

SYNTHETIC
TURF
LABORATORY
TESTING AND
ANALYSIS

FINDINGS

MARTHA'S VINEYARD
COMMISSION
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HW ROLE

- Conducted Environmental Performance peer review for MVC
- Recommended additions to Applicant's original material testing proposal to better evaluate potential PFAS
- Supported MVC/Tetra Tech during testing and risk assessment
- Reviewed lab results and Tetra Tech's *Synthetic Turf Laboratory Testing and Analysis Summary Report* dated 2/26/21
- Submitted conclusions and recommendations to MVC based on our interpretation of the data

TESTING & ANALYTICAL METHODS

- Applied best available science and existing risk-based standards
- Looked at semi-volatile organic compounds (SVOCs), metals, Total Fluorine (TF)/Total Organic Fluorine (TOF) and per and polyfluoroalkyl substances (PFAS)
- Mass loading estimates
- Methods imperfect but informative
- Results answered several questions:
 - What known compounds are in materials and are they a contact risk?
 - What known compounds could leach into soils and are they a risk to groundwater?
 - What is the potential for PFAS-related impacts?
- Results inconclusive on significance of detected TOF and PFAS-related compounds

WHAT ARE
WE
LOOKING
FOR WITH
THESE
TESTS?

- Semi-volatile organic compounds (SVOCs)
- MCP 14 Metals
- Per and polyfluoroalkyl substances (PFAS)
 - Total Oxidizable Precursor Analysis (TOPA)
 - Total Fluorine/Total Organic Fluorine (TOF)
- Total concentrations
- Leaching potential
- Theoretical mass loading
 - 100-yr storm
 - Annual rainfall

COMPARABLE STANDARDS

- The Massachusetts Contingency Plan (MCP) Method 1 S-1/GW-1 and S-1/GW-3
 - risk of dermal contact and incidental ingestion/inhalation exposures to oil and/or hazardous materials (OHM) by adults and children over a lifetime
 - potential leaching to drinking water and surface water
- The Environmental Protection Agency (EPA) risk-based Regional Screening Levels
- Massachusetts Department of Environmental Protection (MassDEP) background levels of metals and polycyclic aromatic hydrocarbons (PAHs) in soil
- Background levels of PFAS in Vermont
- The Consumer Product Safety Act, USC 1278a that regulates certain hazardous materials in consumer products.

SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) ANALYSIS

1. Estimate of the concentration of OHM that may leach into the underlying groundwater.
2. Compared to the following standards:
 - The MCP Method 1 GW-1 standard
 - protective of current and future drinking water sources.
 - considers ingestion, inhalation, and dermal absorption of OHM in groundwater
 - The MCP Method 1 GW-2 standard
 - potential for OHM of vapors to impact indoor air
 - The MCP Method 1 GW-3 standard
 - evaluates potential discharge of OHM to surface water
 - The EPA risk-based Regional Screening Levels for tap water
 - The EPA Maximum contaminate Levels.

RESULTS

- Select semi-volatile organic compounds (SVOCs), metals, and per and polyfluoroalkyl substances (PFAS) were detected in most samples
 - Most at background levels or below comparison soil and groundwater standards
 - A few exceedances of comparison value were noted
 - Antimony
 - phenol
 - PFAS precursor (TOPA PFHpA)
- Mass loading estimates
 - Below MassDEP reporting requirements
 - Total 31.5 lbs
- Leaching analyses not performed for PFAS precursors (TOPA) or total organic fluorine (TOF)

SOLIDS ANALYSIS

Sample	Semi-volatile organic compounds (SVOCs)	MCP 14 Metals	Per and polyfluoroalkyl substances (PFAS)	Total Oxidizable Precursor Analysis (TOPA)	Total Fluorine/Total Organic Fluorine
Turf Carpet	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values
BrockFill	<u>Detected and exceeds at least one comparison value</u>	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values	<u>Detected and exceeds at least one comparison value</u>	Not detected by the laboratory
Shockpad	Not detected by the laboratory	<u>Detected</u> but below applicable comparison values	Not detected by the laboratory	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values
Ultrabond	Not detected by the laboratory, elevated reporting limits due to matrix	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values
Pellet Glue	Not detected by the laboratory, elevated reporting limits due to matrix	<u>Detected</u> but below applicable comparison values	Not detected by the laboratory	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values

SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) ANALYSIS

Sample	SVOCs	MCP 14 Metals	PFAS
Turf Carpet	<u>Detected</u> but below applicable comparison values	<u>Detected and exceeds at least one comparison value</u>	<u>Detected</u> but below applicable comparison values
BrockFill	<u>Detected</u> but below applicable comparison values	<u>Detected</u> but below applicable comparison values. One or more elevated reporting limits	<u>Detected</u> but below applicable comparison values
Shockpad	Not detected by the laboratory	<u>Detected and exceeds at least one comparison values</u>	<u>Detected</u> but below applicable comparison values
Ultrabond	Not detected by the laboratory	<u>Detected</u> but below applicable comparison values. One or more elevated reporting limits	<u>Detected</u> but below applicable comparison values.
Pellet Glue	Not detected by the laboratory	<u>Detected</u> but below applicable comparison values. One or more elevated reporting limit	Not detected by the laboratory

CONCLUSIONS

1. Field safe to play on

- Detected compounds at concentrations below background and comparable standards for contact
- Risk through direct contact de minimus

2. Phenol leaching well below GW-1 standard

3. PFAS compounds beyond currently regulated 6 (and 24 we looked at) likely exist

- PFHpA TOPA was detected above the MCP Method 1 S-1/GW-1 standard
- Elevated TOF (117 PPM) indicated other unregulated PFAS may be present
- Methods to reliably evaluate leaching not yet available for TOPA or TOF

4. Various SVOCs, metals and PFAS will potentially leach from the turf components into the underlying groundwater

- SPLP leaching of antimony indicates low levels
- no reporting requirement

5. TOF concentrations orders of magnitude greater than regulated PFAS concentrations.

- Reasonable expectation that more compounds may be regulated in the future
- Uncertainty due to testing limitations and understanding of how compounds react in soils and groundwater

6. Estimates of Total mass of OHM in the leachate is 31.5 lbs

RECOMMENDATIONS

1. Acknowledge uncertainty in PFAS results and consider within context of the urban environment
2. No additional testing recommended at this time given limits of the science
3. PFAS testing in proposed monitoring wells
4. Toxicology one of many factors for your consideration