US EPA Biosolids Program Update

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BIOSOLIDS PROGRAM

HEALTH AND ECOLOGICAL CRITERIA DIVISION

OFFICE OF SCIENCE AND TECHNOLOGY | OFFICE OF WATER

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Disclaimer

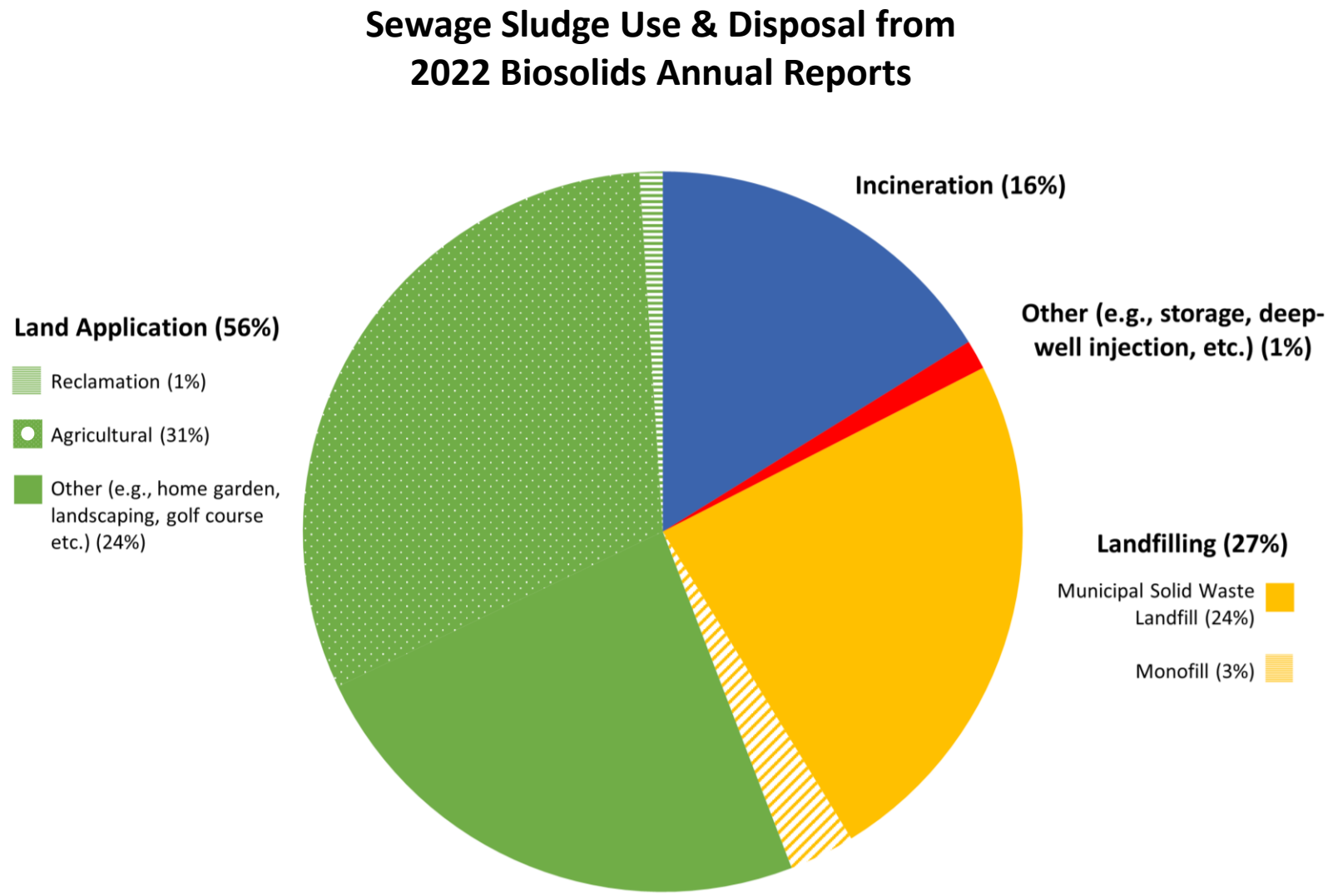
The views expressed in this presentation are those of the author and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency.

What are biosolids and sewage sludge?

- The Clean Water Act defines **sewage sludge** as “any solid, semi-solid, or liquid residue generated during the treatment of *domestic* sewage in a treatment works”
  - Sewage sludges are distinct from industrial sludges or residuals
  - Includes composted, blended, bagged, and bulk products
- **Biosolids** is not defined in law or regulation, but it is generally used to describe sewage sludge treated to meet the requirements of 40 CFR § 503 and intended to be land applied as a soil amendment or fertilizer.

Where does sewage sludge go?

- Landfill capacity limitations
- Greenhouse gas emissions from organics in landfills
- Changing emission regulations for sewage sludge incinerators
- Low or no-cost fertilizer option

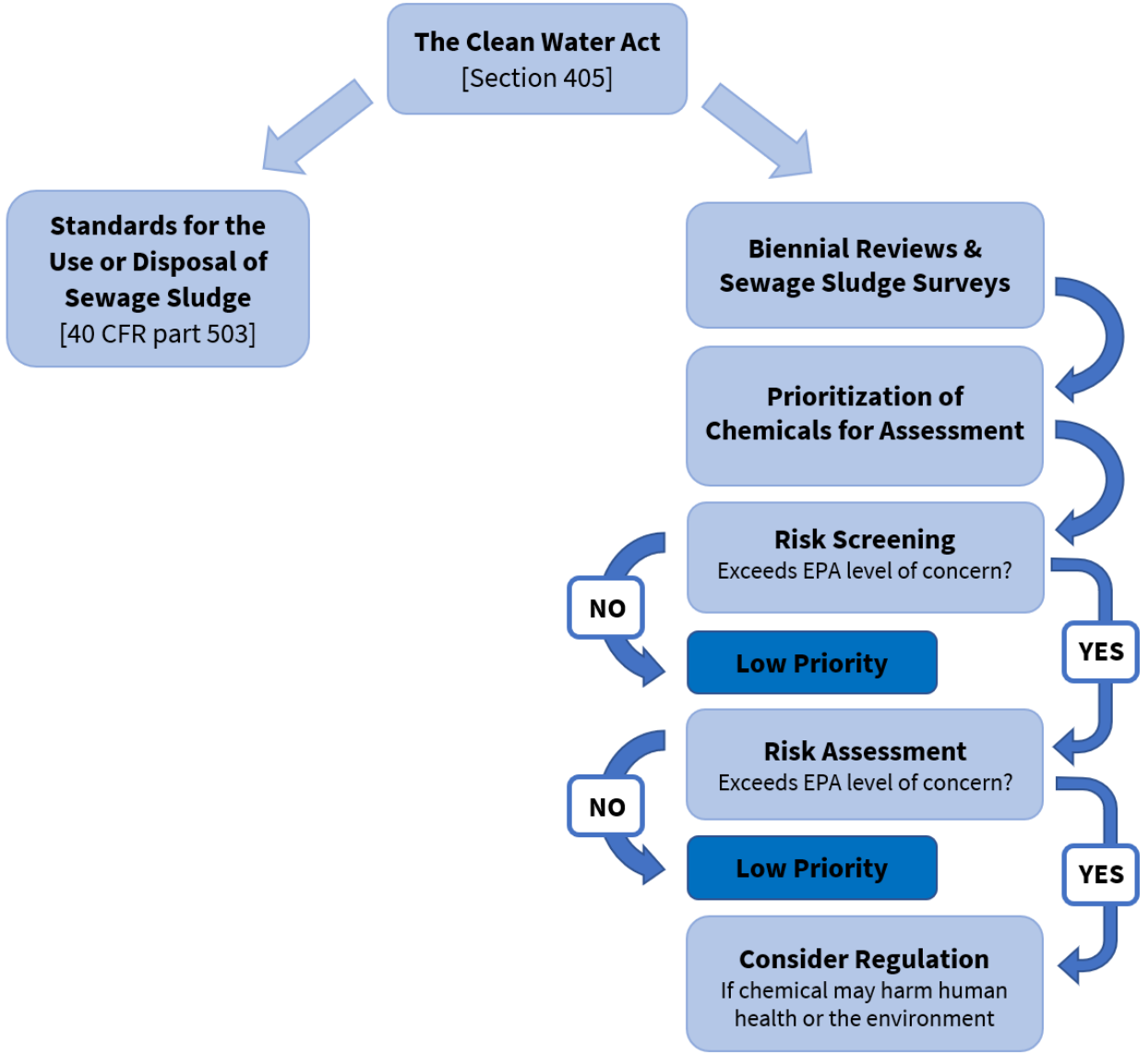


EPA’s role in sewage sludge regulation

Section 405(d) of the Clean Water Act:

1. Identify those toxic pollutants which, on the basis of available information on their *toxicity, persistence, concentration, mobility, or potential for exposure, may be present in sewage sludge in concentrations which may adversely affect public health or the environment*, and propose regulations specifying acceptable management practices for sewage sludge containing each such toxic pollutant and establishing numerical limitations for each such pollutant and;

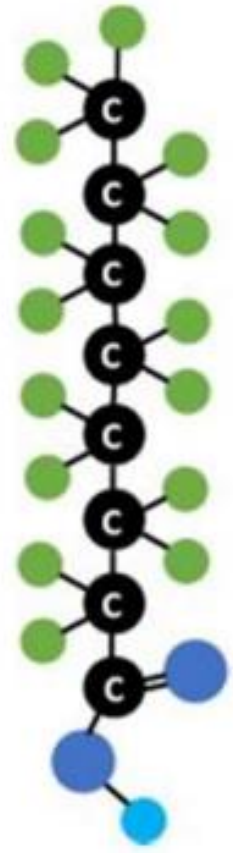
2. From time to time, but not less often than every 2 years, review the regulations for the purpose of identifying additional toxic pollutants.

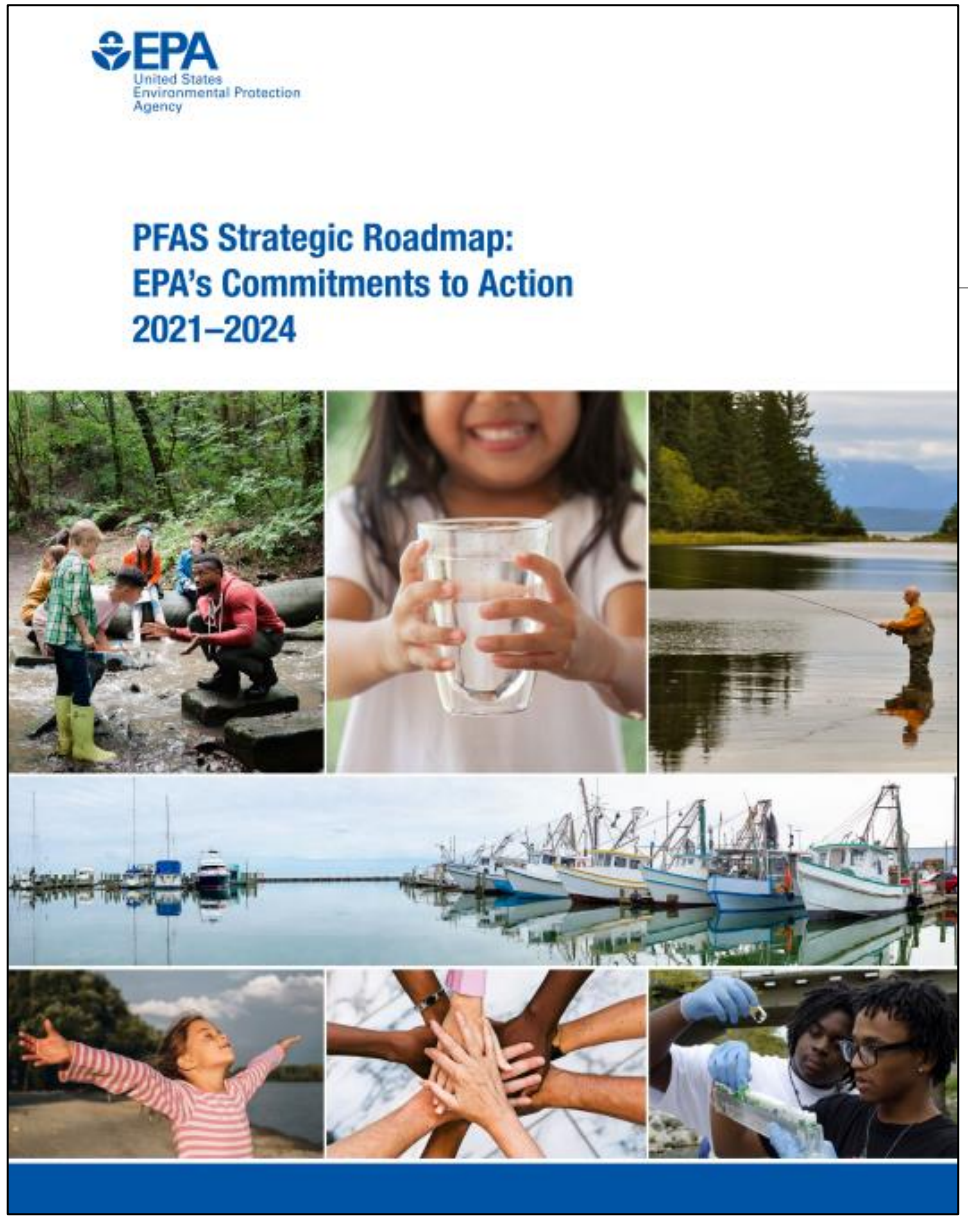


PFAS and Biosolids

Reasons for concern over PFOA and PFOS in sewage sludge

- Difficult to degrade or treat in wastewater treatment plants because they are non-volatile, non-biodegradable, and sorb to solids
- Persistent in the environment
- Bioaccumulative in humans, fish, plants, and livestock
- Potent toxicant to humans
  - Likely to cause cancer
  - Adverse impacts in developmental, cardiac, hepatic, and immune systems
  - Passes from mother to fetus during pregnancy and infant during early life
  - See EPA's Final Human Health Toxicity Assessments for PFOA and PFOS
- Detected ubiquitously across US sewage sludge samples





Biosolids and the PFAS Roadmap

- Publish multi-laboratory validated analytical method for 40 PFAS that can be used on wastewater, surface water and biosolids
  - **Completed** Method 1633 Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS (pdf)
- Finalize risk assessment for PFOA and PFOS in biosolids
  - **In progress**
    - External peer review of draft assessment (completed)
    - Public comment on draft assessment (planned Fall 2024)
    - Final risk assessment (contingent on public comment response)
    - Risk mitigation actions, as needed (contingent RA conclusions)

What is Risk Assessment?

Risk assessment is a scientific process. In general terms, risk depends on the following three factors:

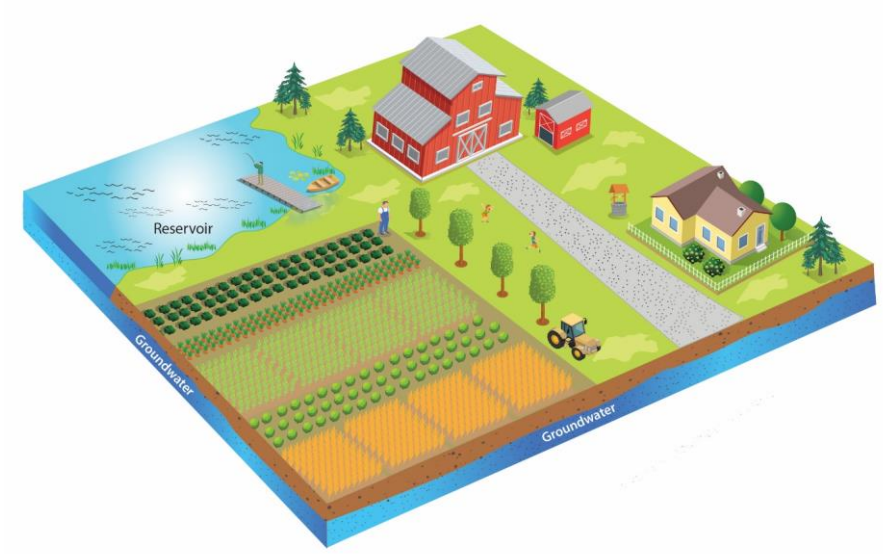
1) **How much of a stressor is present** in an environmental medium (e.g., soil, water, air) over what geographic area,
2) **How much contact (exposure)** a person or ecological receptor has with the contaminated environmental medium, and
3) **How it affects** the health of humans or ecological receptors (i.e. non-cancer hazard, cancer risk).

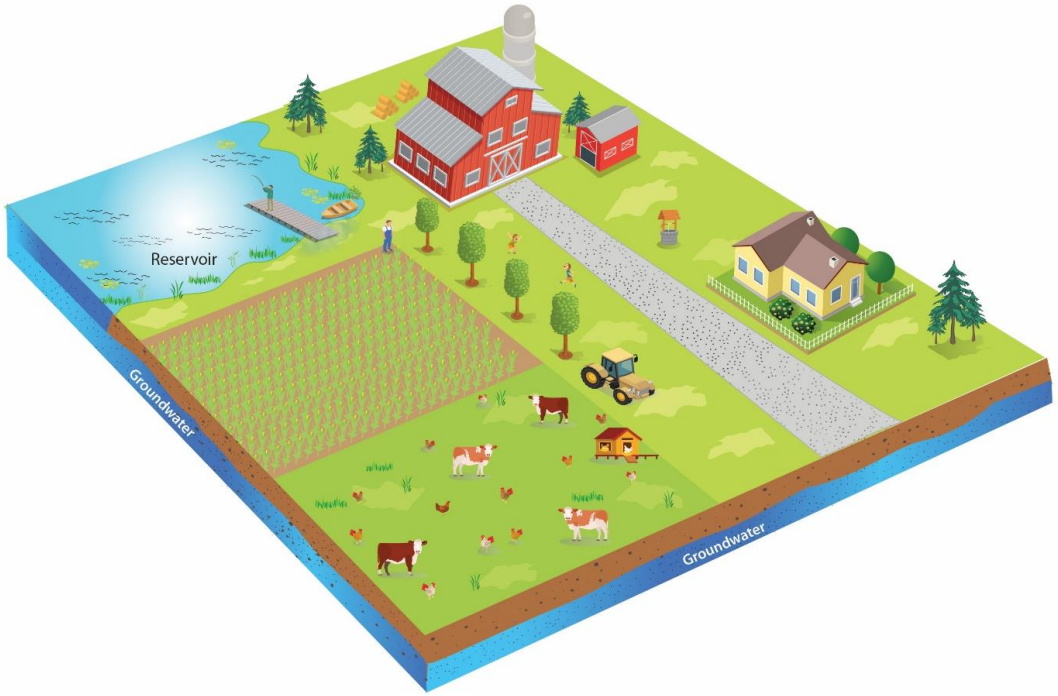
EPA PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024 – "Finalize risk assessment for PFOA and PFOS in biosolids that will serve as the basis for determining whether regulation of PFOA and PFOS in biosolids is appropriate."

Source: EPA Website: Risk Assessment

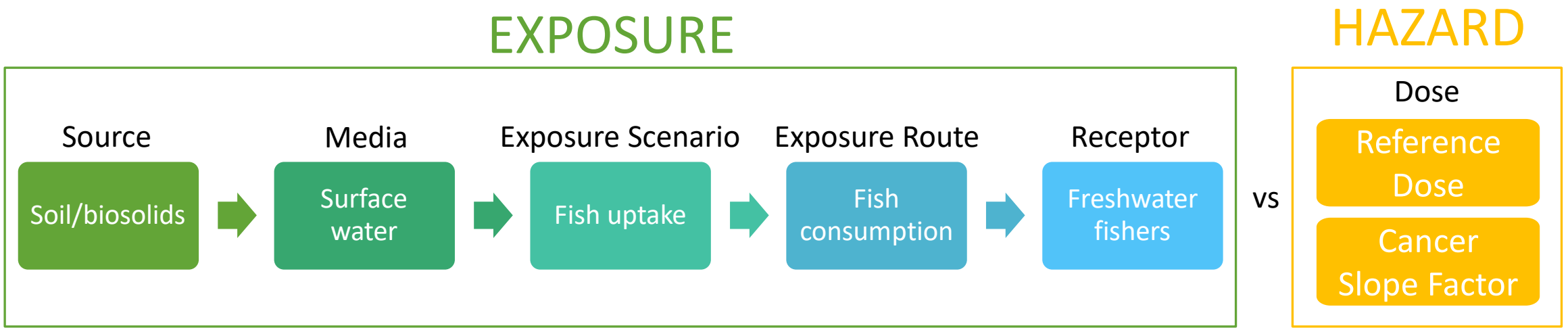
Risk Assessment conceptual models

- Farms – livestock and feed
- Farms – food crops
- Sewage sludge disposal sites
- Land reclamation sites
- Home or community gardens
- Sewage sludge incinerators





Example Exposure Pathway – eating fish



Other potential human exposure pathways

- **Pasture farm**
  - Milk and beef (cow exposed through soil, food, water)
  - Chicken meat and eggs (hen exposed through soil, food, water)
  - Drinking water (groundwater or surface water sources)
  - Incidental soil ingestion (child and adult)

- **Fruit/vegtable farm**
  - Fruits (protected and unprotected)
  - Vegetables (protected, unprotected and root)
  - Drinking water (groundwater or surface water)
  - Incidental soil ingestion (children and adult)

- **Surface disposal**
  - Drinking water (groundwater)

Can be exposed through one or multiple pathways

Can be exposed to PFOA, PFOS, or both

Additional EPA PFAS and biosolids actions

- Advise WWTPs on PFAS monitoring and source reduction
  - **Completed**: Memo to WWTPs on recommendations to reduce PFAS risks released in 2022
- Host PFAS in Municipal Biosolids Workshop
  - **Completed**: meeting report pending publication
- Conduct a National Sewage Sludge Survey to determine levels of 40 PFAS
  - **In progress:** See EPA website for updates
- Update EPA's Interim Guidance on Destroying and Disposing of Certain PFAS and PFAS-Containing Materials That Are Not Consumer Products
  - **Completed**: update guidance available online
- Award funding for PFAS in agriculture research grants (understanding PFAS uptake and bioaccumulation in plants and animals in agricultural, rural, and tribal communities).
  - **In progress:** Awards announced online (see RFA for more information)

Priority research areas

- Uptake studies for PFOA, PFOS
  - Pigs, dairy cows, beef cattle, broiler chickens, eggs, sheep, goats
  - Informs the draft and final PFOA/PFOS Risk Assessment and potential risk management actions
- Uptake studies for other PFAS
  - EPA will be monitoring levels of the 40 PFAS included in EPA Method 1633 in sewage sludge during 2025/2026
  - Plant uptake and livestock uptake values are needed for these other PFAS to prioritize PFAS for future risk assessment

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Questions?