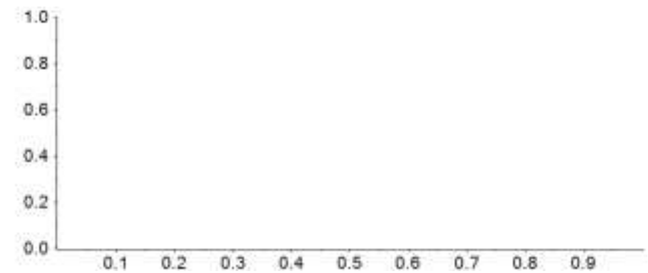
3. 177.0971 / 9.41 (Library/Formula)

Retention Time: 9.40 minutes
Precursor m/z : 177.0982
Fit (%) N/A **RFit (%)** N/A

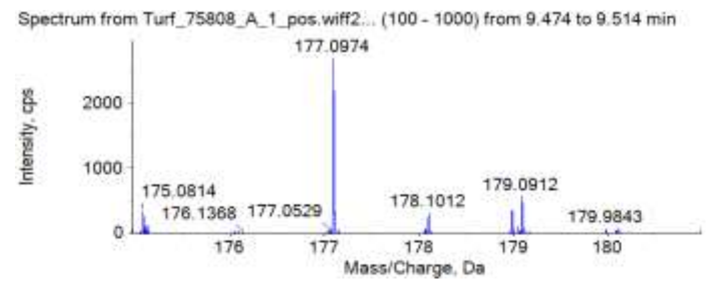
Analyte Name:
177.0971 / 9.41



Acquired / Library MSMS



Acquired / Theoretical MS



410-76735-1

Table 4. NTA results for sample "76935_Neg" acquired in negative polarity

S.N.	Compound Formula	Compound name	Area	Retention Time	Adduct / Charge	Precursor Mass	Found At Mass	Mass Error (ppm)
1	{452.33572}	unknown	1.94E+04	3.33	[M-H]-	451.329	451.3278	-2.66
2	{213.06473}	unknown	1.03E+05	3.42	[M-H]-	212.058	212.0572	-3.77

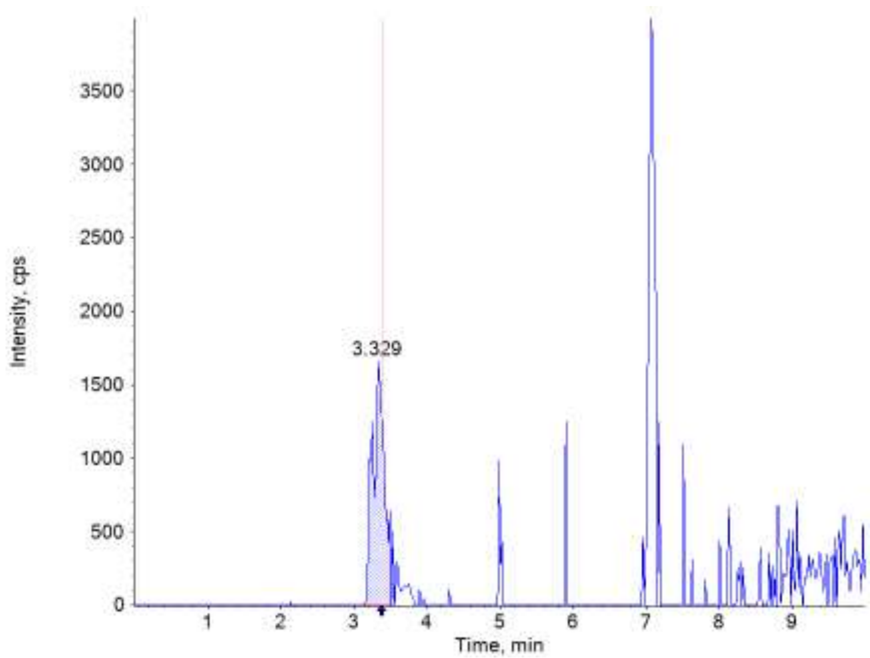
Table 5. NTA results for sample "76935_Pos" acquired in positive polarity

S.N.	Compound Formula	Compound name	Area	Retention Time	Adduct / Charge	Precursor Mass	Found At Mass	Mass Error (ppm)
1	{705.45637}	unknown	4.70E+04	5.62	[M-H]-	704.4496	704.4505	1.28

Compounds chromatographs and mass spectra for sample “76735_neg” acquired in negative polarity

1. 451.3279 / 3.37 [M-H]- (Library/Formula)

Retention Time: 3.33 minutes **Precursor m/z :** 451.3290 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 451.3279 / 3.37 [M-H]-



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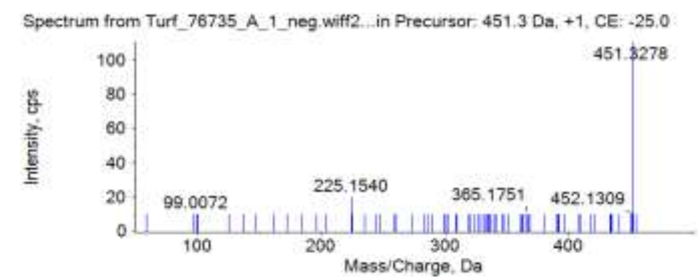

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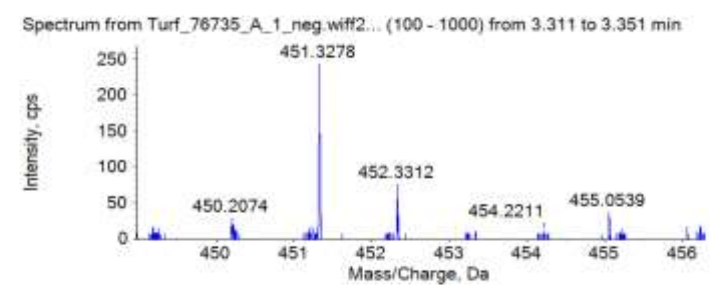
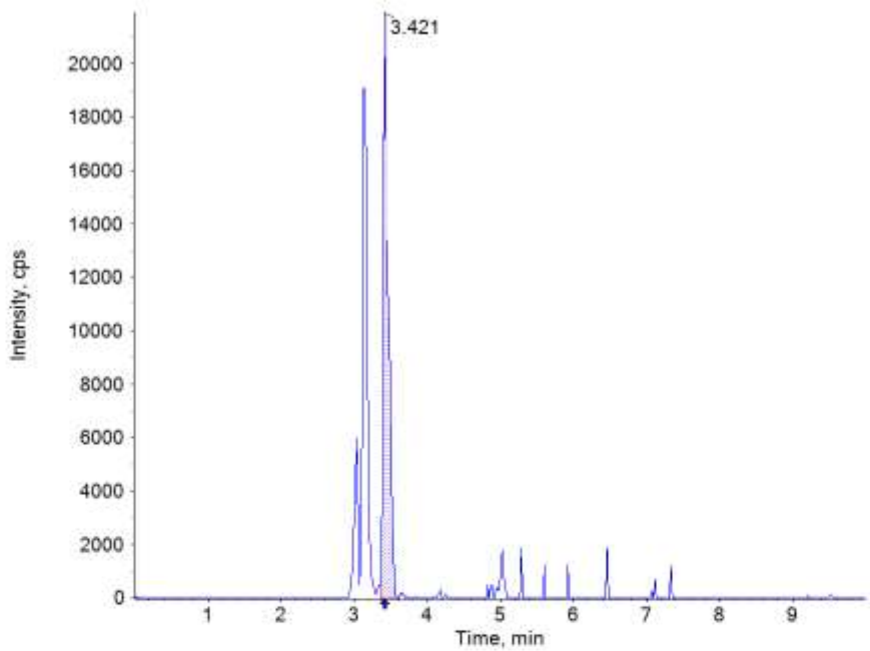
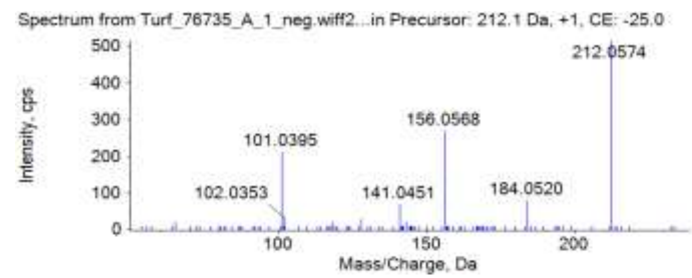
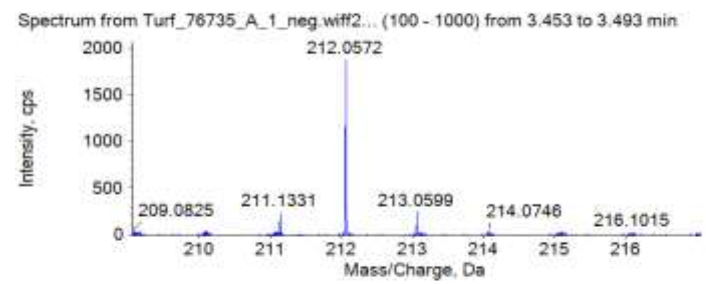


2. 212.0569 / 3.41 (Library/Formula)

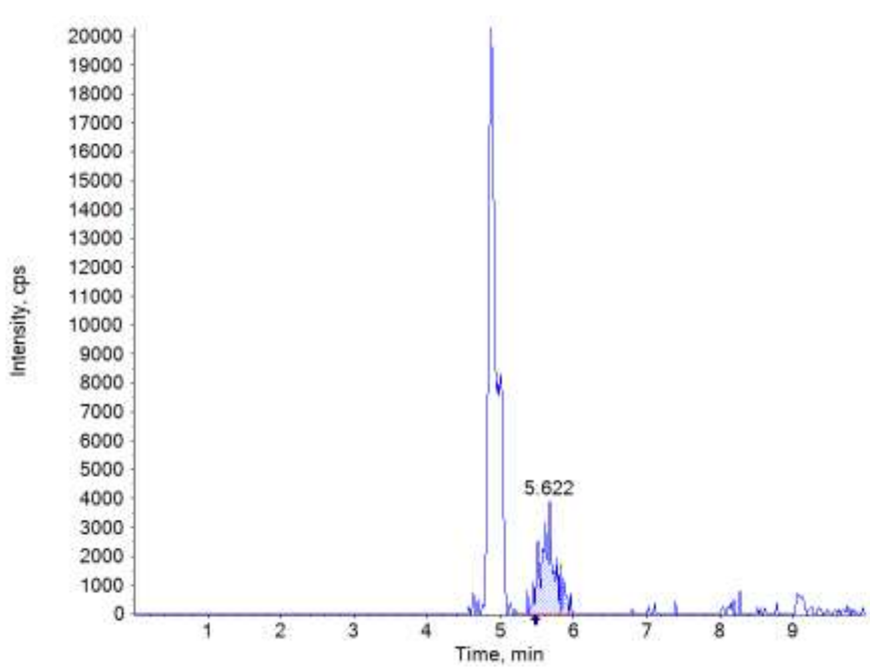
Retention Time: 3.42 minutes **Precursor m/z :** 212.0580 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 212.0569 / 3.41	
	**Acquired / Library MSMS**	
	Acquired / Theoretical MS	

Compounds chromatographs and mass spectra for sample “76735_pos” acquired in positive polarity

1. 704.4485 / 5.47 (Library/Formula)

Retention Time: 5.62 minutes
Precursor m/z : 704.4496
Fit (%) N/A **RFit (%)** N/A

Analyte Name:
704.4485 / 5.47



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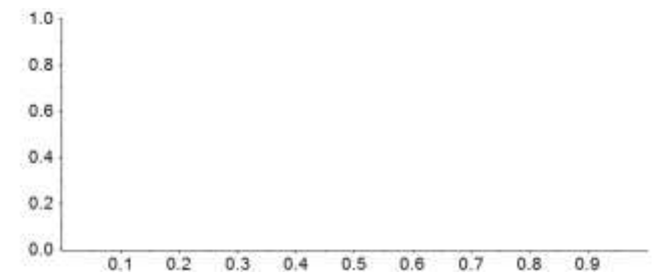

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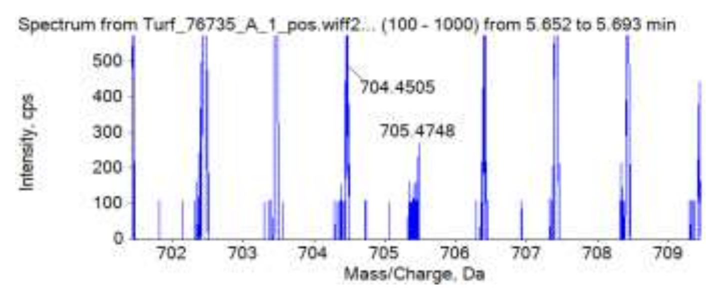


410-76903-1

Table 6. NTA results for sample “76903_Neg”

S.N.	Compound Formula	Compound name	Area	Retention Time	Adduct / Charge	Precursor Mass	Found At Mass	Mass Error (ppm)
1	{224.14073}	unknown	1.03E+05	4.12	[M-H2O-H]-	205.1234	205.1223	-5.36
2	{300.20708}	unknown	8.39E+04	5.38	[M-H]-	299.2004	299.2	-1.34

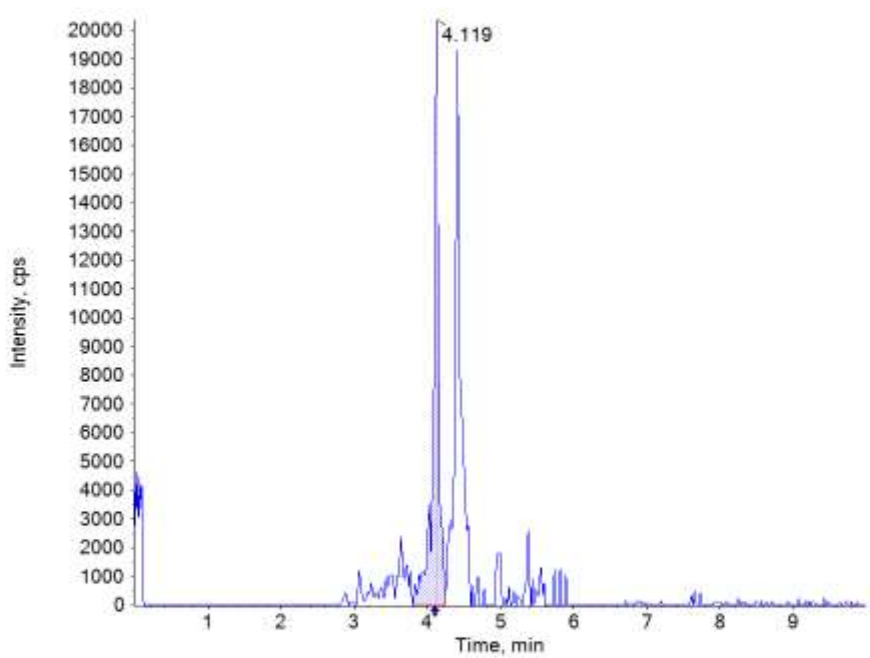
Table 7. NTA results for sample “76903_Pos”

S.N.	Compound Formula	Compound name	Area	Retention Time	Adduct / Charge	Precursor Mass	Found At Mass	Mass Error (ppm)
1	{312.27000}	unknown	7.44E+04	9.15	[M-H]-	311.2633	311.2631	-0.642543238
2	{240.13271}	unknown	1.87E+04	5.91	[M-H]-	239.126	239.1265	2.090943496
3	{243.23080}	unknown	1.13E+04	5.64	[M-H]-	242.2241	242.2248	2.889877502

Compounds chromatographs and mass spectra for sample “76903_neg” acquired in negative polarity

1. 205.1223 / 4.10 [M-H2O-H]- (Library/Formula)

Retention Time: 4.12 minutes **Precursor m/z :** 205.1234 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 205.1223 / 4.10 [M-H2O-H]-



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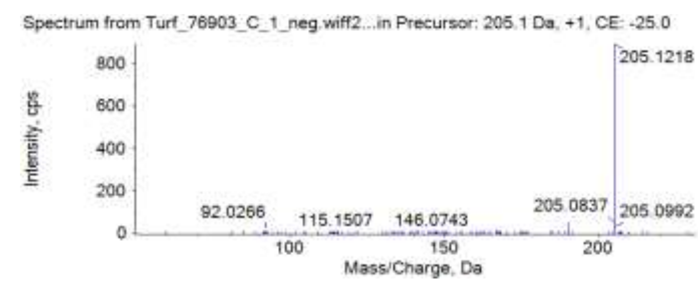

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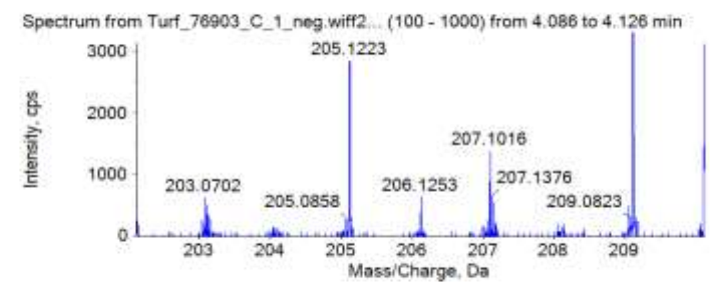
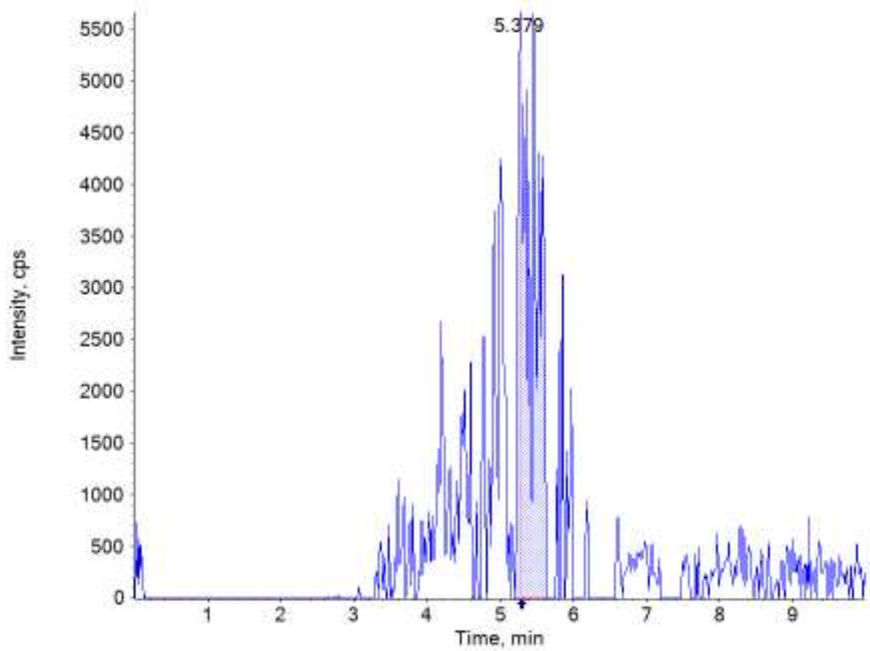


2. 299.1993 / 5.29 [M-H]- (Library/Formula)

Retention Time: 5.38 minutes
Precursor m/z : 299.2004
Fit (%) N/A **RFit (%)** N/A

Analyte Name:
299.1993 / 5.29 [M-H]-



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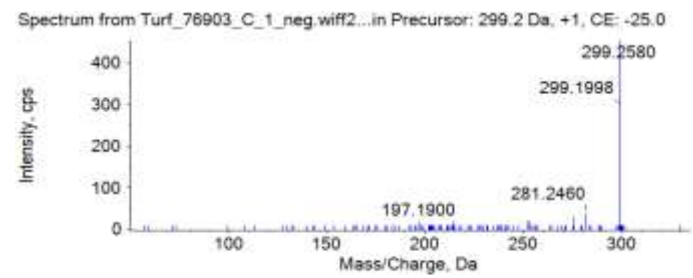

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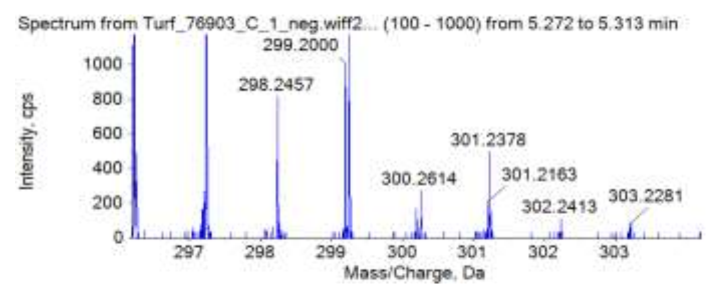
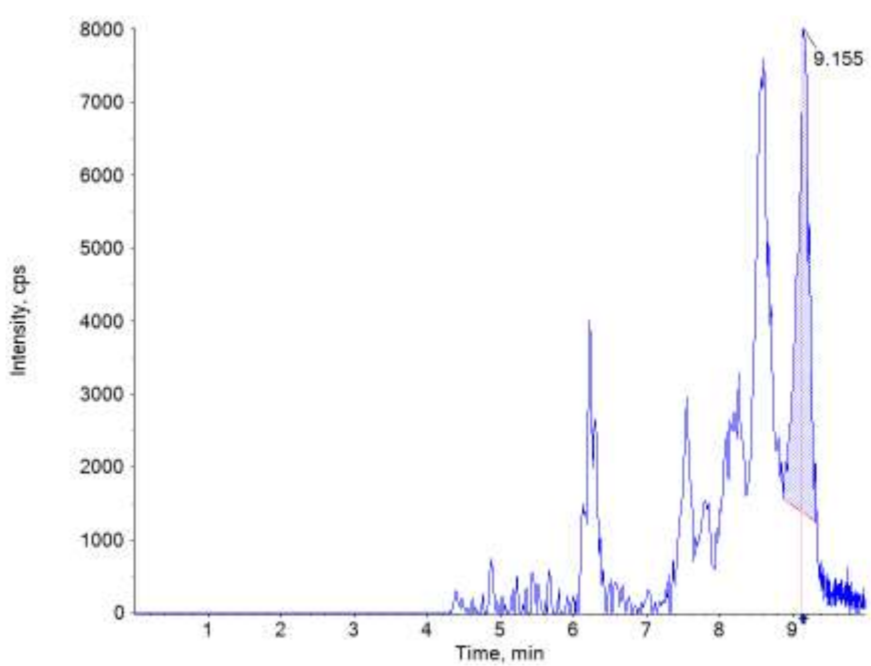


Compounds chromatographs and mass spectra for sample “76735_pos” acquired in positive polarity

1. 311.2622 / 9.14 (Library/Formula)

Retention Time: 9.15 minutes
Precursor m/z : 311.2633
Fit (%) N/A **RFit (%)** N/A

Analyte Name:
311.2622 / 9.14



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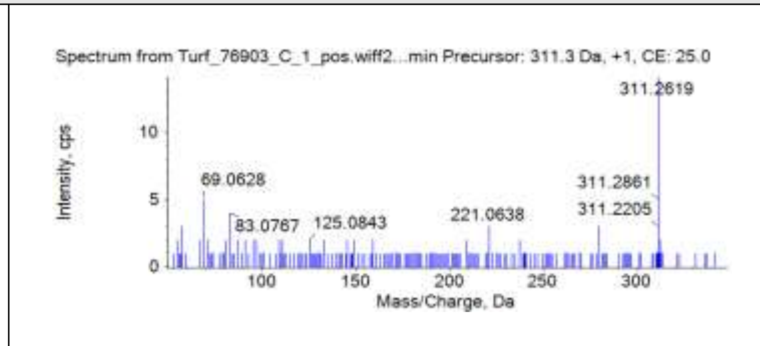

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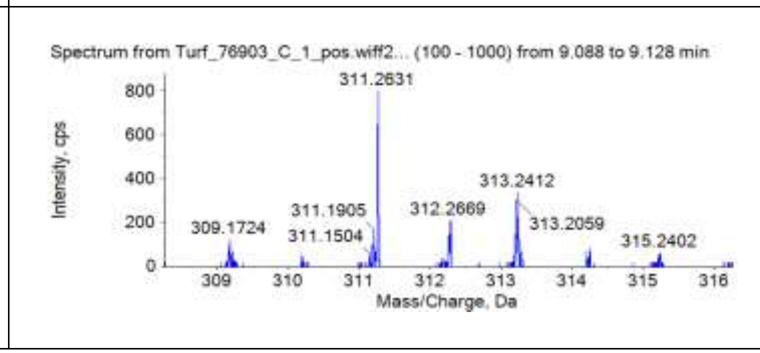
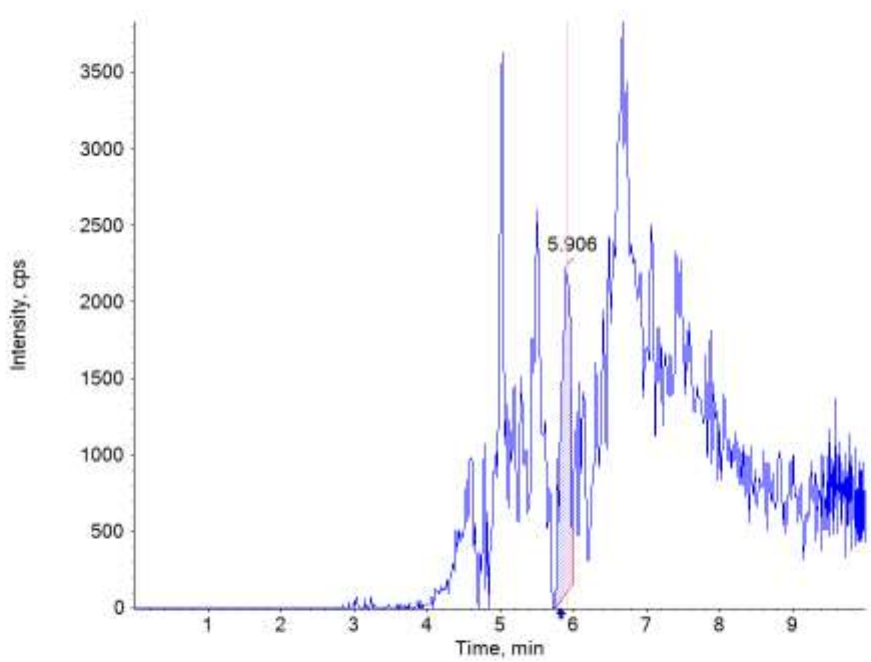


2. 239.1249 / 5.82 (Library/Formula)

Retention Time: 5.91 minutes **Precursor m/z :** 239.1260 **Fit (%)** N/A **RFit (%)** N/A	**Analyte Name:** 239.1249 / 5.82



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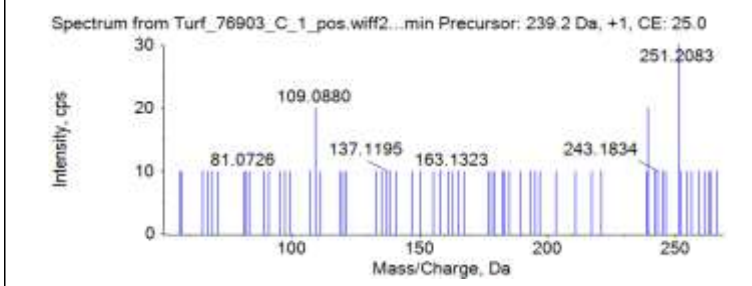

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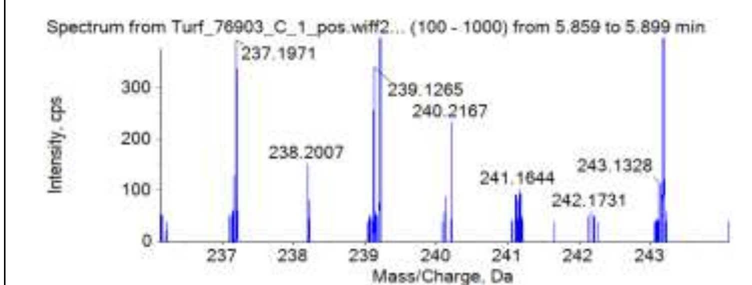
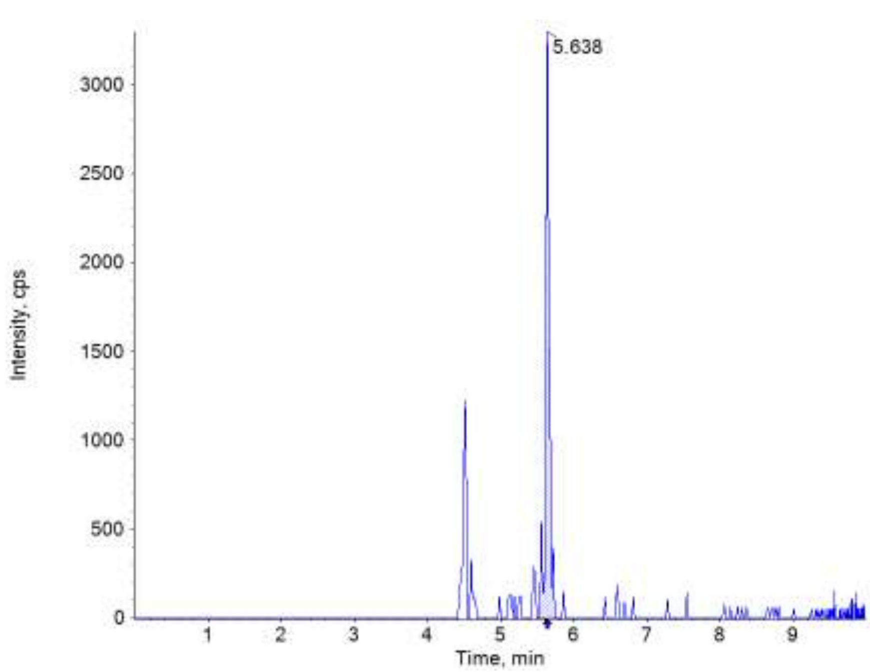


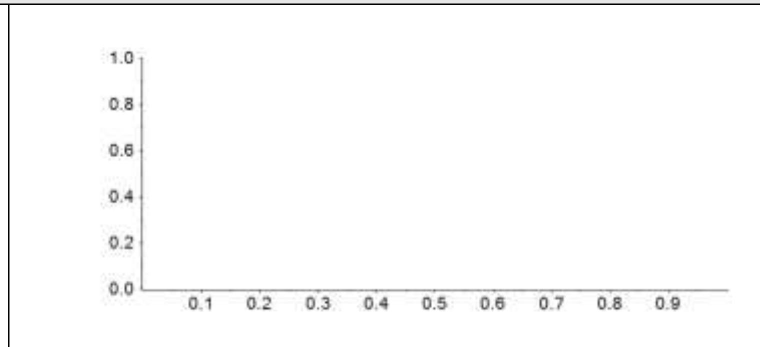
3. 242.2230 / 5.63 (Library/Formula)

Retention Time: 5.64 minutes
Precursor m/z : 242.2241
Fit (%) N/A **RFit (%)** N/A

Analyte Name:
242.2230 / 5.63



Acquired / Library MSMS



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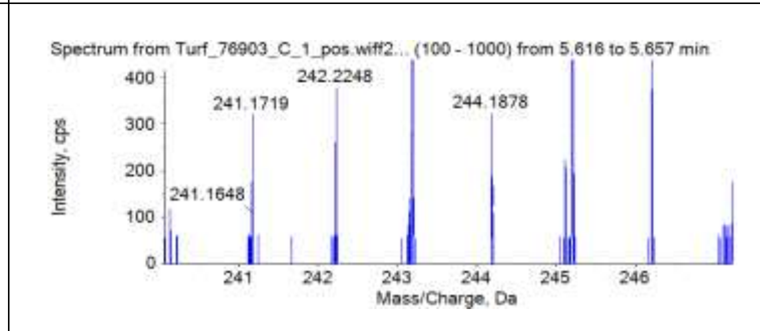

General Conclusion

Most of the compounds screened after NTA appeared as [M-H]-, which indicate a loss of hydrogen after dissociation in water. This indicate the presence of either a carboxylic or sulfonic acid functional group in the backbone of the compounds.

Evaluation of PFAS in Artificial Turf

Burrillville High School

August 2024

Prepared For:

Town of Burrillville
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Prepared By:

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EXECUTIVE SUMMARY

The Town of Burrillville is installing an artificial turf field at Burrillville High School. Concerns have been raised by community members on the potential presence of per- and polyfluoroalkyl substances (PFAS) in the artificial turf material. This report has been prepared to address these concerns.

Based on evaluations performed to date, it has been demonstrated that the detection of very low levels of a very limited number of PFAS in the artificial turf does not represent a human health risk to those using the artificial turf ballfields and it does not pose a risk to the environment, the groundwater, the surface water, and the aquifer. Refer to **Section 2.0** of this report for more detail.

The detected concentration of one PFAS in the leachate of one of the FieldTurf carpet turf samples was well below the groundwater regulatory screening criteria (detected 87x lower than the 20 parts per trillion [ppt] screening criteria or detected at 1.15% of the regulatory screening criteria) in combination with the understanding that the leachate would be diluted upon entering the aquifer. Therefore, there would not be an adverse impact to the environment based on the presence of this PFAS in the carpet turf leachate. United States Environmental Protection Agency (USEPA) and Rhode Island screening criteria were utilized for this evaluation. Refer to **Section 2.0** and **Table 3** for more detail.

It is expected that there will be physical contact with the artificial turf when in use. Some of the artificial turf samples contained low-level trace concentrations (reported as "J" estimated values) of a limited number of PFAS. When compared to the health-based screening levels, concentrations were orders of magnitude below the target benchmark levels, thus indicating no significant risk from exposure to these compounds. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are two of the PFAS of greatest concern. PFOA was not detected in any of the studies performed. The detected concentration of PFOS in one sample was below the Rhode Island background value and was well below the human health risk screening criteria (detected 47x lower than the 6.3 parts per billion [ppb] risk screening criteria or detected at 2.14% of the risk screening criteria). All other PFAS were substantially lower than screening criteria. Rhode Island screening criteria were not available for this evaluation; as a replacement, USEPA and the lowest of the New England states' screening criteria were utilized. Refer to **Section 2.0** and **Table 2** for more detail.

Two rubber infill samples were tested for 30 PFAS, with no PFAS detected in either sample. Refer to **Section 2** for more detail.

1.0 SUMMARY OF PREVIOUS TURF CARPET STUDIES

For the Burrillville project, the proposed product to be used is called FieldTurf Vertex Prime (FTVTP-1) which consists of 50% Classic HD and 50% Field Turf Revolution 360. The project will also use an infill consisting of sand and cryogenic (or frozen) rubber.

1.1 David Teter Consulting Study

In a packet provided from the FieldTurf manufacturer, a report was included by David Teter Consulting who evaluated the same products being used by Burrillville: FieldTurf Classic HD and FieldTurf Revolution 360. These two products were analyzed for 29 different per- and polyfluoroalkyl substances (PFAS) chemicals in two different manners.

- First, the products were mixed in a chemical solvent (acidic methanol) that is designed to extract the PFAS from the product, if present. This test is not indicative of what would leach off of the sample into the environment as the material would not be exposed to this chemical solvent while in the environment. However, this test does provide information on whether PFAS may be present in these products and at what concentration.

  The extracts of these samples were analyzed for 29 different PFAS chemicals. None of the 29 PFAS were detected in either product (detection limits ranging from 0.79-0.81 nanograms per gram (ng/g or parts per billion [ppb]).
- Second, a leaching test (called synthetic precipitation leaching procedure [SPLP]) was performed on each product. This test is designed to determine what could leach out of the product into the environment during a rain/precipitation event.

  The extracts of these samples were analyzed for 29 different PFAS chemicals. None of these PFAS were detected in either product (detection limits ranging from 2-5 nanograms per liter (ng/L or parts per trillion [ppt]).

1.2 Portsmouth, New Hampshire Study

Also included in this packet from FieldTurf was a reference to work that TRC did for the City of Portsmouth, New Hampshire. Memorandum (cityofportsmouth.com)

Two tests were performed on the FieldTurf carpet product, Prestige Vertex.

- First, the same chemical solvent extraction described in **Section 1.1** was performed. The extracts of these samples were analyzed for 70 different PFAS chemicals. None of the 70 PFAS were detected (detection limits ranging from 0.12-0.4 ng/g or ppb). These results were consistent with the David Teter Consulting evaluation in **Section 1.1**.
- Second, the product was subjected to a strong oxidation called total oxidizable precursor (TOP) assay. This test provides information on whether there are “other” PFAS in the sample (other than the 70 that were measured in the first test) that may transform into the regulated PFAS over time. The purpose of the TOP Assay analyses is to determine if PFAS precursors are present in the samples. There are thousands of potential PFAS precursors, with only several that are commonly analyzed for by commercial laboratories. The current analytical method can quantify a limited list of PFAS; the list of compounds

includes perfluoroalkyl acids (PFAAs) and select PFAS precursors. TOP Assay is not designed to identify and report on the full suite of PFAS that may be present in each sample. However, through a strong oxidation procedure, the TOP Assay analysis causes the breakdown of PFAS precursor compounds into the measurable and regulated PFAAs. The TOP Assay will not breakdown the persistent compounds like perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS); it will only break down the precursors. In essence, the TOP Assay accelerates the natural rate of transformation of PFAS in the environment. As a result, this analysis can be used to quantify the potential risk of accelerating precursor transformation into PFAAs that could result from the oxidation of these samples, a worst-case scenario.

The post-oxidation analysis of the carpet turf sample showed very low level, trace concentrations of a limited number of PFAS but it also showed that this strong oxidation did not result in a significant increase of the measurable and regulated PFAS, indicating that this carpet sample did not contain a significant mass of <u>other</u> precursor PFAS. Potential transformation or oxidation of PFAS in these materials in the future will not cause an increase in concentrations of regulated PFAS and will not result in additional risk or an additional exposure scenario.

1.3 Brunswick, Maine Study

Finally, a similar study was also performed in Brunswick, Maine. Similar tests were completed on several FieldTurf carpet samples, including the solvent extraction to determine what PFAS may be in the products, the SPLP leaching test to mimic a rain/precipitation event to determine what could leach into the environment, and the TOP Assay oxidation to determine potential transformation of “other” PFAS in the future. In this study, only PFAS chemicals regulated by the United States Environmental Protection Agency (USEPA) or the state of Maine were evaluated.

1.4 Appropriateness of Testing Methodologies Utilized

In all three studies described above, appropriate methodologies were used for the intended objectives. In all cases, an established USEPA methodology (Method 537.1) was utilized for the basis of the analysis. It should be noted that USEPA Method 537.1 was developed for drinking water samples. Therefore, the laboratories modified this method to accommodate the artificial turf matrix, which must be prepared/extracted using a different procedure than used for drinking water samples. Additionally, in all cases, the laboratories modified the quantitation approach to utilize isotope dilution, which is the most accurate approach to the quantitation of PFAS and required in subsequent USEPA Methods (e.g., EPA 1633) for non-drinking water matrices. Isotope dilution provides a correction for potential matrix interferences in the final PFAS results and therefore provides a higher level of accuracy.

The purpose of each testing method was as follows:

1. Solvent extraction: This analysis utilizes a chemical solvent that is designed to extract the PFAS from the product. These data are used to indicate whether or not PFAS are present in the products and at what concentration followed by an evaluation of human health risk.
2. TOP Assay: The purpose of the TOP Assay analyses is to determine if PFAS precursors are present in the samples, as described above. This analysis is used to quantify the potential risk of accelerating precursor transformation into PFAAs that could result from

the oxidation of these samples, a worst-case scenario. These data are used as part of the human health risk evaluation.

3. SPLP: The purpose of this test is to determine if PFAS could leach out of the product into the environment during a rain/precipitation event. Samples are extracted/shaken in a slightly acidic water matrix, designed to mimic rainwater, for a 18-24 hour period. This process simulates the natural leaching process that occurs to wastes on or in the ground as a result of precipitation and is used to determine the mobility/leachability of analytes (i.e., PFAS) and the potential for those analytes to impact groundwater or surface water.

A summary of the PFAS results from each of the three studies is provided in **Table 1**.

Table 1. Summary of Turf Carpet PFAS Studies

Study	Type of Test	Summary of Results
David Teter Consulting (November 2019) 6 FieldTurf carpet samples, including Classic HD and Revolution 360, tested for 29 PFAS	Solvent extraction	PFAS not detected (<0.79-0.81 ng/g)
	SPLP leaching	PFAS not detected (<2-5 ng/L)
Portsmouth, NH Study (June 2022) 1 FieldTurf carpet sample tested for 70 PFAS	Solvent extraction	PFAS not detected (<0.12-0.4 ng/g)
	TOP Assay oxidation	Trace levels PFAS detected: HFPO-DA: 0.515 J ng/g PFBA: 0.199 J ng/g PFPeA: 0.0499 J ng/g PFHxA: 0.0570 J ng/g PFOS: 0.135 ng/g PFPrA: 1.08 J ng/g R-Eve: 0.0679 J ng/g
Brunswick, ME Study (July/August 2023) 5 FieldTurf carpet samples tested for 10 PFAS	Solvent extraction	4 samples: PFAS not detected (<0.80-0.85 ng/g) 1 sample: PFBA: 1.5 ng/g
	TOP Assay oxidation	3 samples PFAS not detected (<0.86 ng/g) 2 samples: PFBA: 0.28 J ng/g / 0.22 J ng/g
	SPLP leaching	4 samples PFAS not detected (<1.8-2.0 ng/L) 1 sample: PFHpA: 0.23 J ng/L

J – estimated value; detected below the reporting limit
ng/g – nanograms per gram (parts per billion)
ng/L – nanograms per liter (parts per trillion)

1.5 Infill Testing

In the packet provided to the Town, there was one PFAS testing report provided for the infill from 2020. The samples were analyzed for 30 PFAS; PFAS were not detected in either of the two samples submitted.

2.0 EVALUATION OF DATA FROM PREVIOUS TURF CARPET STUDIES

TRC performed an evaluation of these data to determine the following:

- Is there a risk to humans from being exposed to PFAS which may be present in this turf material?
- Is there a risk to the environment from the leaching of PFAS from these turf materials?

Consideration was made as to which PFAS were detected and the types of exposure applicable to the tested materials.

Is there a risk to humans from being exposed to PFAS which may be present in this turf material?

To do this evaluation, the detected concentrations of PFAS were compared to available promulgated USEPA and state human health-based residential soil screening values. The USEPA (USEPA 2024b) and individual states (ITRC 2024) have derived health-based soil screening criteria under residential exposures for some of the PFAS. These screening values are meant to establish unlimited use of contaminated soil sites and therefore are extremely conservative (i.e., health protective) when used for comparing concentrations in artificial turf. When neither of these values were available for a particular PFAS compound, the lowest available screening value was obtained from another state. Finally, if there were no promulgated screening values available for a particular compound, we used the lowest state residential soil screening level as a surrogate. Therefore, this resulted in a very conservative evaluation.

Comparing detected concentrations of PFAS in the artificial turf products to available residential soil screening criteria is a highly conservative and health protective approach.

- USEPA soil screening criteria for a residential setting assume a combination of ingestion, dermal contact and inhalation exposures over a period of 24 hours/day, 350 days/year for 6 years for non-cancer effects and over a period of 350 days/year for a combined 26 years (20-year-old adult and 6-year-old child combined exposures) for carcinogenic effects (USEPA 2014, 2024c). Exposures to the artificial turf components will be significantly lower than these assumed residential soil exposures.
- The primary route of exposure for residential soils is assumed to be ingestion, whereas exposure to the artificial turf carpet would be primarily through limited dermal exposure. Some physical contact is expected with the artificial turf when in use.

The samples that were tested using solvent extraction and TOP Assay provide data that can be used to compare to residential soil screening values. Currently, there are no residential soil screening criteria in Rhode Island. For purposes of evaluating these data for Burrillville, the lowest available residential soil screening criteria in New England were used for comparison. In addition, USEPA's residential soil screening criteria are presented.

David Teter's report on the two Burrillville products showed none of the PFAS were detected in these products. Some of the carpet turf samples from Portsmouth, NH and Brunswick, ME had low-level trace concentrations of a limited number of PFAS. When these concentrations were compared to the health-based screening levels, concentrations were orders of magnitude below the target benchmark levels, indicating no significant risk from exposure to these compounds. Like any chemical, there is a limit as to when the chemical may have adverse effects; in these cases, the concentrations detected were orders of magnitude below these levels. Refer to **Table 2** for a summary of these results compared to the regulatory criteria as well as values from a PFAS background study performed in Rhode Island. **Figures 1a and 1b** also provide a visual comparison of detected results to regulatory criteria.

It should be noted that regulatory criteria do not currently exist for two of the PFAS detected (PFPeA and R-Eve). If regulatory criteria were to be developed for PFPeA in the future, the criteria would most likely be similar to the criteria for PFBA and PFHxA, which have similar chemical structure and bracket PFPeA in terms of carbon number range (i.e., PFBA: 4 carbons; PFPeA: 5 carbons; PFHxA: 6 carbons). The detected concentration of PFPeA was 640,000x lower than the lowest of the current criteria for PFBA and PFHxA. Although, there are no current regulatory criteria for R-EVE, the detected concentration of R-EVE was 93x lower than the current criteria for PFOS. Therefore, it is unlikely these PFAS will present an issue from a human health perspective in the future.

Is there a risk to the environment from the leaching of PFAS from these turf materials?

The SPLP leachate test is used primarily as a means of determining potential mobility and leachability of PFAS from the artificial turf samples and is used to determine the potential for a material left on the ground to impact groundwater or surface water.

The USEPA (USEPA 2024a, 2024b) and individual states (ITRC 2024) have also derived health-based groundwater screening criteria and drinking water maximum contaminant levels (MCLs) for some of the PFAS. **Table 3** presents a summary of the USEPA and Rhode Island groundwater screening values and maximum contaminant levels (MCLs) compared to the results of the turf carpet studies.

- The detected results were compared to available groundwater/drinking water/surface water screening criteria. David Teter's evaluation showed no PFAS were detected in this leachate test for the two Burrillville products. The Brunswick, ME test showed trace levels of one PFAS chemical in one out of five samples but it was 87x below the screening criteria in combination with the understanding that this leachate would also be diluted upon entering the aquifer. Therefore, there would not be an adverse impact to the environment based on the presence of the trace level of this one PFAS in the leachate. **Figure 2** also provides a visual comparison of the detected result to regulatory criteria.
- The SPLP extractions of the proposed turf samples did not result in a significant increase of PFAS, indicating that PFAS leachability and mobility from these materials will not be of concern.

NOTE:

AQUEOUS SAMPLE (TURF LEACHATE) RESULTS ARE REPORTED IN UNITS OF NG/L (PARTS PER TRILLION)

SOLID TURF RESULTS ARE REPORTED IN UNITS OF NG/G (PARTS PER BILLION).

CONCENTRATIONS IN AQUEOUS SAMPLES ARE COMPARED TO GROUNDWATER/DRINKING WATER/SURFACE WATER CRITERIA.

CONCENTRATION IN SOLID SAMPLES ARE COMPARED TO SOIL CRITERIA.

Table 2. Summary of PFAS Results from Studies Performed on Solid Turf Material

PFAS	Regulatory Criteria				Sample Results					Human Health Risk Evaluation
	USEPA RSL (USEPA 2024b)	Lowest New England State Criteria (ITRC 2024)	Lowest State Direct Contact Criteria for Other PFAS With No EPA or New England State Criteria (ITRC 2024)	Background Values in Rhode Island (2023 Study) Click here for study	David Teter Nov 2019 Study	Portsmouth NH June 2022 Study		Brunswick, ME July/August 2023 Study		
	ng/g (ppb)	ng/g (ppb)	ng/g (ppb)	ng/g (ppb)	Solvent extraction ng/g (ppb)	Solvent extraction ng/g (ppb)	TOP Assay ng/g (ppb)	Solvent extraction ng/g (ppb)	TOP Assay ng/g (ppb)	
PFBA	**78,000**	**110,000 (ME)**	-	NA	<0.81	<0.4	**0.199 J**	**1.5**	**0.28 J**	PFBA detections 52,000x lower than regulatory criteria
PFBS	19,000	26,000 (ME)	-	NA	<0.81	<0.4	<0.4	<0.9	<0.97	Not detected
PFPeA	NA	NA	NA	NA	<0.81	<0.12	**0.0499 J**	+	+	Trace PFPeA; no regulatory criteria
PFHxA	**32,000**	**43,000 (ME)**	-	NA	<0.81	<0.12	**0.0570 J**	<0.9	<0.97	PFHxA detection 560,000x lower than regulatory criteria
PFHxS	1,300	100 (NH)	-	0.087	<0.81	<0.12	<0.12	<0.9	<0.97	Not detected
PFHpA	NA	300 (MA)	-	0.178	<0.81	<0.12	<0.12	<0.9	<0.97	Not detected
PFHpS	NA	NA	13 (HI)	NA	<0.81	<0.12	<0.12	+	+	Not detected
PFOA	0.019	200 (NH)	-	0.639	<0.81	<0.12	<0.12	<0.9	<0.97	Not detected
PFOS	**6.3**	**100 (NH)**	-	0.842	<0.81	<0.12	**0.135**	<0.9	<0.97	PFOS detection 47x lower than regulatory criteria
PFNA	190	100 (NH)	-	0.172	<0.81	<0.12	<0.12	<0.9	<0.97	Not detected
PFDA	NA	300 (MA)	-	0.110	<0.81	<0.12	<0.12	<0.9	<0.97	Not detected
PFUnDA	19,000	NA	-	NA	<0.81	<0.12	<0.12	+	+	Not detected
PFDoDA	3,200	NA	-	NA	<0.81	<0.12	<0.12	+	+	Not detected
PFTeDA	63,000	NA	-	NA	<0.81	<0.12	<0.12	+	+	Not detected
HFPO-DA (Gen-X)	**230**	**320 (ME)**	-	NA	**0.075 J**	<0.4	**0.515 J**	<0.9	<0.97	HFPO-DA detections 450x lower than regulatory criteria
TFSI	23,000	NA	-	NA	+	+	+	+	+	Not analyzed
PFODA	2,500,000	NA	-	NA	+	<0.12	<0.12	+	+	Not detected
PFPrA	**39,000**	NA	-	NA	+	+	**1.08 J**	+	+	PFPrA detection 36,000x lower than regulatory criteria
R-EVE	NA	NA	-	NA	+	+	**0.0679 J**	+	+	Trace R-EVE; no regulatory criteria

NA – No standard/value available for this PFAS
RSL – Regional Screening Level
- Standard available from USEPA or New England State
+ Analysis not performed for this PFAS

Detected concentrations; refer to Figures 1a and 1b.
USEPA regulatory screening criteria for detected PFAS; refer to Figures 1a and 1b.
Lowest New England state screening criteria for detected PFAS; refer to Figures 1a and 1b.

Table 3. Summary of PFAS Results from Studies Performed on Leachates of Turf Material

PFAS	Regulatory Criteria					Sample Results		Environmental Risk Evaluation
	USEPA RSL (USEPA 2024b)	RIDEM Criteria (Groundwater GAA or Drinking water)	RIDEM Criteria (Surface water)	Lowest State Criteria for Other PFAS With No EPA or RIDEM Criteria (ITRC 2024)	USEPA MCLs (USEPA 2024a)	David Teter Nov 2019 Study	Brunswick, ME July/August 2023 Study	
	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	SPLP Leach ng/L (ppt)	SPLP Leach ng/L (ppt)	
PFBA	18,000	NA	NA	-	NA	<5	+	Not detected
PFBS	6,000	NA	NA	-	*	<5	+	Not detected
PFPeA	NA	NA	70[1]	-	NA	<5	+	Not detected
PFHxA	9,900	NA	70[1]	-	NA	<5	+	Not detected
PFHxS	390	20[1]	70[1]	-	10 (*)	<5	<2	Not detected
PFHpA	NA	**20[1]**	**70[1]**	-	NA	<5	**0.23 J**	PFHpA detection 87x lower than regulatory criteria
PFHpS	NA	NA	NA	20 (HI)	NA	<5	+	Not detected
PFOA	0.0027	20[1]	70[1]	-	4	<2	<2	Not detected
PFOS	2	20[1]	70[1]	-	4	<5	<2	Not detected
PFNA	59	20[1]	70[1]	-	10 (*)	<5	<2	Not detected
PFDA	NA	20[1]	70[1]	-	NA	<5	<2	Not detected
PFUnDA	6,000	NA	NA	-	NA	<5	+	Not detected
PFDoDA	1,000	NA	NA	-	NA	<5	+	Not detected

Table 3. Summary of PFAS Results from Studies Performed on Leachates of Turf Material

PFAS	Regulatory Criteria					Sample Results		Environmental Risk Evaluation
	USEPA RSL (USEPA 2024b)	RIDEM Criteria (Groundwater GAA or Drinking water)	RIDEM Criteria (Surface water)	Lowest State Criteria for Other PFAS With No EPA or RIDEM Criteria (ITRC 2024)	USEPA MCLs (USEPA 2024a)	David Teter Nov 2019 Study	Brunswick, ME July/August 2023 Study	
	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	SPLP Leach ng/L (ppt)	SPLP Leach ng/L (ppt)	
PFTeDA	20,000	NA	NA	-	NA	<5	+	Not detected
HFPO-DA (Gen-X)	15	NA	NA	-	10 (*)	<5	+	Not detected
TFSI	5,900	NA	NA	-	NA	+	+	Not analyzed
PFODA	800,000	NA	NA	-	NA	+	+	Not analyzed
PFPrA	9,800	NA	NA	-	NA	+	+	Not analyzed
R-EVE	NA	NA	NA	NA	NA	+	+	Not analyzed

NA – No standard available for this PFAS
- Standard available from USEPA or Rhode Island
+ Analysis not performed for this PFAS
[1] Criteria are for individual PFAS and sum of listed PFAS
*Also used to confirm hazard index <1 when 1 or more of these PFAS detected

Detected concentration; refer to Figure 2.
RIDEM Groundwater screening criteria; refer to Figure 2.
RIDEM Surface Water criteria; refer to Figure 2.

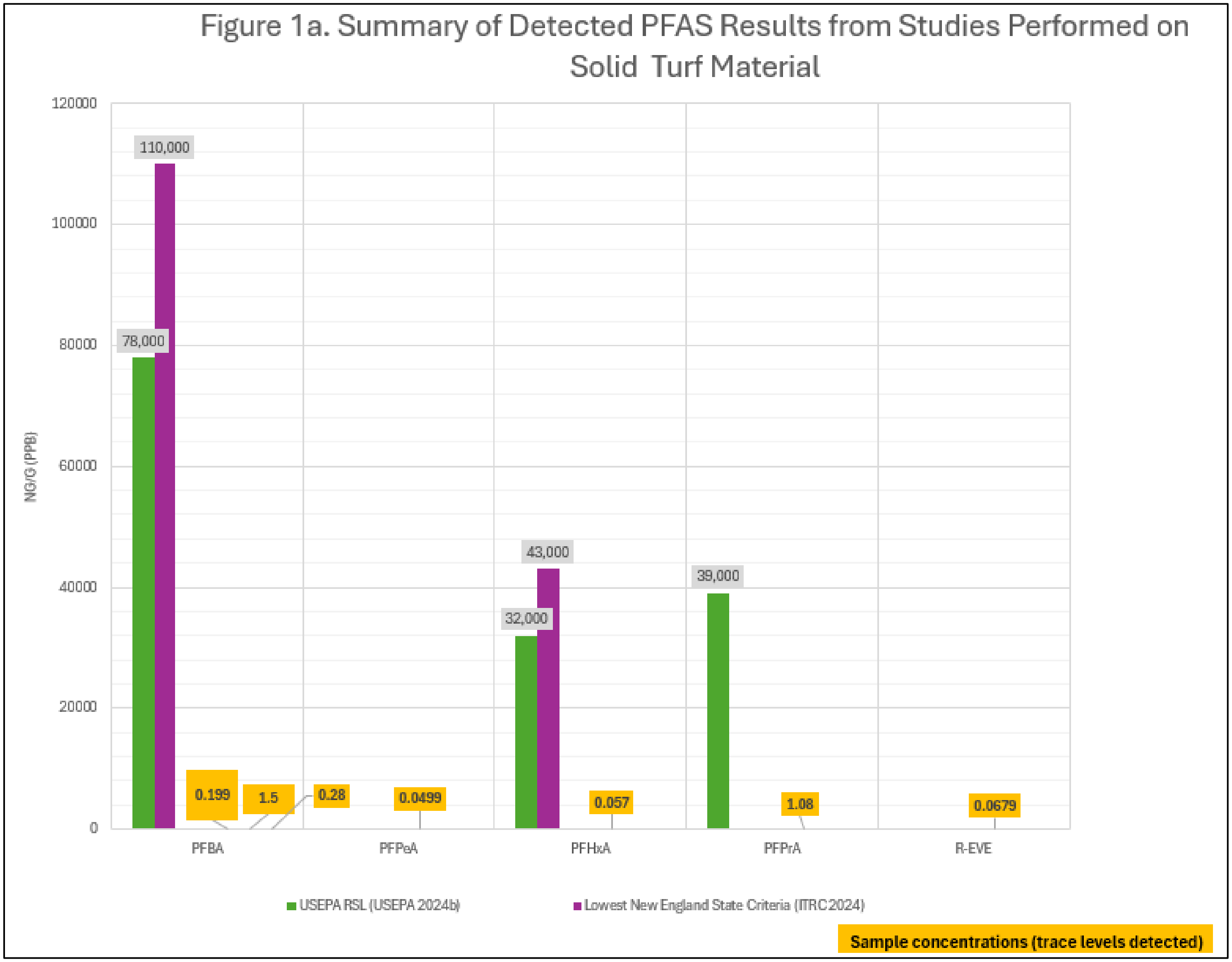
Figure 1a. Summary of Detected PFAS Results from Studies Performed on Solid Turf Material
NG/G (PPB)
120000
100000
80000
60000
40000
20000
0
110,000
78,000
43,000
32,000
39,000
0.199
1.5
0.28
0.0499
0.057
1.08
0.0679
PFBA
PFPeA
PFHxA
PFPrA
R-EVE
USEPA RSL (USEPA 2024b)
Lowest New England State Criteria (ITRC 2024)
Sample concentrations (trace levels detected)

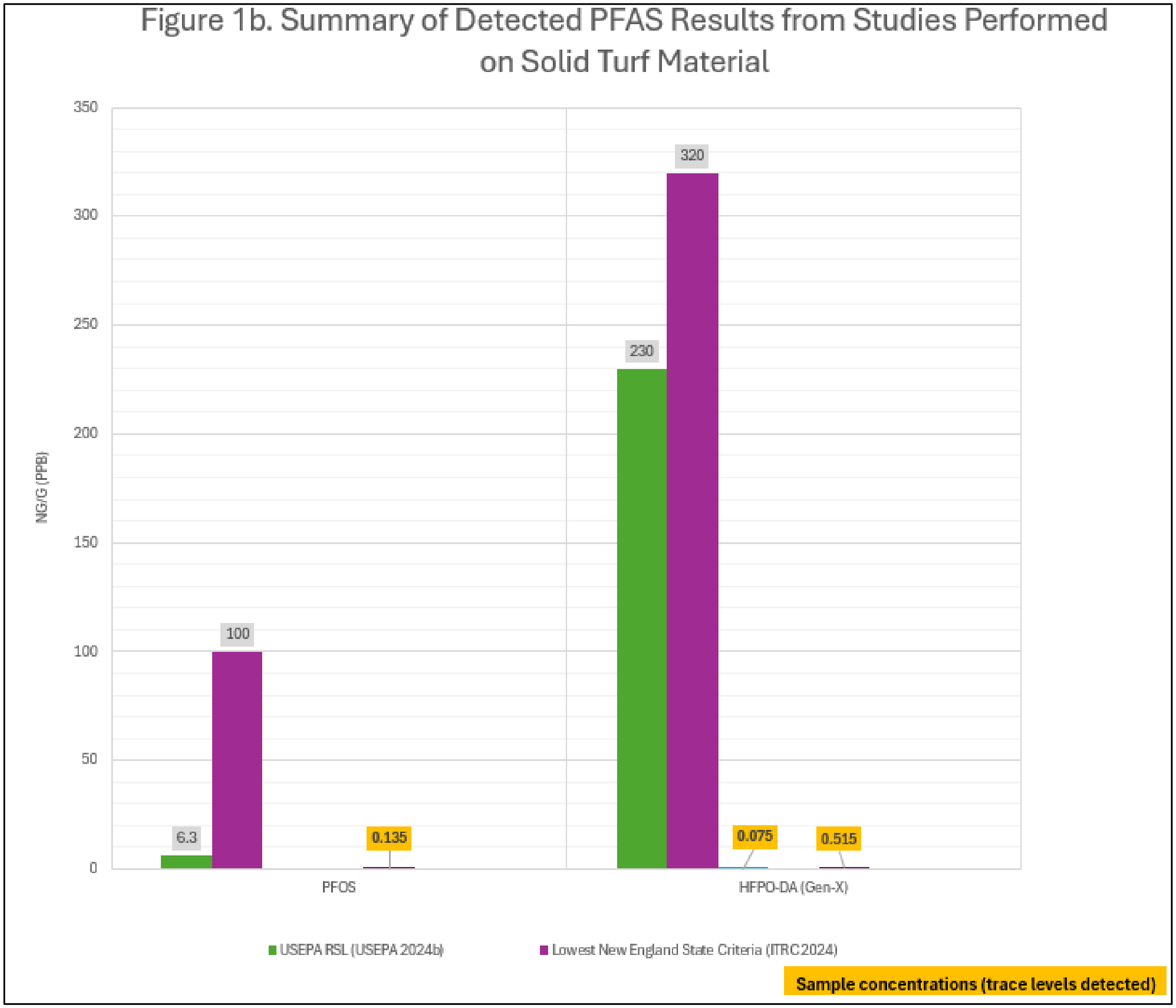

Figure 1b. Summary of Detected PFAS Results from Studies Performed on Solid Turf Material
NG/G (PPB)
350
300
250
200
150
100
50
0
6.3
100
0.135
230
320
0.075
0.515
PFOS
HFPO-DA (Gen-X)
USEPA RSL (USEPA 2024b)
Lowest New England State Criteria (ITRC 2024)
Sample concentrations (trace levels detected)

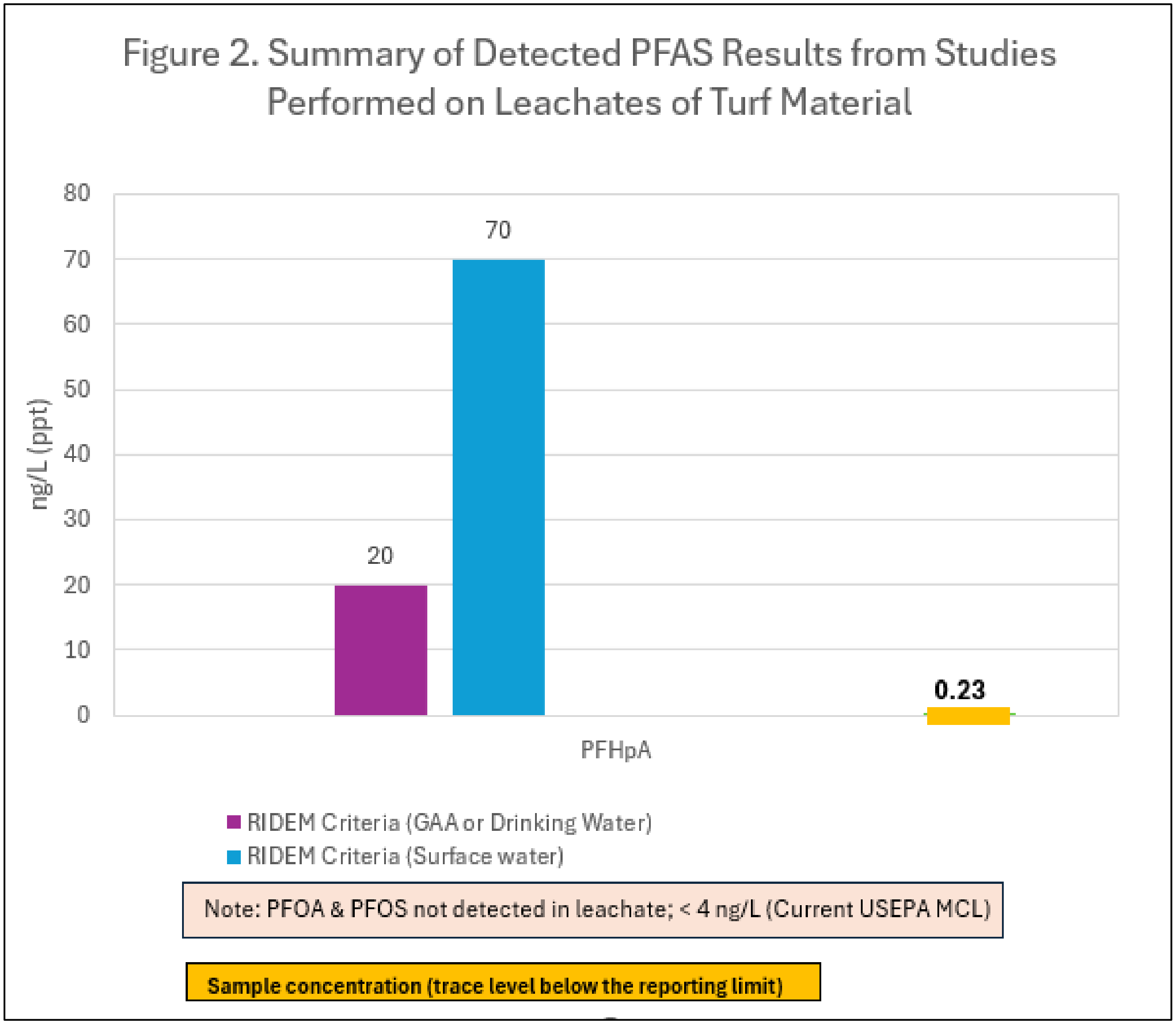
Figure 2. Summary of Detected PFAS Results from Studies Performed on Leachates of Turf Material
80
70
60
50
40
30
20
10
0
ng/L (ppt)
70
20
0.23
PFHpA
RIDEM Criteria (GAA or Drinking Water)
RIDEM Criteria (Surface water)
Note: PFOA & PFOS not detected in leachate; < 4 ng/L (Current USEPA MCL)
Sample concentration (trace level below the reporting limit)

Conclusions of Turf Evaluation

Based on this evaluation, it has been demonstrated that the detection of very low levels of a very limited number of PFAS in the artificial turf does not represent a human health risk to those using the artificial turf ballfields and it does not pose a risk to the environment, the groundwater, the surface water, and the aquifer.

With the detected concentration of one PFAS in one of the FieldTurf carpet turf samples being below the groundwater screening criteria in combination with the understanding that the leachate would be diluted upon entering the aquifer, there would not be an adverse impact to the environment based on the presence of this PFAS in the SPLP extract.

It is expected that there will be physical contact with the artificial turf when in use. Some of the artificial turf samples had low-level trace concentrations (reported as "J" estimated values in Table 2) of a limited number of PFAS. When compared to the health-based screening levels, concentrations were orders of magnitude below the target benchmark levels, thus indicating no significant risk from exposure to these compounds.

3.0 RHODE ISLAND CONSUMER PFAS BAN ACT OF 2024, HB 7356 (CHAPTER 18.18)

A review of the recent enacted Consumer PFAS Ban Act of 2024 was performed. The pertinent sections of this Act, in relation to artificial turf, are summarized below with review comments. In summary, the Town of Burrillville will be in compliance with this regulation.

23-18.18-2: *It is the intent of the general assembly to ban uses of PFAS in covered products by January 1, 2029, unless the use of PFAS in the covered product is considered unavoidable*. Covered product includes artificial turf.

23-18.18-4 (b): *Except as provided otherwise in this section, on and after January 1, 2029, no person shall manufacture, sell, offer for sale, or distribute for sale in the state: (1) Artificial turf containing intentionally added PFAS*.

- The Town of Burrillville will not be manufacturing, selling, offering for sale, or distributing for sale artificial turf containing intentionally added PFAS.
- 23-18.18-3: (12): *Intentionally added PFAS means PFAS added to a covered product or one of its product components to provide a specific characteristic, appearance or quality or to perform a specific function. "Intentionally added PFAS" also includes any degradation byproducts of PFAS or PFAS that are intentional breakdown products of an added chemical. The use of PFAS as a processing agent, mold release agent or intermediate is considered intentional introduction for the purposes of this chapter where PFAS is detected in the final covered product.*
- The manufacturers of the artificial turf products being used by Burrillville have attested that their products do not contain intentionally added PFAS. This attestation is allowed as per 23-18.18-4 (c) (1): *If the department has reason to believe that a covered product contains intentionally added PFAS and the covered product is being offered for sale in the state, the director may direct the manufacturer of the product to, within thirty (30) days:*

(1) Provide the director a certificate attesting that the covered product does not contain intentionally added PFAS.

4.0 RESPONSES TO ATTORNEY MARISA DESAUTEL/ROBERTA LACEY COMMENTS AT PUBLIC MEETING ON 6/26/2024

The comments made during the public meeting on June 26, 2024 by Attorney Marisa Desautel on behalf of Roberta Lacey, were reviewed. These comments are summarized below followed by responses addressing the concerns brought forth.

1. *Comment: PFAS are extremely high risk to human health and the environment: this is especially concerning because the field is sited in an aquifer overlay district and groundwater recharge area that provides drinking water to several drinking water wells and an irrigation well to be used for the turf field itself. PFAS are known as forever chemicals because they do not biodegrade and they persist in the environment and human body. PFAS are linked to a wide range of health risks in humans and animals.*

   Response: PFAS can be a risk to human health and the environment. However, like any chemical, there are regulatory criteria developed to show the concentration at which the chemical becomes adverse to human health or the environment. The evaluations provided in **Section 2.0** show that although trace levels of limited PFAS were detected, these levels were orders of magnitude below any regulatory criteria, indicating they are not a risk to human health or the environment.

2. *Comment: PFAS does exist in turf fields despite manufacturer's claims. Samples tested were for a different purpose. They tested solids as a player that is actually using the field. They did not test leachate (stormwater runoff). There is concern that the leachate will go into the groundwater reservoir that residents rely on for drinking water. An SPLP procedure should have been performed. The report compares PFAS concentrations in solids to criteria in liquids. The right method (537M) was used but on wrong type of solid. They sampled solid and not liquids that would leach out and contaminate the groundwater.*

   Response: There appears to be a lack of understanding of the tests performed. The David Teter consulting report provided both solid turf testing and SPLP leachate testing. The Portsmouth, NH report provided solid turf testing and a TOP Assay oxidation of solid turf material. The evaluations provided in **Section 2** show that the leachate would not cause a concern to the environment. Results were well below the regulatory criteria in combination with the understanding that the leachate would be diluted upon entering the aquifer and therefore would not have an adverse impact to the environment.

3. *Comment: Some forms of regulated PFAS were suppressed in the report. The report indicated in the post TOP assay, concentration of 6:2 FTS but this a precursor to PFAS. So, if they sample only solid (not liquids), the precursor does not have chance to convert and add to the regulated PFAS you would pick up in your detection.*

   Response: There appears to be a lack of understanding of the tests performed. The post TOP Assay result shows the worse case scenario of the conversion of precursor PFAS to regulated PFAS. If the regulated PFAS were not detected, this is a good indication that transformation of precursor PFAS in the turf material to regulated PFAS would not occur in the environment. The leachate test will demonstrate what will leach off of the material, not conversion of precursor PFAS.

4. <u>Comment</u>: *In speaking with their groundwater expert and staff at RIDEM, as PFAS leaches from the turf field, it is anticipated to discharge into the groundwater recharge designated area. Although the field is not directly within the recharge zone of public water supply, it could still impact areas with private wells. There are homes with private wells nearby the proposed field as well as an irrigation well meant to be used for the turf field. Groundwater recharge areas are classified as GAA, which stands for areas designated with the highest groundwater quality in the state.*

   <u>Response</u>: The evaluations provided in **Section 2.0** show that the leachate would not cause a concern to the environment. Results were well below the regulatory criteria in combination with the understanding that the leachate would be diluted upon entering the aquifer and therefore would not have an adverse impact to the environment. The results provided in **Section 2.0** were below the current RIDEM GAA criteria for PFAS in groundwater.

5. <u>Comment</u>: *The federal government listed PFAS as a Superfund contaminant. This means liability for anyone involved with the release of PFAS. In April 2024, EPA issued that enforcement would be focused on parties that significantly contribute to release of PFAS chemicals into the environment. This would include the town.*

   <u>Response</u>: In April 2024, EPA designated two PFAS chemicals (not all PFAS) as hazardous substances under CERCLA, PFOA and PFOS. The results provided in **Section 2.0** demonstrate that the turf material would not contribute PFOA or PFOS to the environment. In addition, it should be noted that this ruling pertains to the release of 1 pound of PFOA or PFOS within a 24-hour period. Turf material would not cause such a release. As a comparison, a release of a product known to contain PFAS such as aqueous film forming foam (AFFF) may cause a 1 pound reporting obligation when millions of gallons are released in a 24-hour period. The CERCLA rule advises EPA personnel to concentrate efforts on sites with significant PFAS manufacturing or usage, federal facilities, or other industrial parties; artificial turf fields do not fall under these scenarios. CERCLA liability would not apply to the planned installation of artificial turf by a municipality. This federal statute provides for the cleanup of uncontrolled or abandoned hazardous waste sites as well as accidents, spills and other emergency releases of hazardous substances. Any potential impacts from the use of artificial turf would fall under the purview of the Rhode Island Department of Environmental Management or the Rhode Island Department of Health and the results of testing to date from the FieldTurf manufacturer or on other projects completed by TRC have not identified any potential for leaching of PFAS at levels above regulatory criteria associated with drinking water, groundwater or surface water in Rhode Island.

6. <u>Comment</u>: *North Smithfield High School project: They were in a similar situation. North Smithfield shut down a well because of PFAS contamination; evidence showed a circle of PFAS contamination that radiated around the turf field at North Smithfield high school. Wells upgradient of the high school do not indicate high levels of PFAS and those within the recharge area do. If PFAS moves as our water quality expert thinks it will into private*

wells near athletic fields after construction, EPA and DEM would not rule out looking to Burrillville HS or Town of Burrillville for enforcement action under PFAS liability policy.

Response: As noted in response to comment #5, liability by Burrillville would not be impacted by the CERCLA Hazardous Substance designation by EPA. The source of contamination in North Smithfield has not been linked to artificial turf and should not be used as an example case study.

5.0 PROPOSED NEXT STEPS

Although the Town of Burrillville has demonstrated that the proposed artificial turf will not be a threat to human health or the environment and is in compliance with the Consumer PFAS Ban Act of 2024, a further evaluation of the artificial turf materials will be performed.

The proposed turf carpet and infill material will be submitted for chemical analysis as follows:

- Solvent extraction of materials for the list of 40 PFAS included in the current EPA Method 1633
- TOP Assay testing for the list of 40 PFAS included in the current EPA Method 1633
- SPLP testing for the list of 40 PFAS included in the current EPA Method 1633

TRC will work with the artificial turf manufacturers to ensure proper collection and shipping of the specified materials to the analytical laboratory. One set of samples will be submitted to the laboratory for analysis directly from the manufacturer. The town may also opt to submit a set of samples to the laboratory for analysis upon receipt of materials in Burrillville. The results of these tests will be evaluated in a similar manner as discussed above in **Section 2.0**.

All analyses will be performed by Eurofins Environment Testing in West Sacramento, California, who has decades of experience in specialty testing. As pioneers of high resolution, liquid chromatography, and isotope dilution methods, consultants, industry, and government agencies have long counted on Eurofins to develop innovative analytical solutions or validate standardized methods. With these long-standing reputations for innovation and excellence in the specialty testing realm, Eurofins laboratories were the first place the major players in the PFAS space turned to for support, collaboration, research, and problem solving. Not only did Eurofins develop the first of many commercial methods to support PFAS analysis starting in the year 2000, but they have continued to lead the charge across new frontiers to develop techniques for capturing everything from PFAS in biosolids, to AFFF, artificial turf, pesticides, food, activated carbon, dispersions, air, blood, and much more. When clients or agencies need a solution for something that hasn't been created yet, such as PFAS in source air or ultra short chain PFAS, they have come to Eurofins for solutions. When the defensibility of the data is critical, they come to Eurofins. When technical insights and consultation are needed, they come to Eurofins. Eurofins' model is unique and incredibly beneficial to clients, where they conduct all of the research and development in their Centers of Excellence while providing access to additional capacity for routine work through their auxiliary labs around the country.

A proposal for this evaluation was submitted to the Town of Burrillville on July 12, 2024 and authorized by the Town on July 16, 2024.

The anticipated schedule for this testing is as follows:

First set of samples submitted to Eurofins	Week of 7/29/24
Laboratory results provided to TRC	TBD
Evaluation and report provided to Town of Burrillville	TBD
Second set of samples submitted to Eurofins (optional)	TBD
Laboratory results provided to TRC (optional)	TBD
Evaluation and report provided to Town of Burrillville (optional)	TBD

6.0 REFERENCES

ITRC 2024. Interstate Technology Regulatory Council (ITRC). PFAS – Per and Polyfluoroalkyl Substances. PFAS Water and Soil Values Table Excel File. Updated April. On-line at: Fact Sheets – PFAS — Per- and Polyfluoroalkyl Substances (itrcweb.org)

USEPA 2014. Memorandum: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-1200, February 6.

USEPA 2024a. Final PFAS National Primary Drinking Water Regulation. April 2024. https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

USEPA 2024b. Regional Screening Levels (RSLs) – Generic Tables. Summary Table (TR=1E-06, THQ = 1.0). May. On-line at: https://semspub.epa.gov/src/document/HQ/404463

USEPA 2024c. Regional Screening Levels (RSLs) – Equations. May. On-line at: https://www.epa.gov/risk/regional-screening-levels-rsls-equations