





# **Biosolids and Contaminants of Emerging Concern**

## **Shenandoah Valley Wastewater Treatment Plant Network**

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August 24, 2022

# Presentation Overview

- Brief Regulatory History in Virginia
- Scope of Law and Regulation in Virginia
- Regulatory Philosophy
- EPA Regulation of Contaminants in Biosolids
- EPA/DEQ PFAS Strategy

# Regulatory Program Timeline



- **<1994:** Land application regulated by DEQ
- **1993:** Federal regulatory action on biosolids land application – 40 CFR Part 503
- **1994:** Virginia General Assembly transfer from DEQ to Virginia Department of Health
- **2002:** National Academies of Science Report
- **2007:** Virginia General Assembly transfer from VDH to DEQ
  - ~20 FTEs funded by land application fees to administer permits & assure compliance
- **2008:** Virginia Biosolids Expert Panel published final report: HJR 694: 2007 Acts of Assembly
- **2008-2013:** Course of DEQ action to amend regulations
- **2015:** DC Water implements THP, reduces fee income
- **2016:** DEQ centralizes biosolids program, reduces FTEs to 10
- **2017:** Joint Legislative Audit & Review Commission Report

## What are Virginia land application trends?



# Biosolids Land Application in Virginia

Calendar Year	Dry Tons Spread
2008	260,655
2009	204,879
2010	230,142
2011	220,534
2012	225,314
2013	184,590
2014	190,065
2015	130,219
2016	145,920
2017	139,686
2018	111,467
2019	136,879
2020	115,207
2021	112,127

- Current Land Application Area: ~40,000 ac
- Cropland, Pastureland, Woodland in VA: ~8,000,000 ac
- Biosolids are land applied on <1% of the available acreage

# *Options for Residuals Management*

- Land Apply as fertilizer
- Landfill as waste
- Incinerate with emissions limits

Virginia Solid Waste Regulation establishes reuse as preferential to disposal

## Industrial Residuals: are not biosolids...

- Biosolids originate from municipal wastewater treatment plants and is treated sewage sludge
- “Industrial Wastes” means liquid or other wastes resulting from any process of industry, manufacture, trade, or business, or from the development of any natural resources.



# Industrial Residuals: are not biosolids...

- Broad definition – much variability between sources
- Virginia Dept. of Agriculture
  - “Industrial co-products” registered as fertilizers or soil amendments
  - Available for sale to general public
- Case-by-case evaluations
  - Suitability for agricultural use – fertilizer or soil amendment
  - Characterization
    - Nutrients
    - Heavy metals
    - Other constituents of concern – VPA application considers 170 potential constituents
    - Biosolids standards applicability varies
    - Pathogen Reduction and Vector Attraction

# Biosolids... Statutory Directive



- § 62.1-44.19:3.B.

The Board, with the assistance of the Department of Conservation and Recreation and the Department of Health, shall adopt regulations to ensure that (i) sewage sludge permitted for land application, marketing, or distribution is properly treated or stabilized; (ii) land application, marketing, and distribution of sewage sludge is performed in a manner that will protect public health and the environment; and (iii) the escape, flow or discharge of sewage sludge into state waters, in a manner that would cause pollution of state waters, as those terms are defined in § 62.1-44.3, shall be prevented.

# Regulatory Requirements: Virginia Pollution Abatement Permit Regulation



- **9VAC25-32-315. Additional and more stringent requirements.**

A. On a case-by-case basis, the board may impose requirements for the use of biosolids or the disposal of sewage sludge in addition to or more stringent than the requirements in this part when necessary to protect human health and the environment from any adverse effect of a pollutant in the biosolids or sewage sludge.

# Regulatory Requirements: Virginia Pollution Abatement Permit Regulation

- **9VAC25-32-400. Additional monitoring.**

D. The department may require biosolids to be tested for certain toxic organic compounds prior to agricultural use. If performed and validated, these test results shall be utilized to evaluate the maximum allowable annual loading rate for the tested biosolids. If analytical test results verify that biosolids contains levels of organic chemicals exceeding concentration limits incorporated in federal regulations or standards, appropriate restrictions shall be imposed for agricultural use of those biosolids.

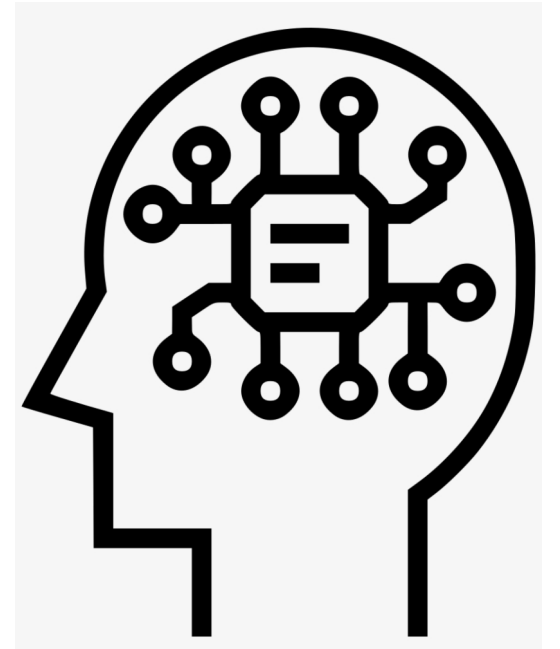
# *Public Health Protection*

- Pre-Treatment of Sewage
- Biosolids Treatment
- Site-Specific Permitting with Landowner Consent\*
- Notification\*
- Setbacks from Dwellings and Property\*
- Odor Control Plans\*
- Complaint Response\*

\* Virginia DEQ requirements exceeding Federal 503

# DEQ Biosolids Program - Regulatory Philosophy

- Regarding the “precautionary principle”
- DEQ relies significantly upon the risk assessments conducted by the EPA and their resources to conduct such studies
- If EPA sets limits, DEQ will respond with regulatory action to align state requirements



# Current VPA Permit Requirements for Pollutant Content

- All are Individual Permits
- Class B pathogen reduction
  - Site-specific permitting
  - Pollutant content - identical to federal 503 rule (9 metals)
- Class A pathogen reduction (Exceptional Quality “EQ”)
  - Land application sites not identified in permit
  - Pollutants must be below Pollutant Concentration (PC) levels
    - i.e. no Cumulative Pollutant Loading Rate (CPLR) option
  - Annual monitoring of 12 organic chemicals & 6 add’l elements
    - PCBs, Aldrin, Chlordane, etc.
    - Al, B, Ca, Chlorides, Manganese, Sulfur

# EPA Risk Assessments for Biosolids

- 40 CFR Part 503: The “biosolids rule” was based upon the risk assessments conducted prior to the 1993 revisions
- Clean Water Act Section 405(d)(2)(C) requires EPA to review federal biosolids standards every two years to identify additional toxic pollutants that occur in biosolids and set regulations for those pollutants if sufficient scientific evidence shows they may harm human health or the environment.
- Latest review published in Feb 2021 for 2018-2019





# EPA Risk Assessments for Biosolids: 2018-2019 Report

- 18 new articles that provide relevant data on chemical pollutants that may occur in biosolids
- 116 new chemicals identified
  - 50 PCBs
  - 4 pesticides
  - 19 flame retardants
  - 8 PFAS
  - 3 antibiotics
  - 1 metal
  - 2 inorganics
  - 29 other organics
- New data on 48 chemicals previously identified in biosolids
- Concentration data for 61 of the 116 new chemicals identified
- Concentration data for 34 chemicals previously identified
- Additional data found that is needed to conduct risk assessments, e.g:
  - Human health toxicity values
  - Ecological toxicity data
  - Physical-chemical properties
  - Bioconcentration or bioaccumulation data
- New data on microbial pollutants



# Evaluating Additional Pollutants



- Is it present in biosolids?
- At what level is it present in biosolids?
  - Biosolids concentrations vs. soil concentrations
- At what level is it toxic to humans? To other “ecological receptors”?
- Fate and transport to humans and other receptors?
- Mitigation
  - Concentration reduction in biosolids
  - Environmental conditions - soil (mineral & microbial), climate
  - Site management – rate, timing, placement, crop type

# EPA PFAS Roadmap for Biosolids

- Risk Assessment Framework
  - Planning & Scoping – purpose, scope, technical approach
  - Problem Formulation – who/what/where is at risk, hazard ID, exposure ID
  - Analysis – potential for adverse effects, hazard ID, dose-response
  - Risk Characterization – risk of health problems, ID uncertainties
- Finalize risk assessment for PFOA and PFOS in biosolids
  - Expected Winter 2024
  - Will serve as basis for determining whether additional regulation for biosolids is appropriate



# DEQ PFAS Strategy: Biosolids

- Locations/Sources of Interest
  - PFAS generally: military/NASA facilities, manufacturers of PFAS, firefighting training
  - PFAS & residuals: Survey of discharging facilities
    - Potential for presence of PFAS in influent
    - Are residuals land applied?
  - ID strategies for source reduction
  - Monitoring: methods, funding/research opportunities
- DEQ is monitoring EPA progress with PFAS research and subsequent recommendations and/or regulatory action
- DEQ is not planning to take any regulatory action related to general permits for Exceptional Quality biosolids while PFAS research/findings are pending

# Outside of “Hot Spots”: Broad Perspective

This from Sally Brown, soil scientist at the University of Washington:

- Concentrations of PFAS in biosolids are in the same range as in human breast milk (and only enough biosolids are produced to cover about 0.1% of the arable land in the US every year, so consider the relative impact)
- Concentrations of PFAS in biosolids are an order of magnitude lower than in household dust
- What is “safe” per emerging state regulations may vary by an order of magnitude
- New shorter chain versions are gaining prevalence while the longer chain, older compounds are slowly becoming history

"Not saying that PFAS isn't a concern, just that if you really want to rid the world of PFAS, biosolids are not where you start."

# Questions?

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<https://www.deq.virginia.gov/water/land-application-beneficial-reuse/biosolids-industrial-waste>