

U.S. EPA Biosolids Program Update

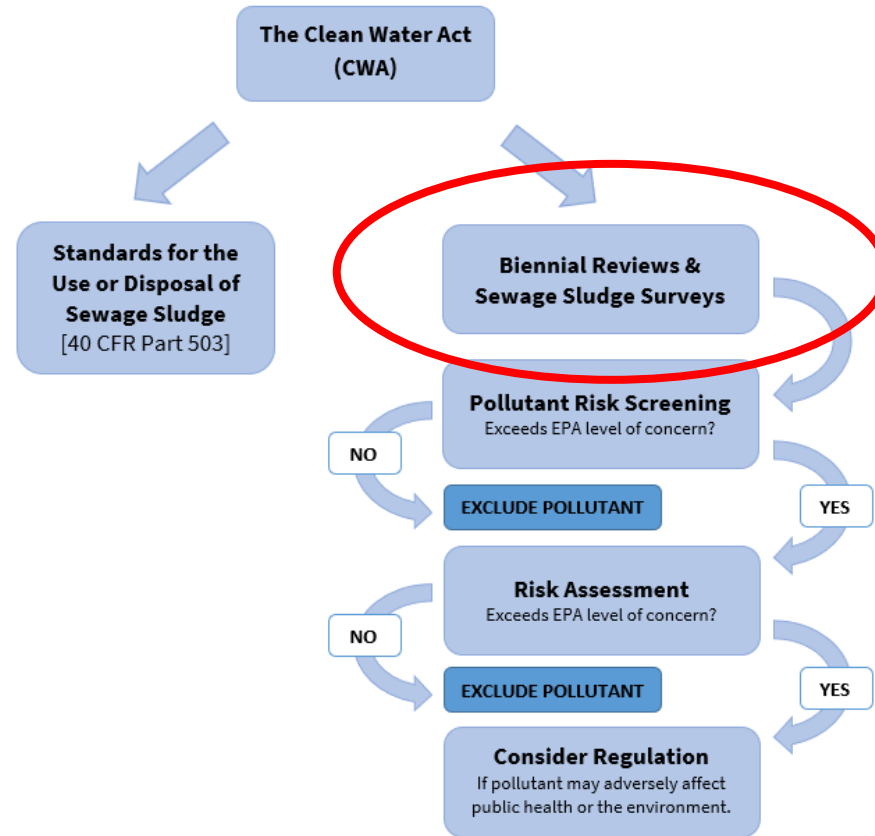
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OFFICE OF WATER | OFFICE OF SCIENCE AND TECHNOLOGY
HEALTH AND ECOLOGICAL CRITERIA DIVISION | BIOSOLIDS PROGRAM



Biosolids Program

Clean Water Act Requirements



Biennial Reviews & Sewage Sludge Surveys

Biennial Reports
BR No.1 (2004-2005)
BR No.2 (2006-2007)
BR No.3 (2008-2009)
BR No.4 (2010-2011)
BR No.5 (2012-2013)
BR No.6 (2014-2015)
BR No.7 (2016-2017)
BR No.8 (2018-2019)

Sewage Sludge Surveys
1988 National Sewage Sludge Survey
2001 National Sewage Sludge Survey
2006 Targeted National Sewage Sludge Survey

- Biennial Review Report No.9 (2020-2021) has been initiated.



Biosolids List on EPA's CompTox Chemicals Dashboard

- Link: <https://comptox.epa.gov/dashboard/chemical-lists/BIOSOLIDS>

LIST: Chemicals in biosolids (2021)

Search for chemical by systematic name, synonym, CAS number, DTXSID or InChIKey

Identify subtyping search

List Details

Description: Biosolids are a product of the wastewater treatment process. During wastewater treatment the solids are separated from the acids. These solids are then treated physically and chemically to produce a semi-solid, nutrient-rich product known as biosolids. The terms "biosolids" and "sewage sludge" are often used interchangeably. Section 402(d) of the Clean Water Act (CWA) requires the United States Environmental Protection Agency (EPA) to (1) develop a regulation to establish pollutant limits and management practices to protect human health and the environment from any reasonably anticipated adverse effects of pollutants that might be present in sewage sludge, and (2) review sewage sludge regulations every two years to identify any additional pollutants that may occur in biosolids and to set regulations for pollutants identified in biosolids if sufficient scientific evidence shows they may harm human health or the environment. The regulation 40 CFR Part 503, Standards for the Use or Disposal of Sewage Sludge, was published on February 18, 1993 (58 FR 9248). Part 503 established pollutant limits for ten metals. Since 1993, EPA has conducted eight biennial reviews and three national sewage sludge surveys to review additional pollutants found in biosolids and assess possible exposure from those chemicals. To date, 726 chemicals have been found in biosolids. You can learn more about the curation of the list of chemical pollutants here: [DTXSID LINK TO ARTICLE](#). Concentration data is also available for 484 chemical pollutants selected in the three national sewage sludge surveys here: [DTXSID LINK TO DOWNLOAD CONCENTRATION DATA](#). To view all the reported pollutants found in biosolids see Table B-1, Chemical and Metabolite Pollutants Identified in Biosolids in Biennial Review No. 8. (Last Updated November 9th 2021)

Number of Chemicals: 726

Showing 126 of 726 chemicals

<p>2,2',4,5'-Tetrachlorobiphenyl</p> <p>EPA ID: DTXSID1387623 CAS# 19134-18-8 Me. Num.: DT-0503</p>	<p>Monochlorobiphenyl</p> <p>EPA ID: DTXSID1310186 CAS# 1733-18-8 Me. Num.: DT-0490</p>	<p>Chlorobenzilate</p> <p>EPA ID: DTXSID020205 CAS# 171-54 Me. Num.: DT-0422</p>	<p>Tylosin</p> <p>EPA ID: DTXSID04496 CAS# 141-812 Me. Num.: C-6477017</p>	<p>Diethyl hydrogen phosphite</p> <p>EPA ID: DTXSID04496 CAS# 100-107 Me. Num.: C-6471549</p>	<p>Ofloxacin</p> <p>EPA ID: DTXSID04108 CAS# 104-304 Me. Num.: DT-0420804</p>
<p>Clofibric acid</p> <p>EPA ID: DTXSID0888 CAS# 442-97 Me. Num.: DT-04109</p>	<p>Chlorophene</p> <p>EPA ID: DTXSID02176 CAS# 120-51 Me. Num.: DT-04109</p>	<p>Ibuprofen</p> <p>EPA ID: DTXSID02176 CAS# 120-770 Me. Num.: DT-04109</p>	<p>Perfluorodecansulfonic acid</p> <p>EPA ID: DTXSID04496 CAS# 141-812 Me. Num.: C-6477017</p>	<p>2,2',4,5-Tetrachlorobiphenyl</p> <p>EPA ID: DTXSID1387623 CAS# 19134-18-8 Me. Num.: DT-0503</p>	<p>Anhydrotetracycline</p> <p>EPA ID: DTXSID04496 CAS# 141-812 Me. Num.: C-6477017</p>

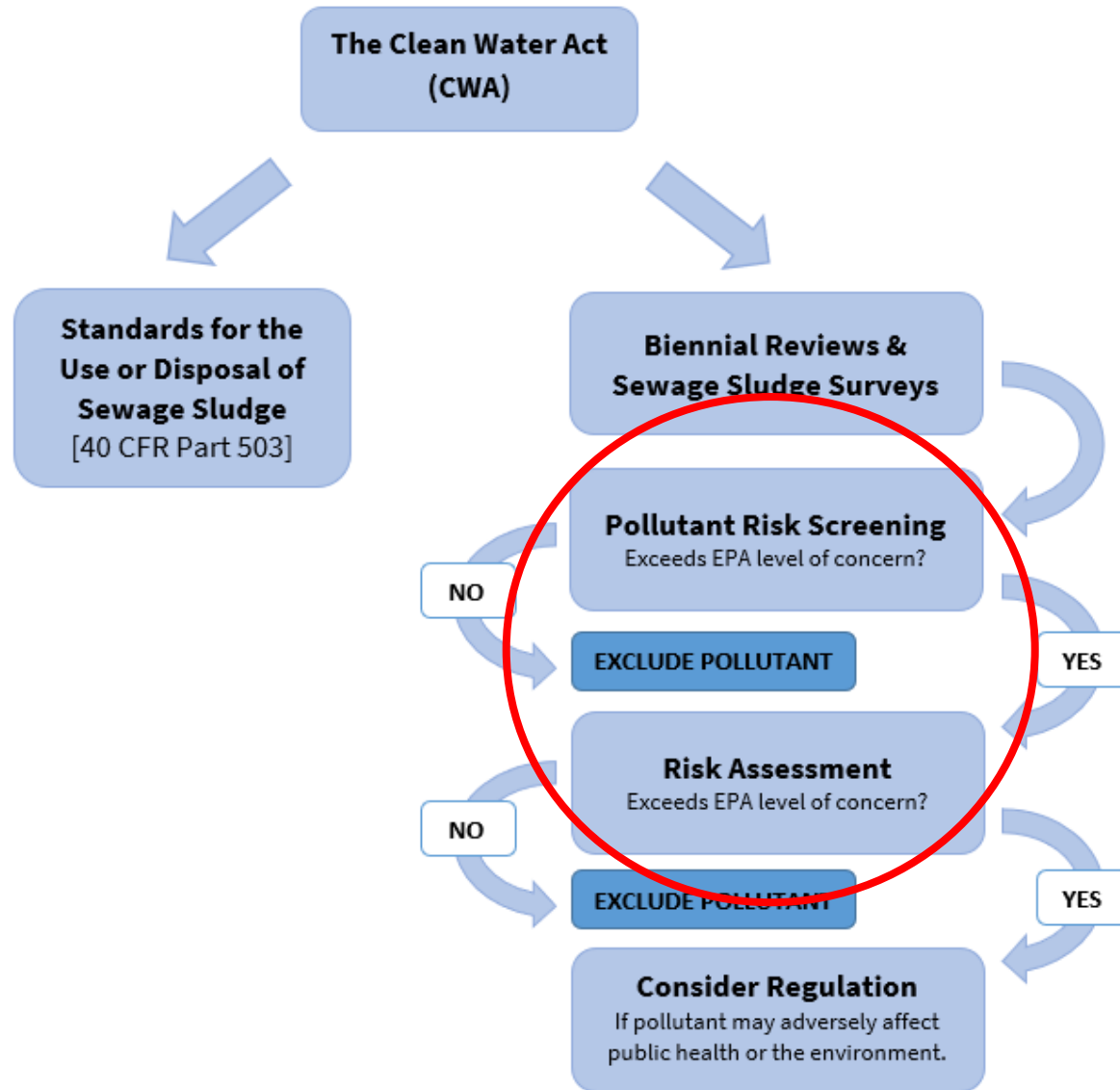
- Richman, Tess, Arnold, Elyssa, Williams, Antony. (Manuscript accepted). Curation of a list of chemicals in biosolids from EPA National Sewage Sludge Surveys & Biennial Review Reports. Scientific Data.



EPA's CompTox Chemicals Dashboard

- CompTox Chemicals Dashboard Help Pages
 - Link: <https://s3.amazonaws.com/dmap-ccte-ccd/current/manual/index.html>
- CompTox Chemicals Dashboard Primer Videos
 - Link: <https://www.epa.gov/chemical-research/comptox-chemicals-dashboard-primer-videos>





Science Advisory Board (SAB)

- “Approach to Biosolids Chemical Risk Assessment and Biosolids Screening Tool” (Summer 2022)
- Link: https://sab.epa.gov/ords/sab/f?p=100:18:7435319323204:::RP,18:P18_ID:2610



Risk Assessment Framework

EPA is proposing a three-step approach to biosolids risk assessment:

- Step 1: Prioritization using the Public Information Curation and Synthesis (PICS) Approach
 - Link: [EPA National Biosolids Meeting Summary 2021 \(pdf\)](#)
 - Link: [EPA National Biosolids Meeting 2021 \(Session 3\): EPA's Preliminary Biosolids Risk Assessment Approach – Biosolids Pollutant Prioritization](#)



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 - Link: [EPA National Biosolids Meeting 2021 \(Session 3\): EPA's Preliminary Biosolids Risk Assessment Approach – Biosolids Pollutant Prioritization](#)
- Step 2: Screening-level Model
 - Link: [EPA National Biosolids Meeting Summary 2021 \(pdf\)](#)
 - Link: [EPA National Biosolids Meeting 2021 \(Session 5\): EPA's Preliminary Biosolids Risk Assessment](#)



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- Step 2: Screening-level Model
 - Link: [EPA National Biosolids Meeting Summary 2021 \(pdf\)](#)
 - Link: [EPA National Biosolids Meeting 2021 \(Session 5\): EPA's Preliminary Biosolids Risk Assessment](#)
- Step 3: Framework for Refined Risk Assessment including Probabilistic Modeling
 - Link: [SAB - Approach to Biosolids Chemical Risk Assessment and Biosolids Screening Tool](#)



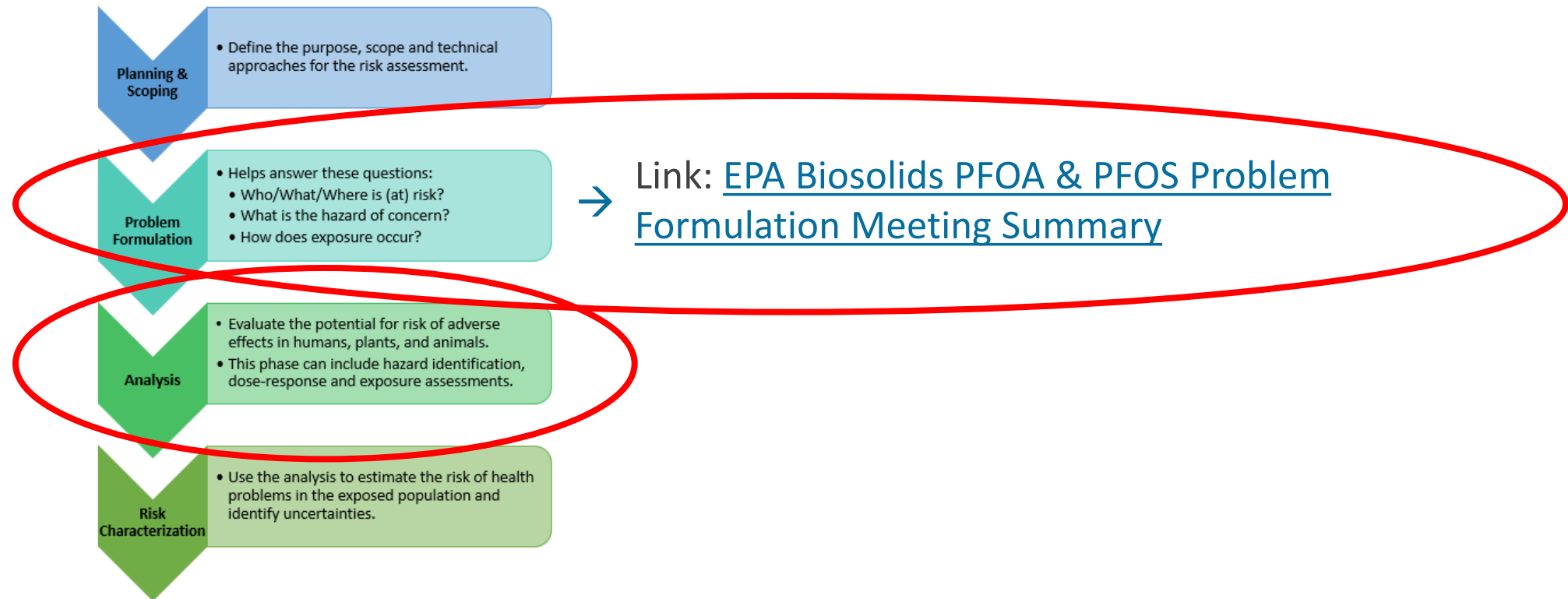
PFOA and PFOS Risk Assessment

- EPA PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024 – “Finalize risk assessment for PFOA and PFOS in biosolids that will serve as the basis for determining whether regulation of PFOA and PFOS in biosolids is appropriate.”
 - Link: <https://www.epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024>



PFOA and PFOS Risk Assessment (cont.)

Generalized Risk Assessment Framework



PFOA and PFOS Risk Assessment (cont.)

- “Analyses to support EPA's National Primary Drinking Water Rulemaking for PFAS” (November 2021)
- Link: https://sab.epa.gov/ords/sab/f?p=100:18:1337369690699:::RP,18:P18_ID:2601



Biosolids Research Updates

Pathogen and Vector Attraction Reduction:

- Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge" report (EPA/625/R-92/013)
 - Under internal review. Expected Summer 2022.

Antibiotic Resistant Bacteria and Genes:

- Evaluate types and prevalence of antibiotic resistant bacteria (ARB) and antibiotic resistance genes (ARGs) in biosolids to inform management strategies.

Contaminants of Emerging Concern:

- Develop non-targeted analysis and other methods to evaluate contaminants of emerging concern (CECs) in wastewater and biosolids.



Biosolids Research Updates (cont.)

PFAS Analytical Methods:

- [Draft Method 1633](#)
 - Multi-laboratory validation ongoing
- Non-targeted analyses

PFAS Prevalence and Pretreatment:

- Evaluate pretreatment strategies
 - [PFAS Innovation Treatment Team Research Briefs](#)

Thermal Treatment Strategies:

- Incineration and Pyrolysis/Gasification:
 - Sewage sludge incinerator products of incomplete combustion (PICS).
 - Pyrolysis field study with BioForceTech
 - Manuscript accepted (J. Air & Waste Mgmt.)
 - Co-incineration of spent drinking water residuals with limed sewage sludge



Biosolids Research Updates (cont.)

Contaminants and Land Application:

- Field Study 2: Application biosolids and evaluation of contaminant attenuation
 - Increase (4X-33X) in stable PFAS species after 1 year.
 - Presentation: [Land Application Field Study II](#)
- Field Study 3: Long-term (20 years) land application and evaluation of contaminant transport and plant uptake.
- Modeling subsurface transport.
 - PFAS analyses in soil and GW.
 - Adapt current modeling approaches to more accurately describe fate/transport for application to land application sites.
 - Manuscript on modeling limitation accepted (GW Monitoring and Remediation).



Biosolids-Related Research Grants

- [Practical Methods to Analyze and Treat Emerging Contaminants \(PFAS\) in Solid Waste, Landfills, Wastewater/Leachates, Soils, and Groundwater to Protect Human Health and the Environment](#)
 - “Decreasing polyfluoroalkyl substances (PFASs) in municipal wastewater effluent and minimizing release from land-applied biosolids” (Grant ID RD839640 - Lee, Linda S., Chaplin, Brian, Judy, Jonathan)



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- [National Priorities: Research on PFAS Impacts in Rural Communities and Agricultural Operations](#)
 - “Evaluating PFAS Occurrence and Fate in Rural Water Supplies and Agricultural Operations to Inform Management Strategies” (Grant ID R840082 - Lee, Linda S., Pennell, Kurt, Preisendanz, Heather)



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- [National Priorities: Evaluation of Pollutants in Biosolids](#)
 - “Unregulated Organic Chemicals in Biosolids: Prioritization, Fate and Risk Evaluation for Land Applications” (Grant ID R840245 - Olabode, Lola, Gan, Jay, Lee, Linda S., McAvoy, Drew)
 - “Fate and Transport of Unregulated Organic Contaminants in Biosolids - Development of a Human and Environmental Exposure Risk Framework” (Grant ID R840247 - Prasse, Carsten, Burke, Thomas A., Nachman, Keeve)
 - “Elucidating the occurrence of known and emerging chemical contaminants in wastewater biosolids and the influence of treatment and management processes on their fate, mobility and bioavailability” (Grant ID R840248 - Hale, Robert C., Guardia, Mark La, Luellen, Drew, Song, Bongkeun)
 - “Assessing biosolid treatment processes on pollutant environmental fate and plant uptake following land application” (Grant ID R840252 - Li, Hui, Carignan, Courtney, Huang, Qingguo, Ippolito, James, Norton, John, Zhang, Wei)



Stakeholder Engagement

- Webinar Series: <https://www.epa.gov/biosolids/epa-biosolids-webinar-series>
- National Meetings: <https://www.epa.gov/biosolids/2021-epa-biosolids-national-meeting>
- Website: <https://www.epa.gov/biosolids>



Questions?



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