

PFAS Litigation and Regulatory Developments Conference

BIOSOLIDS UPDATE



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What Are Biosolids



- The Clean Water Act defines sewage sludge (not industrial sludge) as any solid, semi-solid or liquid residue generated during the treatment of domestic sewage in a treatment works.
- Biosolids are not specifically defined in law or regulation but describe sewage sludge treated to meet the requirements of 40 CFR § 503 and intended to be applied as soil amendment or fertilizer.



Beneficial Uses of **BIOSOLIDS**

❖ Mine Reclamation



❖ Forestry



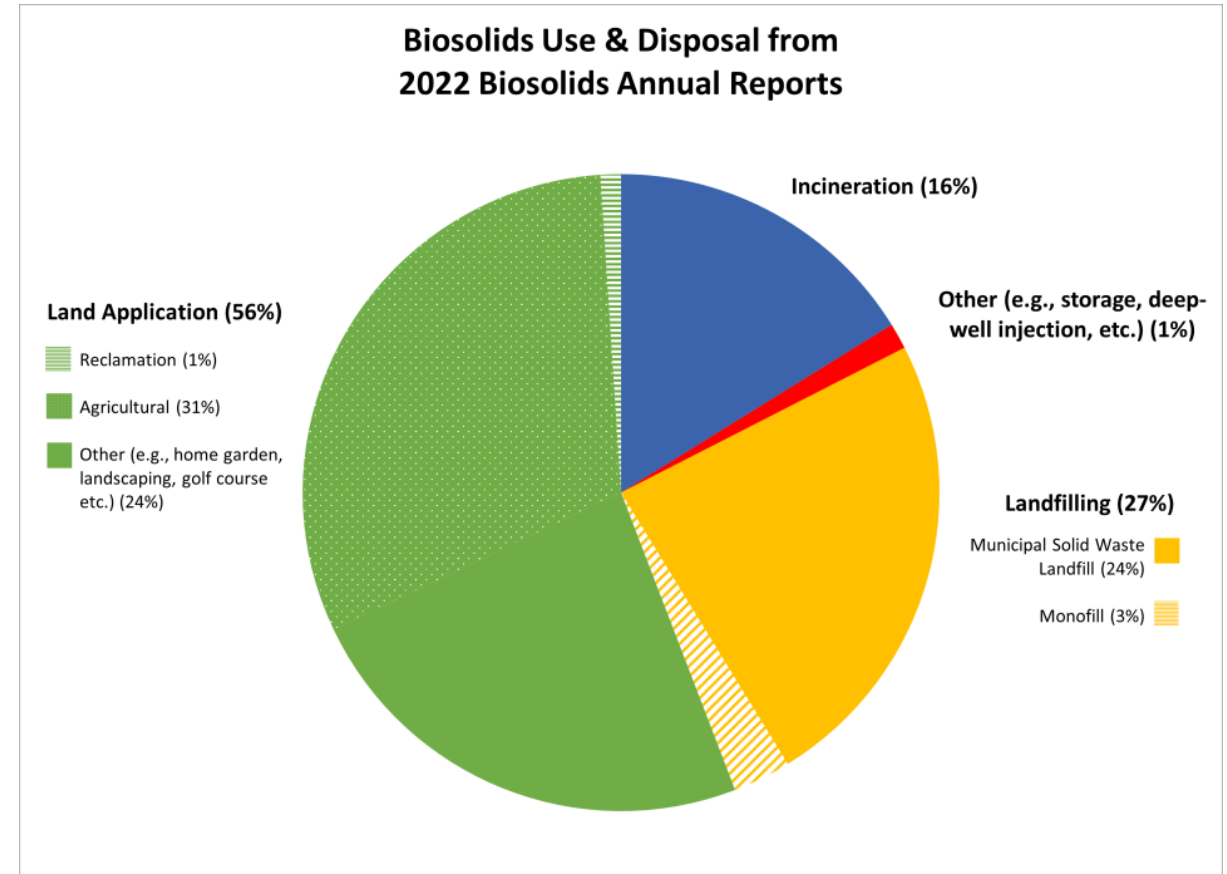
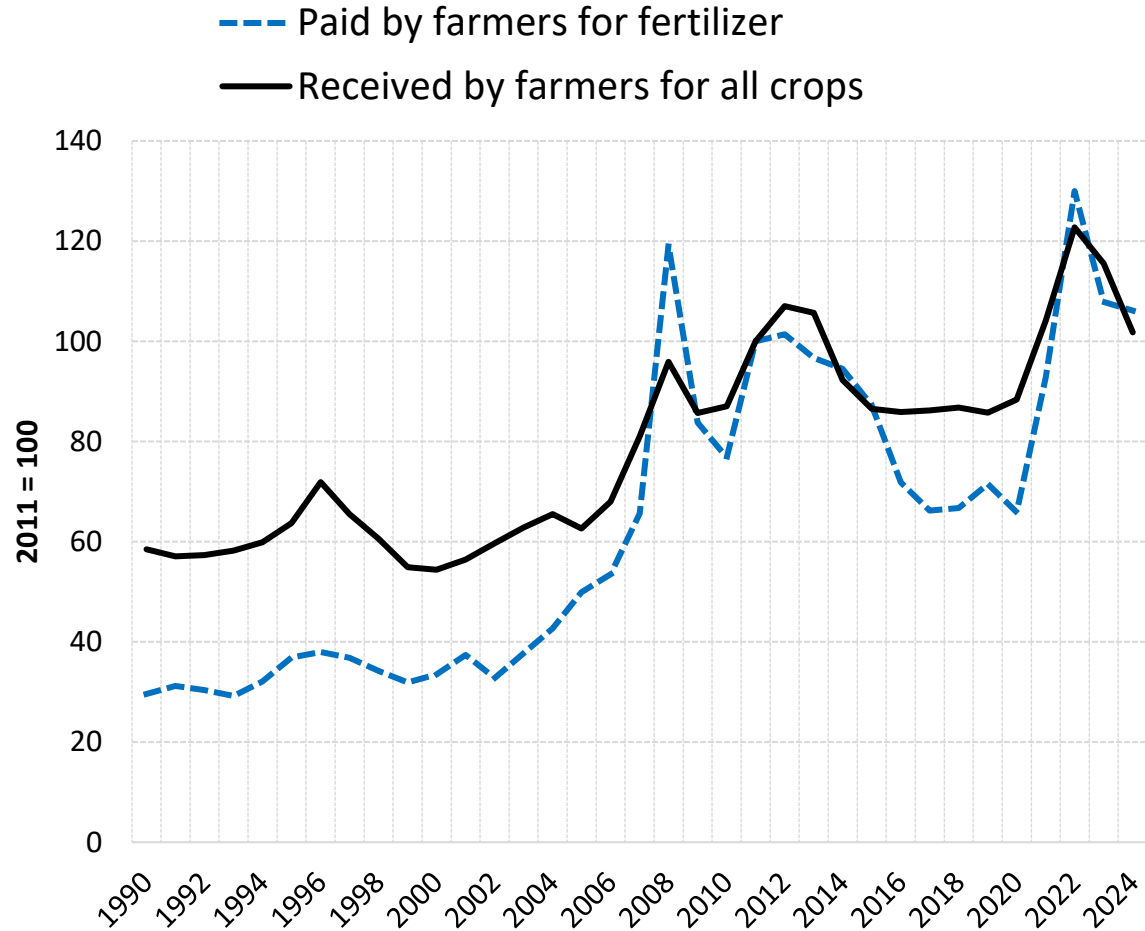
❖ Gardening/Landscaping



❖ Agricultural Use



How Did We Get Here?



Sources are (i) USDA Economic Research Service, Fertilizer Use and Price, Table 8. Fertilizer Price Indexes, <https://www.ers.usda.gov/data-products/fertilizer-use-and-price>, (ii) USEPA, Basic Information about Sewage Sludge and Biosolids, Last Updated January 6, 2025, <https://www.epa.gov/biosolids/basic-information-about-sewage-sludge-and-biosolids>

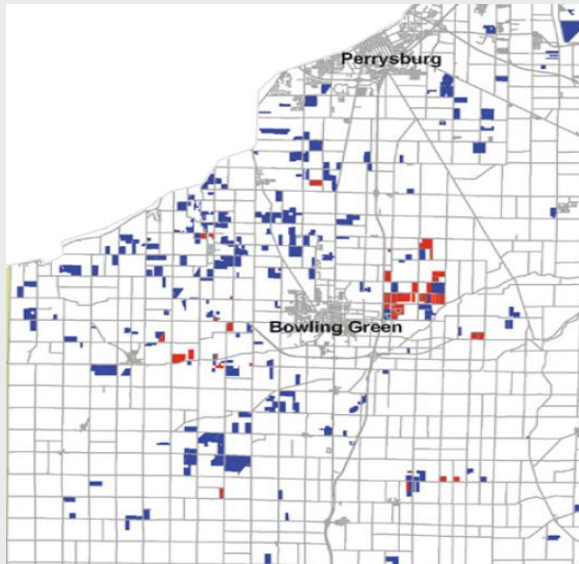
How Big is the Problem?



Bowling Green, OH (2010)

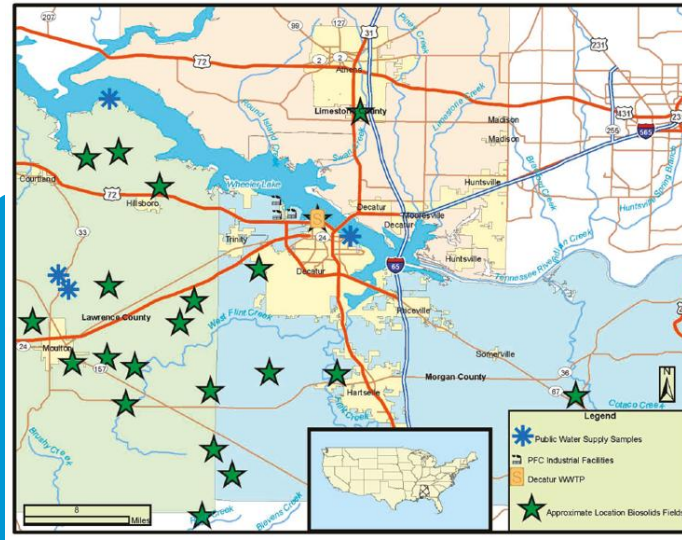
~10% of fields over 14 years

- Fields permitted to receive Class B solids
- Permitted fields with applications, 1990-2003



Decatur, AL (2011)

~1% of acreage over 18 years



National (2022)

~7% of harvested cropland ever

EWG: 'Forever chemicals' may taint nearly 20 million cropland acres



Sources are (i) Czjakowski, Kevin, April Ames, Bhuiyan Monwar Alam, Robert K. Vincent, "Application of GIS in Evaluating the Potential Impacts of Land Application of Biosolids on Human Health," in Geospatial Technologies in Environmental Management, pp. 165-186. (ii) Lindstrom, Andrew B., Mark J. Strynar, Amy D. Delinsky et al. "Application of WWTP Biosolids and Resulting Perfluorinated Compound Contamination of Surface and Well Water in Decatur, Alabama, USA," Environ. Sci. Technol. 2011, 45, 8015-8021. (iii) Hayes, Jared, "EWG: 'Forever chemicals' may taint nearly 20 million cropland acres," <https://www.ewg.org/news-insights/news/2022/04/ewg-forever-chemicals-may-taint-nearly-20-million-cropland-acres>, April 14, 2022. (iv.) USDA NASS Census of Agriculture, 2022. Table 9. Land in Farms, Harvested Cropland, and Irrigated Land by Size of Farm: 2022 and 2017



Federal Regulations – Biosolids and PFAS



- **Biosolids requirements established in Section 405(d) Clean Water Act:**
 - Establish numeric limits and management practices from reasonably anticipated adverse effects during use or disposal
 - Review biosolids regulations bi-annually to *identify pollutants*
- **EPA Part 503 Rule governs biosolids**

What about PFAS?



- Rule 503 regulates 10 pollutants - all metals
- PFAS **NOT** currently included as a Rule 503 pollutant
- **BUT** EPA's Draft PFOA and PFOS Biosolids Risk Assessment issued 1/14/25
- Covers only PFOS and PFOA and people living on or near impacted sites or that rely primarily on their products
- Does not look at risk to the general population



- EPA's second draft comment period for Destruction and Disposal Guidance closed on October 15, 2024. seeking input on available and effective methods to dispose and destroy PFAS
- Guidance suggests viable technologies for biosolids management that are contaminated with PFAS other than thermal destruction and landfilling – both of which are expensive, not always practical and not sustainable.



- EPA Water Quality Criteria for Aquatic Life and Human Health for PFOA and PFOS (and other PFAS) have been on the table for release for quite some time now. EPA just released the final recommended aquatic life criteria for PFOA and PFOS on October 1, 2024 in a pre-publication form.
- It also includes benchmark values for eight other PFAS. If the criteria values are adopted as water quality standards should not be an issue for utilities to meet. However, the final recommended values are significantly different for PFOA and PFOS.



- EPA's POTW Influent Study questionnaire will be sent to nearly 400 clean water utilities in early 2025 and a select group of 100 or more utilities will begin sampling for PFAS in their influent and upstream thereafter.
- Biosolids sampling pushed back to 2026. We are still awaiting the second-round comment period on the Study and while EPA's timeline is to start the Study in the new year, continued delays and the new administration could have an impact on timing and whether the Study gets off the ground.



- On January 14, 2025, the U.S. Environmental Protection Agency (EPA) released its Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS).
- Opened for public comment on January 15, 2025 and will continue until March 16, 2025.
- In some states, more than 50% of sewage sludge generated from publicly owned treatment works (POTWs) has been land-applied in recent years.



What to Expect from the New Administration



- No clear indication of impact on biosolids management.
- New EPA administrator comes from area with PFAS issues, has voted against Federal regulations in the past, but has supported PFAS regulations.
- **The USEPA ELG for Oil & Gas (O&G) and Waste Management Sectors has been Rescinded. This order by the Trump administration stops a December 16, 2024, proposal to develop effluent limit guidelines (ELGs) for the O&G and waste management sectors under the Clean Water Act. Developing EGLs has been an ongoing effort since 2021 as part of the Plan 16 and the PFAS Strategic Roadmap.**



Compelling Federal Regulations of Biosolids and PFAS

Current Litigation Could Have Significant Impacts

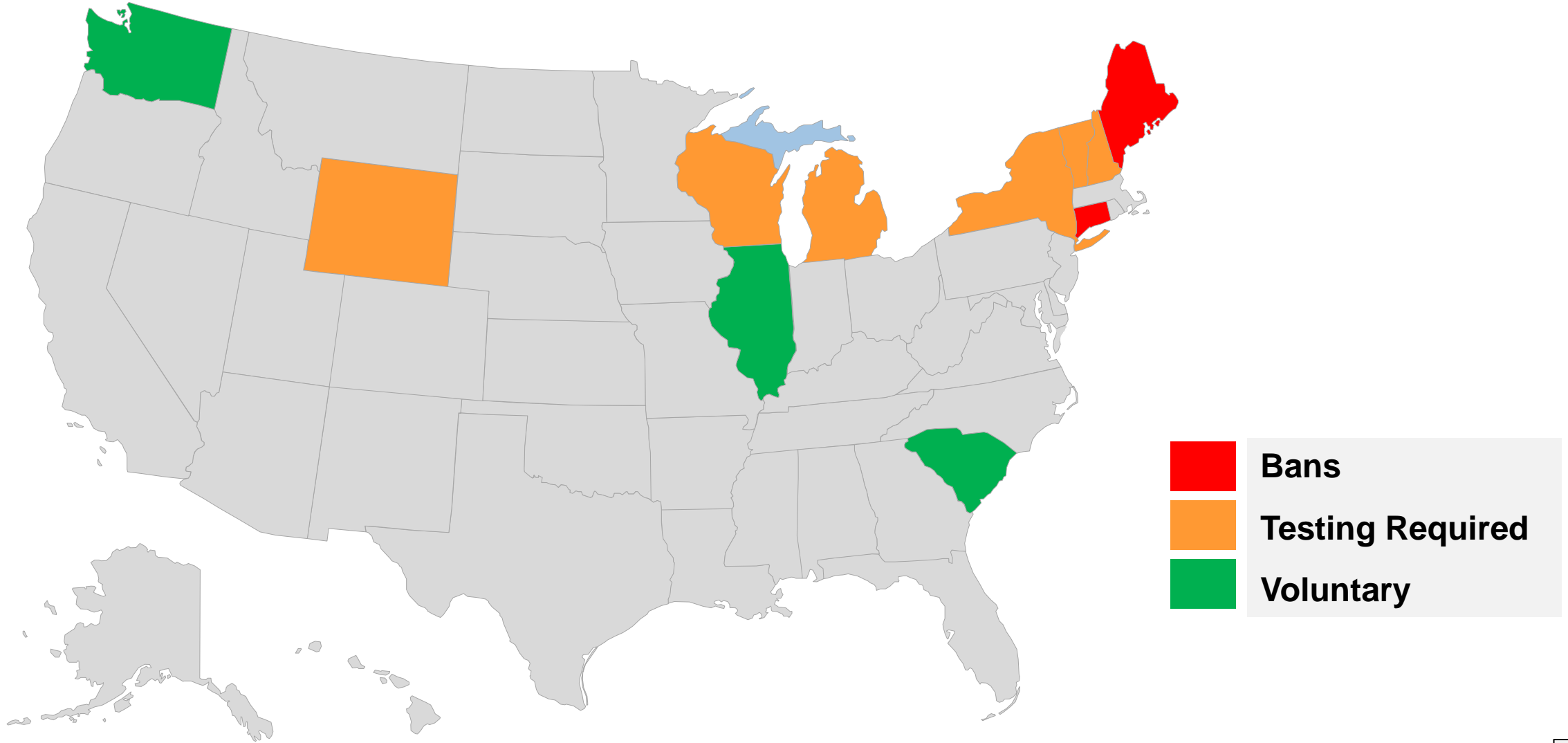


- ***James Farmer et al. v. EPA***, U.S. District Court for the District of Columbia Citizen Suit
- Alleges EPA failing to perform a non-discretionary duty under CWA Section 405
- Contends that EPA has identified 29 PFAS in its biennial reviews – 10 with “sufficient evidence” to justify regulation in Part 503
- EPA counters that it has a mandatory duty to ONLY perform biennial assessments
- Court ruling could accelerate inclusion and numbers of PFAS as Rule 503 pollutants



State Regulations – Biosolids and PFAS

State PFAS Biosolids Regulations





Federal and State PFAS Regulations Concerning Biosolids Will Likely Spawn Litigation

CERCLA Hazardous Substance Designation



- Will lead to “Superfund” litigation
- Liable parties = current and past owners, generators, and transporters
- Strict and joint and several liability
- Liable for cleanup costs, damages to natural resources, health assessment costs
- **EPA Enforcement Discretion Policy does not shield entities from state actions, citizen suits and contribution claims**





- The “normal application of fertilizer” not considered a release of a hazardous substance under CERCLA



Legal Challenge to PFAS Designation

PFAS Designation Challenged



- **Petitioners argue:**
- **EPA misinterprets** term “may present substantial danger”
- **EPA failed** to provide notice and opportunity to comment for cost-benefit analysis
- **EPA failed** to adequately consider costs
- **EPA acted** arbitrarily, capriciously, or otherwise contrary to law





- ***Loper Bright Enterprises v. Raimondo***
- Ends “Chevron deference”
- Policy of deference to agency’s interpretation of ambiguous language in statutes pertaining to their work



Biosolids Litigation

Wastewater Treatment Plant Settlement



- CWA and RCRA Citizen Suit Against City for Land Application of Biosolids with PFAS
- *Coosa River Basin Initiative v. City of Calhoun, GA* filed last year
- Settlement has sweeping and onerous requirements for City including impacts for Upstream Industrial Dischargers



Farmers File Suit Under Common Law Theories



- Texas farmers filed suit against manufacturer of biosolids-based fertilizer
- Claim land application contaminated soil, surface and well water, and livestock
- Claims = strict product liability, negligence, private nuisance



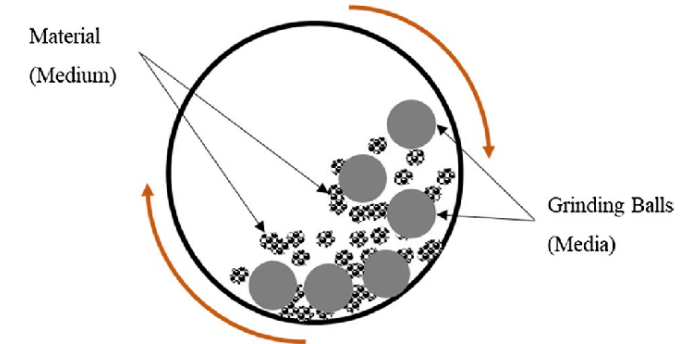


Treatment and Mitigation Options

Mechanochemical Degradation (MCD)



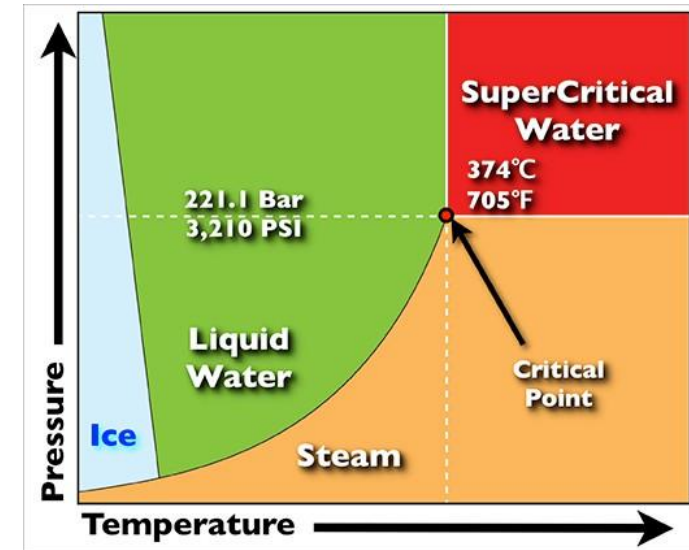
- High energy ball-milling
- No solvents or heat
- Soils/solids application including biosolids
- Co-milling reagents (silica, potassium hydroxide, calcium oxide maybe added to react with fluorine)
- Milling process produces radicals, electrons, heat and plasma that react with PFAS to produce inorganic fluoride compounds and graphite
- Proven technology at both bench and pilot scale with some POPs (PCBs) that achieved 99% destruction at a 6t/hr rate. PFAS being evaluated and may release gaseous PFAS that will require treatment.



Super Critical Water Oxidation (SCWO)



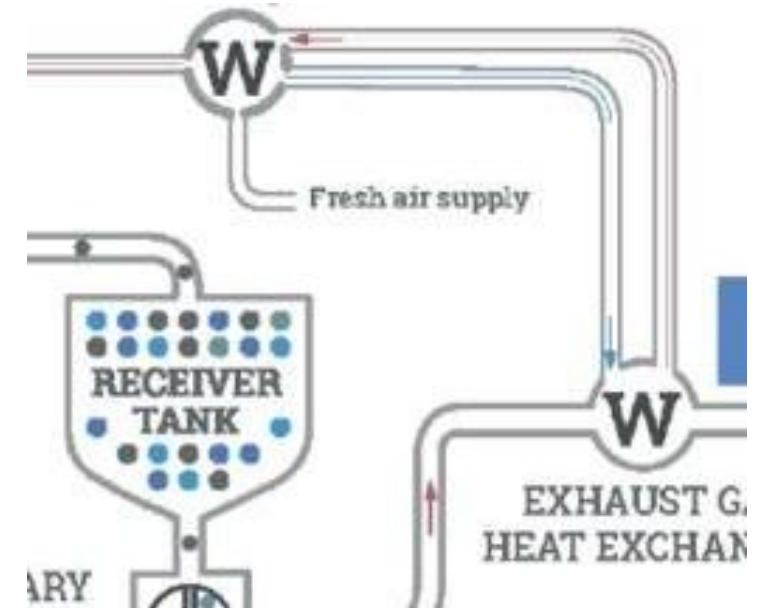
- PFAS resists oxidization at standard temperatures and pressures.
- SCWO uses higher temperatures (approx. 705F) and higher pressures (approx. 221.1 bar) to achieve complete destruction of all PFAS compounds.
- Above the critical point, organic compounds that are usually insoluble in water become highly soluble.
- With the addition of an oxidizing agent such as oxygen, supercritical water dissolves and oxidizes PFAS.
- Can achieve >99.99% destruction with treatment rates currently up to 500 gpd for mobile system.
- Treatment takes seconds and produces inert salts.



Other Thermal Treatment Options



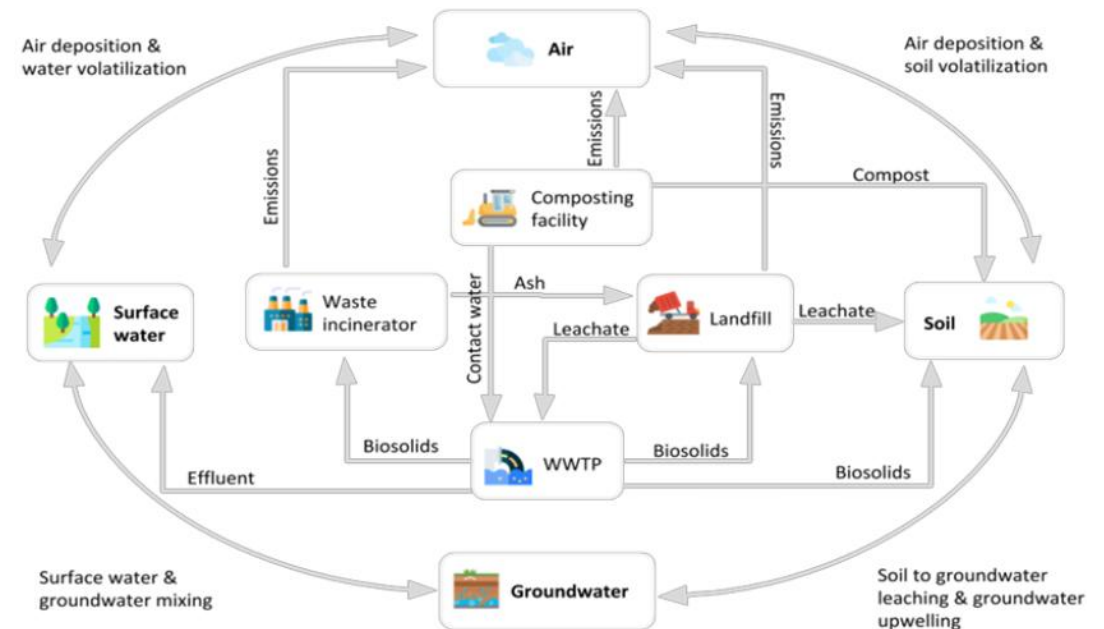
- **Pyrolysis** is a treatment process that decomposes impacted solids at moderately high temperatures in an oxygen-free environment.
- **Gasification** is similar but introduces small quantities of oxygen. Gasification leverages the partial combustion process to provide additional heat to operate the process.
- Potential application for biosolids
- Can be used to create biochar/soil amendment and syngas (alternate fuel source)
- Solids reduction of over 90%
- Emissions and incomplete destruction of PFAS needs additional evaluation.



GOAL - Develop and implement initiatives to reduce sources of PFAS in waste streams entering municipal WWTP and landfills.

Steps:

- Identify sources of PFAS to conduits
- Identify source reduction strategies
- Formally solicit stakeholder feedback on Tasks 1 and 2
- Develop a toolkit of source reduction strategies for implementation
- Identify issues for future study



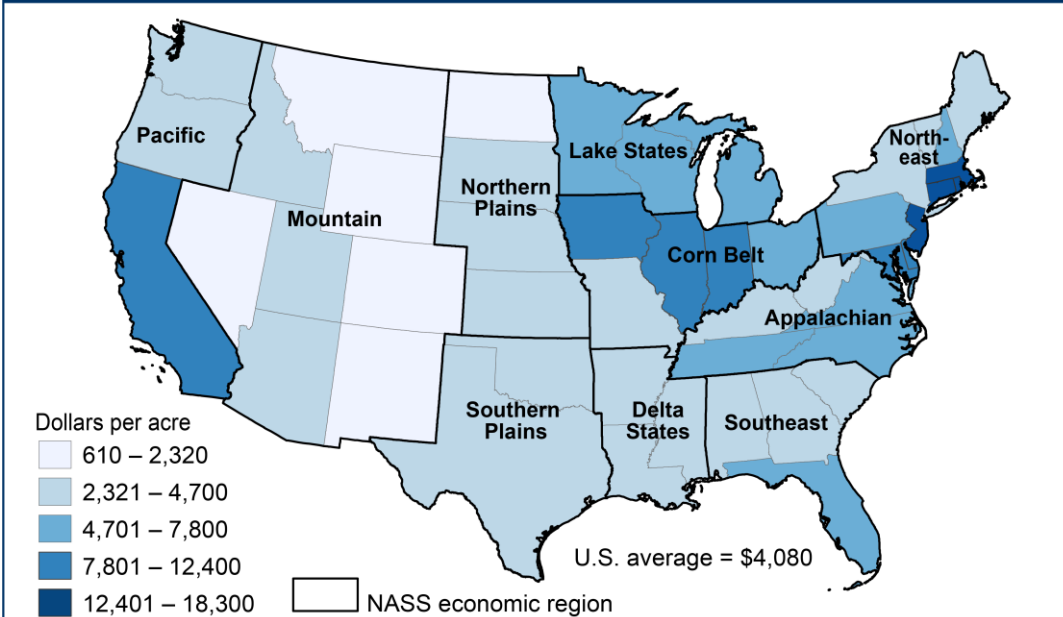


Economics of Biosolids Contamination

Is Restoration Economically Feasible?



U.S. farm real estate values by State, 2023

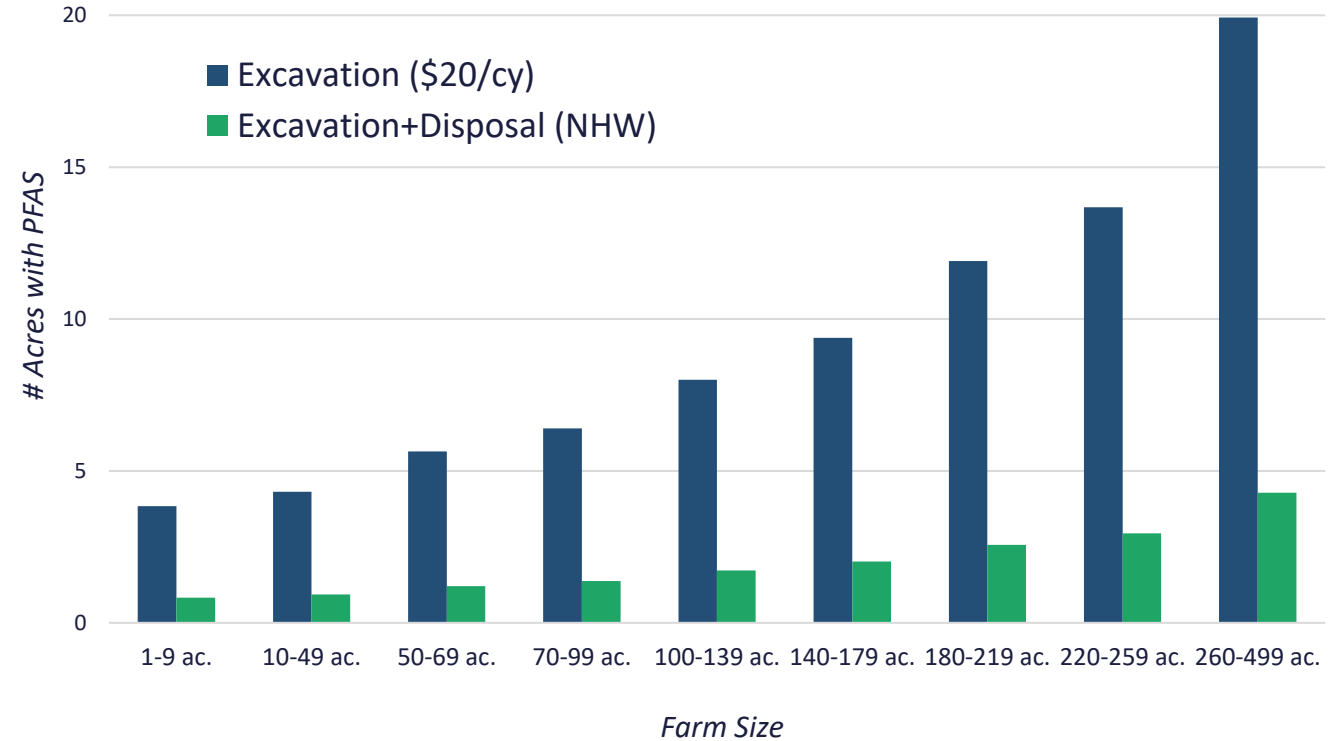


Note: Farm real estate includes land and buildings. Data reflect values as of June 1 of each year. U.S. estimates exclude Alaska and Hawaii. Economic regions as determined by USDA, National Agricultural Statistics Service.

Source: USDA, Economic Research Service using 2023 State agricultural land value estimates from USDA, National Agricultural Statistics Service, *QuickStats*.

Farm real estate values (land and buildings) vary across the nation and by type of crop.

Land Area with PFAS Before Removal Exceeds National Average Farm Real Estate Value

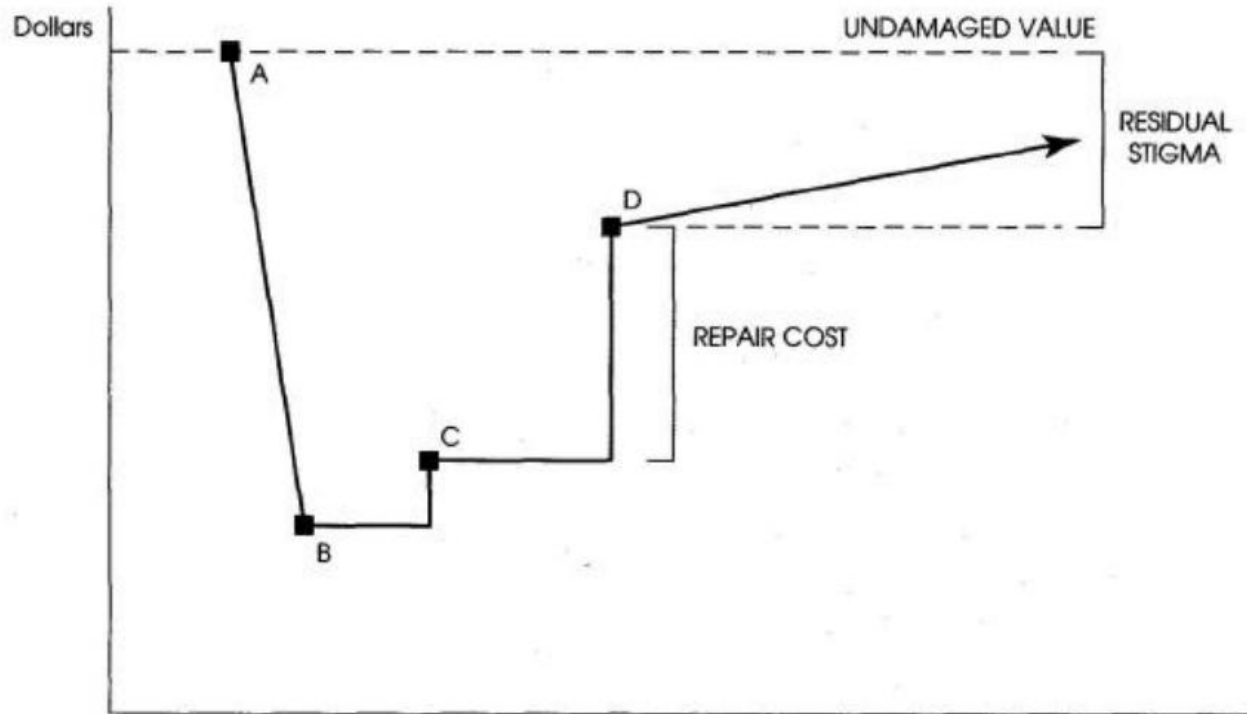


Depicted are the number of acres with PFAS contaminated soil requiring excavation before the cost exceeds the farm real estate value.

Measures of Property Value Diminution



$$\text{PVD} = \text{Cost} + \text{Use} + \text{Risk Effects}$$



A: Value of property before discovery of damage
 B: Value of property immediately after discovery of damage
 C: Value of property after nature and extent of damage are known
 D: Value of property immediately after repairs are performed

PFAS PVD Estimates for Residential Property, Selected Areas (% per Home)

Washington County, MN ^a	-3%, -7.7%
Hoosick Falls, NY ^b	-9% to -20%
Cape Fear, NC ^c	-5%
Mather, CA ^d	-2.3%
Fairbanks, AK ^d	No Impact to -20%
Mesa, AZ ^d	No Impact to -20%
Dalton, GA ^d	No Impact
Madison, WI ^d	No Impact

Source: Sanders, Michael V. "Post-Repair Diminution in Value from Geotechnical Problems". *The Appraisal Journal*: January 1996.

Sources: (a) Expert Report of David L. Sunding, Ph.D. (*State of Minnesota v. 3M Company*), (b) Declaration of Dr. Jeffrey Zabel (*Baker et al. v. St. Gobain et al.*); (c) Expert Report of David Sunding, Ph.D., July 16, 2021, *Victoria Carey, et al. v. E.I. du Pont de Nemours, et al.*, Case No: 7:17-CV-00189, United States District Court for the Eastern District of North Carolina (d) Anderson, Orell, Chris Yost-Bremm, PhD, Stephen G. Valdez et al., "PFAS Contamination and Residential Property Values A Study of Five US Sites within the Assessment Stage of the Remediation Lifecycle", *The Appraisal Journal*, Winter 2022.

Business Loss and Value Diminution



'Forever Chemicals' and Risks to Farms

Michigan Farm Is Cautionary Tale of PFAS Contamination and Sewage Sludge Fertilizer

5/9/2022 | 11:59 AM CDT



By [Chris Clayton](#), DTN Ag Policy Editor

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Jason Grostic's cows are tame and relaxed on his small Michigan farm. But after repeatedly testing his farm for PFAS chemicals in biosolids applied to

BRIGHTON, Mich. (DTN) -- Jason Grostic looks over his mama cows and wonders how he became the guy that the state of Michigan has shut down from selling either his meat or his cattle because of contamination from "forever chemicals."

After working with state officials to test biosolids for more than two years, Grostic was asked to join a Zoom meeting in late January. On that call, state officials told him he was under a seizure notice. No animals or meat were allowed to leave his farm.

"They said, 'You're out of business.' I said, 'Now what am I supposed to do?' They said, 'We haven't got a clue, but you're not selling your beef, and you can't get rid of your cattle.'"

Grostic's 200-acre farm was shut down after Michigan

Lost Profits (Temporary)

Culling livestock, livestock products, or crops that can be re-established.

Non-operation/interruption.

One-time or temporary expenses.

Business Value Diminution (Permanent)

Land/assets taken out of production; restriction to highest and best use.

Revoking organic certification, Reputational damage, "stigma".

Ongoing compliance or mitigation costs.