NEW HAMPSHIRE DEPARTMENT OF Environmental Services

PFAS Occurrence in Leachate at New Hampshire Landfills

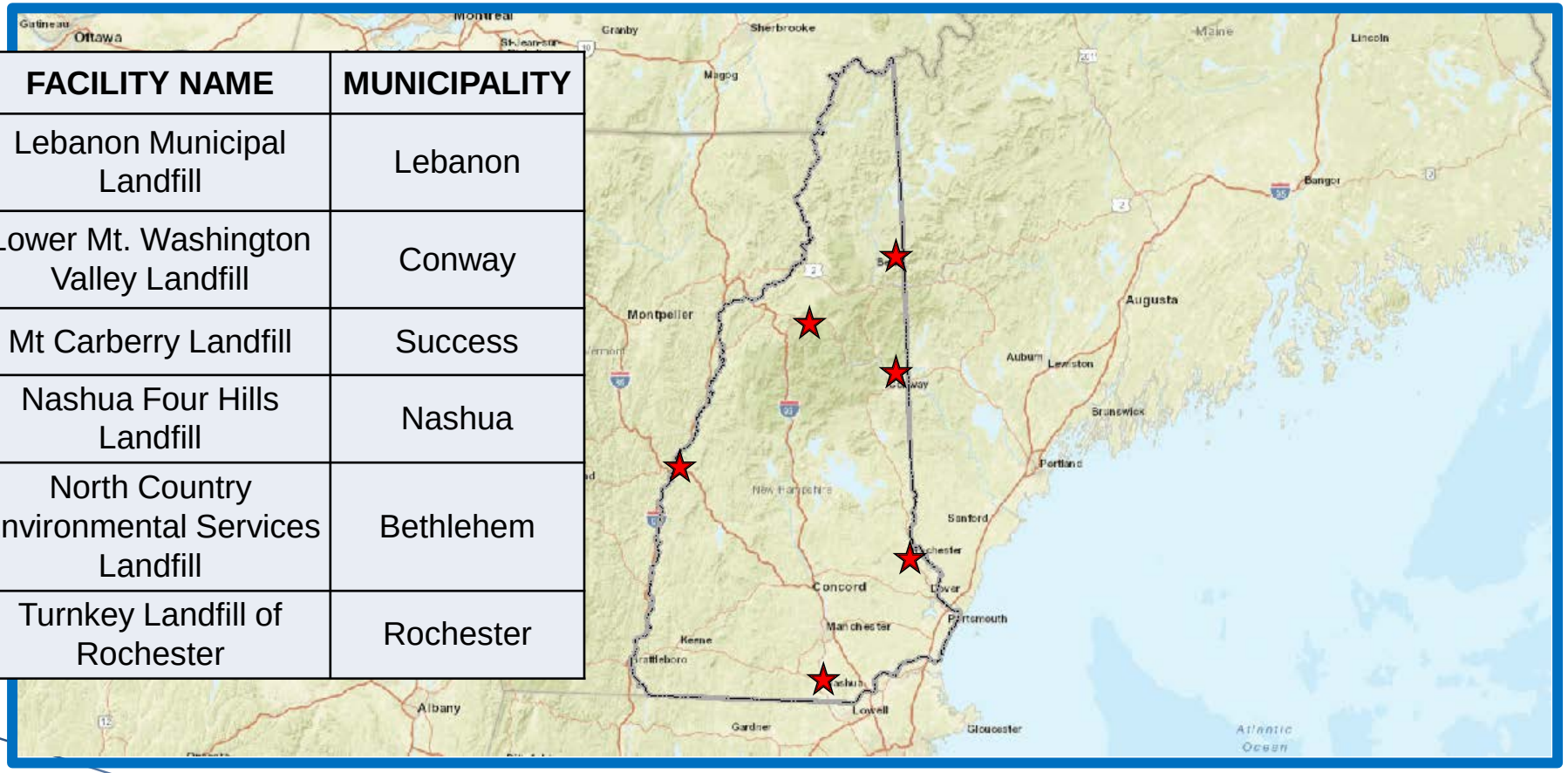
JOINT LEGISLATIVE
FISCAL COMMITTEE

October 14, 2022

Landfills in New Hampshire

6 Operating Lined Municipal Solid Waste (MSW) Landfills

FACILITY NAME	MUNICIPALITY
Lebanon Municipal Landfill	Lebanon
Lower Mt. Washington Valley Landfill	Conway
Mt Carberry Landfill	Success
Nashua Four Hills Landfill	Nashua
North Country Environmental Services Landfill	Bethlehem
Turnkey Landfill of Rochester	Rochester



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Landfills in New Hampshire

Potential Waste Contributions to NH's Lined MSW Landfills

- Asbestos
- Bulky Waste
- White Goods
- C&D
- Contaminated Soil
- Electronics
- Food Waste
- Industrial Waste
- Medical Waste
- Mixed Municipal Solid Waste
- MSW Ash
- WWTP Sludge
- Tires
- Wood Ash
- *Casting Sands**
- *Auto Shredder Residue**

** Limited Application*

Landfill Leachate Management In New Hampshire

Landfill Leachate Management

What is Landfill Leachate?

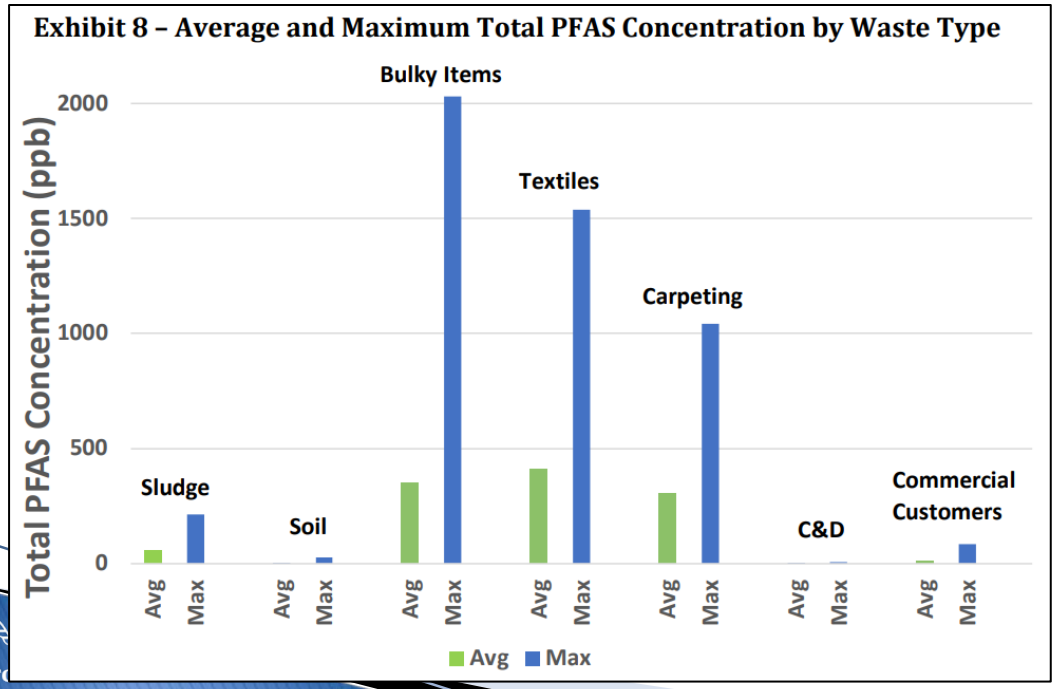
- Env-Sw 103.34 “Leachate” means a liquid, including any suspended components in the liquid, which has contacted or passed through solid waste.

As liquid passes through a landfill’s waste mass it leaches, or extracts, chemicals or constituents from wastes as they break down. Along with PFAS these can include: organic compounds, heavy metals, chlorides, nitrates, etc.

Landfill Leachate Management

Initial Investigations into PFAS in Landfill Leachate

- NHDES conducted an initial sampling survey of leachate from 9 landfills in 2018. A wide variety of PFAS were detected at varying concentrations.
- In 2019 the state of Vermont required its only operating landfill to conduct a study of potential PFAS sources in waste streams.



From "PFAS Waste Source Testing Report" Coventry, Vermont, October 2019, Sanborn, Head & Associates, Inc. https://anrweb.vt.gov/PubDocs/DEC/SolidWaste/OL510/OL510%202019.10.15%20NEWSVT%20PFAS%20Source%20Testing%20Rpt%20-%20Final.pdf

Landfill Leachate Management

Current Management of Landfill Leachate

- Leachate captured in the landfill's liner system is shipped or piped to WWTPs.
  - Negligible destruction of PFAS – partitions to effluent and sludge.
  - Relative impacts on receiving water quality – rivers/groundwater.
  - Relative impacts on sludge – potentially limiting management options.
- One active landfill pretreats its leachate (not PFAS specific) - Turnkey Landfill of Rochester.

Cyclical Relationship between landfills and WWTPs.

- Leachate to WWTP.
- WWTP sludge to landfill.

Landfill Leachate Management

Facility Name	Year	Gallons
Lebanon Municipal Landfill	2019	4,795,889
	2020	3,892,219
	2021	2,633,564
Lower Mt. Washington Valley Landfill	2019	5,213,911
	2020	5,044,912
	2021	4,316,802
Mt Carberry Landfill	2019	23,166,211
	2020	14,681,242
	2021	11,093,176
Nashua Four Hills Landfill	2019	9,323,542
	2020	9,107,427
	2021	15,639,319
North Country Environmental Services Landfill	2019	8,190,236
	2020	9,091,897
	2021	11,410,376
Turnkey Landfill of Rochester	2019	44,967,483
	2020	45,421,203
	2021	48,129,260

Closed Lined Landfills	Location
Dummer Yard Landfill	Berlin
Franklin Ash Landfill	Franklin
Lamprey Ash Landfill	Somersworth
NH / VT Ash Landfill	Newport
Roketenetz Landfill	Pelham
Souhegan Regional Landfill	Amherst

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Occurrence of PFAS in Groundwater at New Hampshire Landfills

PFAS Occurrence in Groundwater at NH Landfills

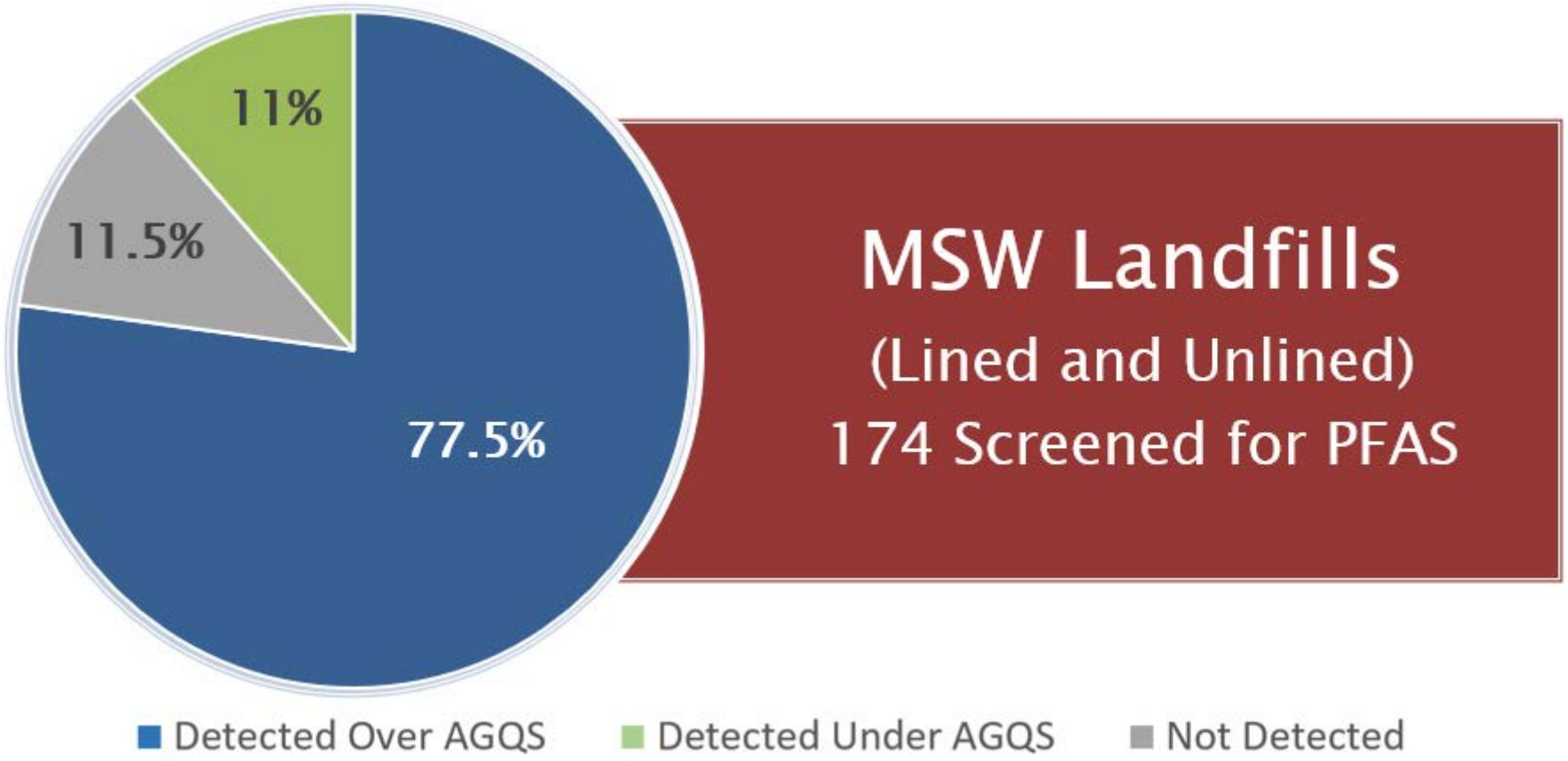
Groundwater Sampling Results at NH Landfills:

- NHDES has required groundwater sampling for PFAS at all lined and unlined landfills that have a groundwater release detection or groundwater management permits.
- As of March 2022, ~ 90% of landfills have sampled for PFAS (including all lined landfills).
  - 91% have PFAS detections.
  - 77.5% have PFAS detected over Ambient Groundwater Quality Standard (AGQS) for PFOA, PFOS, PFHxS, and/or PFNA.
  - 22.5% below AGQS or not detected.

Facility Type	Landfills Sampled	Landfills with PFAS Detections	Landfills with PFAS Detected Over AGQS	Landfills with PFAS Detected Below AGQS	Landfills with PFAS Not Detected
Lined Landfills	13	13	10	0	3
Unlined Landfills	161	145	125	19	17
Totals	174	158	135	19	20

NH's four regulated PFAS include: perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorohexane sulfonic acid (PFHxS), and perfluorononanoic acid (PFNA).

PFAS Occurrence in Groundwater at NH Landfills



Data from "*Status Report on the Occurrence of Per- and Polyfluoroalkyl Substance (PFAS) Contamination in New Hampshire*", dated June 2022, prepared by New Hampshire Department of Environmental Services

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PFAS Occurrence in Groundwater at NH Landfills

Water Supply Well Sampling at NH Landfills:

- PFAS has been detected in drinking water supply wells exceeding the AGQS at 6 closed landfill sites, totaling 24 supply wells.
  - Each has been provided a permanent potable water supply solution (treatment or connection to water utility) or are being provided bottled water until a permanent solution is provided by the responsible party.
  - In approximately half of the cases contaminants other than PFAS, were previously detected at the water supply wells above their respective AGQS.

- To date, there have been no detections of PFAS over AGQS in water supply wells that have been sampled near active landfills.

Potential Future Approaches to Landfill Leachate Management

Potential Future Approaches to Landfill Leachate Management

Continue with Current Practice

- WWTP continue to handle – will have to meet applicable standards for discharge.
  - Impact of future surface water quality standards?
  - Impact for sludge disposal?

Consider a Requirement to Pretreat Leachate

- On-site pretreatment infrastructure at landfills?
- Develop pretreatment infrastructure at WWTPs?
- Develop regional pretreatment facility(ies)?
- Evaluate the significance of the benefit.

Overview of PFAS Treatment Technologies

Treatment Technologies

- Available Technologies
  - Granulated Activated Carbon (GAC)
  - Ion Exchange (Resins)
  - Reverse Osmosis (RO)
- New and Emerging Technologies for Treatment
  - Foam Fractionation
  - Stabilization / Encapsulation
  - Supercritical Water Oxidation (SCWO)
- Pilot Studies?

PFAS Occurrence in Landfill Leachate - Summary

- The 6 active lined MSW landfills are generating approximately 96 million gallons of leachate per year.
- Leachate quantities generated vary widely by landfill, generally based on landfill size.
- Operational timeframes and landfill size does not always correlate with concentrations of PFAS in leachate.
- PFAS is found in a wide-ranging number of waste types.
- There is a cyclical relationship between landfills and WWTPs - landfill leachate & WWTP biosolids.
- There are potential leachate treatment options for PFAS, however, they haven't been fully vetted for treating PFAS in landfill leachate applications.
- Pilot studies may be on the horizon.

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