

Skype Logistics

- Questions

- Questions can be typed in the chat window (bottom left) OR emailed to Feitel.alexandra@epa.gov.
- We will try and leave some time to answer questions during the last ten minutes. Unanswered questions will be addressed via email.

- Skype Help

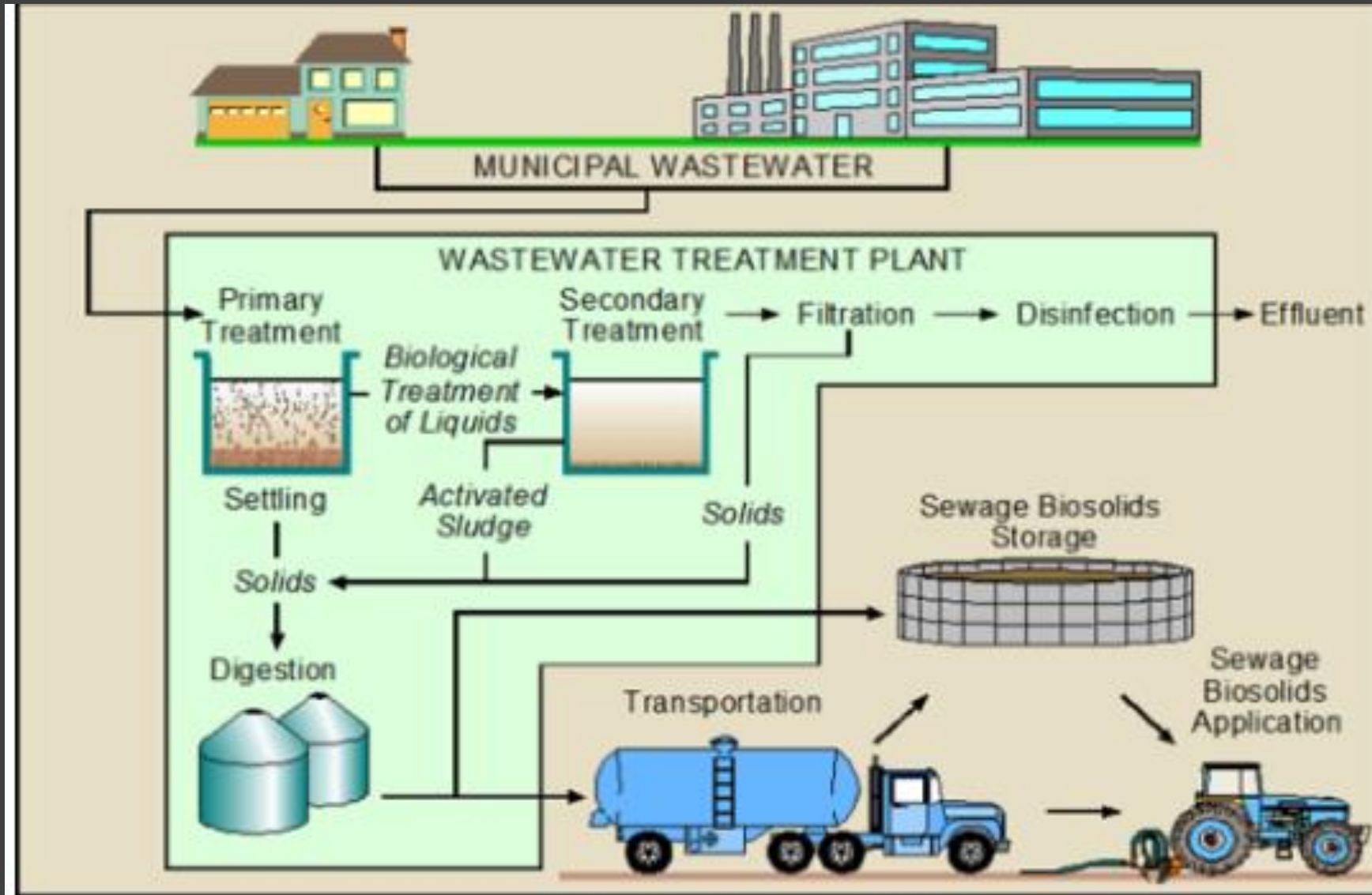
- Skype Web App.
- Help can be accessed by clicking ellipsis bubble (bottom right) and choosing last option: “Skype for Business Help.”



Webinar 1 EPA Biosolids Program and 40 CFR Part 503

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How are Biosolids Produced?



Biosolids Use Statistics



- Based on totals from the biosolids electronic annual reports for 2017:
- About 4.3 Million Dry Metric Tons (mdmt) of biosolids were generated.
 - About 2.2 mdmt biosolids were applied to land.
 - About 584,000 dmt biosolids were incinerated.
 - About 1.5 mdmt biosolids were disposed of via other management practices.
- About 58% of biosolids applied to land were applied to agricultural land (2016).



<https://chicago.suntimes.com/2018/5/30/18470524/a-recycling-effort-that-shouldn-t-go-to-waste>



Statute

- Clean Water Act (CWA)
 - Enacted October 18, 1972 (PL 92-500).
- Section 405 sets the framework for sewage sludge regulations (*i.e.*, 40 CFR Part 503)
 - Requires EPA to establish numeric limits and management practices that protect public health and the environment from the effects of chemical and microbial pollutants during the use or disposal of sewage sludge.
 - Requires EPA to review sewage sludge regulations every two years to identify additional toxic pollutants that occur in sewage sludge and set regulations for those pollutants if sufficient scientific evidence indicates that they may harm human health or the environment.

Regulation

- What does 40 CFR Part 503, *Standards for the Use or Disposal of Sewage Sludge* regulate?
 - Sewage sludge
 - Solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works.
 - Domestic septage
 - The liquid or solid material removed from a septic tank cesspool, portable toilet, type III marine sanitation device, or similar system that receives only domestic septage (household, non-commercial, non-industrial sewage).



Regulation

- Self-implementing rule
 - Federally enforceable without a permit.
- Several states have adopted Part 503 or something more restrictive.
 - Eight states formally delegated (SD, UT, OK, WI, TX, AZ, OH, MI).



Regulation

- The Part 503 rule establishes requirements for the final use or disposal of sewage sludge [biosolids] when biosolids are:
 - Placed on a surface disposal site.
 - Fired in a biosolids incinerator.
 - Applied to land.



<https://www.westernvawater.org/wastewater-service/wastewater-treatment/biosolids-land-application>



<https://www3.epa.gov/region9/water/npdes/sludge.html>



<https://www.greensboro-nc.gov/departments/water-resources/wastewater-system/treatment-process/wastewater-biosolids-disposal>



40 CFR Part 503

- Subpart C: Surface Disposal
 - Applicability § 503.20
 - Special definitions § 503.21
 - General requirements § 503.22
 - Pollutant limits § 503.23
 - Management practices § 503.24
 - Operational standards § 503.25
 - Pathogens § 503.32
 - Vector Attraction Reduction § 503.33
 - Monitoring § 503.26
 - Recordkeeping § 503.27
 - Reporting § 503.28

Surface Disposal

- Surface disposal: Biosolids are placed on an area of land for final disposal.
- Liners and leachate collection systems may be used to contain surface disposal sites.
- Types of surface disposal sites:
 - Monofills
 - Surface impoundments and lagoons
 - Waste piles
 - Dedicated disposal sites
 - Dedicated beneficial use sites
- Pollutant limits for: arsenic, chromium and nickel*.



<http://burchhydro.com/Services/Biosolids-Stabilization>

*Please note that pollutant limits differ for surface disposal, incineration, and land application.



40 CFR Part 503

- Subpart E: Incineration
 - Applicability § 503.40
 - Special definitions § 503.41
 - General requirements § 503.42
 - Pollutant limits § 503.43
 - Operational standard—total hydrocarbons § 503.44
 - Management practices § 503.45
 - Monitoring § 503.46
 - Recordkeeping § 503.47
 - Reporting § 503.48



Incineration

- Incineration: combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.
- For incineration of biosolids, the combustion units are coupled with air pollution control devices (APCDs) to remove small particles and adhering metals in exhaust gas or further decompose organics.
- Biosolids can be fired in several different types of incinerators
 - **Sewage Sludge Incinerator (SSI)**: an enclosed device in which only sewage sludge (and auxiliary fuel) are fired.
 - **Municipal Waste Combustor (MWC)**: equipment that combusts municipal solid waste (co-combusted with biosolids).
 - **Waste-to-Energy**: conversion of waste materials into usable heat, energy or fuel (usually municipal waste combustors co-firing with biosolids).

Incineration

- 40 CFR Part 503 focuses on sewage sludge incinerators (SSIs)
- Commonly used SSIs:
 - Multiple hearth incinerators
 - Fluidized bed incinerators (pictured)
- Since 1988 (when EPA tracking started) the number of SSIs has decreased, however the amount of sewage sludge incinerated has stayed relatively steady between 16-20% (of sewage sludge generated).
 - The decreased number of SSIs is partly due to new Clean Air Act regulations.
 - Units have also become more efficient: 1 fluidized bed can replace 2 smaller multiple hearth incinerators.
 - Fluidized bed incinerators are generally better at meeting federal emission standards compared to multiple hearth, so most new installations use this technology.



<https://hankines.com/fluidized-bed-incinerators/>



Incineration: Part 503 and Beyond

- Incineration is regulated under 40 CFR Part 503, but other aspects of biosolids incineration are covered by additional regulations:
 - Disposal of ash generated during the firing of biosolids in an SSI is regulated under solid waste disposal requirements (40 CFR Parts 257, 258, & 261-258).
 - SSIs, MWCs and other solid waste incinerators are regulated under the Clean Air Act (40 CFR Part 60 & 62).



40 CFR Part 503

- Subpart B: Land Application
 - General requirements § 503.12
 - Pollutant limits § 503.13
 - Operational standards § 503.15
 - Pathogens § 503.32
 - Vector Attraction Reduction § 503.33
 - Monitoring § 503.16
 - Recordkeeping § 503.17
 - Reporting § 503.18
 - Management Practices § 503.14

Land application

- Land application: Biosolids are applied to land to condition the soil or fertilize crops or other vegetation grown in the soil.
- Biosolids can be applied in solid or liquid states via:
 - Spreading or spraying on soil surface
 - Tilling into soil after being surface applied
 - Injected directly below the surface
- Types of land that benefit from land application:

| Nonpublic contact sites | Public contact sites |
|---|--|
| <ul style="list-style-type: none"> ■ Areas not frequently visited by the public. ■ Examples: Agricultural land, forests, reclamation sites. | <ul style="list-style-type: none"> ■ Areas where people are likely to come into contact with biosolids applied to land. ■ Examples: Public parks, plant nurseries, roadsides, golf courses, lawns, home gardens. |



Pollutant Limits § 503.13

- Regulated pollutants: Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, Zinc* .
- Pollutant limits – all land applied biosolids must meet the *ceiling concentrations* for pollutants and must also meet either:
 - *Pollutant concentration limits*
 - *Cumulative pollutant loading rate*
 - *Annual pollutant loading rate*
- Pollutant limits are risk based.

*Please note that pollutant limits differ for surface disposal, incineration, and land application.



Pathogen Reduction § 503.32(a),(b)

- Pathogens: Microorganisms that cause disease, including some bacteria, viruses, protozoa, and other organisms.
- Pathogen reduction requirements:
 - Based on technological and microbiological requirements.
 - Pathogens of interest: Salmonella sp., fecal coliforms, enteric viruses, viable helminth ova.
 - Level of pathogen reduction distinguishes Class A biosolids from Class B biosolids.

| Class A Biosolids | Class B Biosolids |
|---|--|
| <ul style="list-style-type: none">▪ Goal is to reduce pathogens below detectable limits.▪ Applied to lawns and home gardens, sold or given away in bags or other containers. | <ul style="list-style-type: none">▪ Goal is to reduce pathogens to levels that are unlikely to pose a threat to public health and the environment under specific use conditions.▪ Applied to agricultural and non-agricultural land (e.g., forest, public contact sites, surface disposal sites and reclamation sites). |



Pathogen Equivalency Committee (PEC)

- PEC provides technical assistance and recommendations on process equivalencies for pathogen reduction in sewage sludge to government and industry.
- Ensures that new processes employed for sewage sludge treatment are robust and effective in pathogen reduction.
- Reviews and makes recommendations to federal and/or state permitting authorities on applications proposing new innovative or alternative sewage sludge pathogen reduction processes.

Vector Attraction Reduction § 503.33

- Vector: A living organism (such as a fly or mosquito) that transmits infectious diseases between humans or from animal to human.
- Two ways to achieve Vector Attraction Reduction:

| Reduction through Treatment | Reduction through Barriers |
|---|--|
| <ul style="list-style-type: none"> ▪ Treatments are operating conditions or tests to demonstrate that vector attraction has been reduced in biosolids. ▪ Examples: Aerobic and anaerobic digestion, composting, alkali addition, drying, elevated pH (domestic septage only). | <ul style="list-style-type: none"> ▪ Soil is used as a physical barrier to prevent vectors from coming in contact with land applied biosolids. ▪ Examples: injection of biosolids below land surface, incorporation of biosolids into soil, placement of a cover over biosolids. |

40 CFR Part 503



Options for Meeting Pollutant Limits, Pathogen and Vector Attraction Reduction Requirements for Land Application of Biosolids

| | Pollutant Limit Requirement § 503.13 (a)(1) and (b)(1)-(b)(4) | | Pathogen Requirements § 503.32 (a)(3)-(a)(8), (b)(2)-(b)(4) | Vector Attraction Reduction Requirement § 503.33 (b)(1)-(b)(10) |
|---|---|---|---|---|
| Class A Exceptional Quality (EQ) | Ceiling Concentrations (a)(1) | Pollutant Concentration (b)(3) | Any Class A Alternative (a)(3)-(a)(8) | Any Alternative 1-8 (b)(1)-(b)(8) |
| Class A | Ceiling Concentrations (a)(1) | Pollutant Concentration (b)(3) | Any Class A Alternative (a)(3)-(a)(8) | Alternative 9 or 10 (b)(9) or (b)(10) |
| | | Cumulative Pollutant Loading Rates (b)(2) | | Any Alternative 1-10 (b)(1)-(b)(10) |
| | | Annual Pollutant Loading Rates (b)(4) | | Any Alternative 1-8 (b)(1)-(b)(8) |
| Class B | Ceiling Concentrations (a)(1) | Pollutant Concentration (b)(3) | Any Class B Alternative (b)(2)-(b)(4) | Any Alternative 1-10 (b)(1)-(b)(10) |
| | | Cumulative Pollutant Loading Rates (b)(2) | | Any Alternative 1-10 (b)(1)-(b)(10) |



Reporting § 503.18

- Required reporting by facilities with design flow rate is \geq one million gallons/day, serve 10,000 people or more, or a Class I sludge management facility (or are otherwise required to report per permit conditions, enforcement action, state law, etc.)
 - Submit an annual report by February 19 of each year covering the previous year.
- EPA Biosolids Center of Excellence receives and reviews annual reports.
 - In 2017, electronic report collection began in the 42 states where EPA implements the Federal Biosolids Program.
 - In 2019, ~98.5% of reports were received electronically.



Enforcement and Compliance: Biosolids Center of Excellence

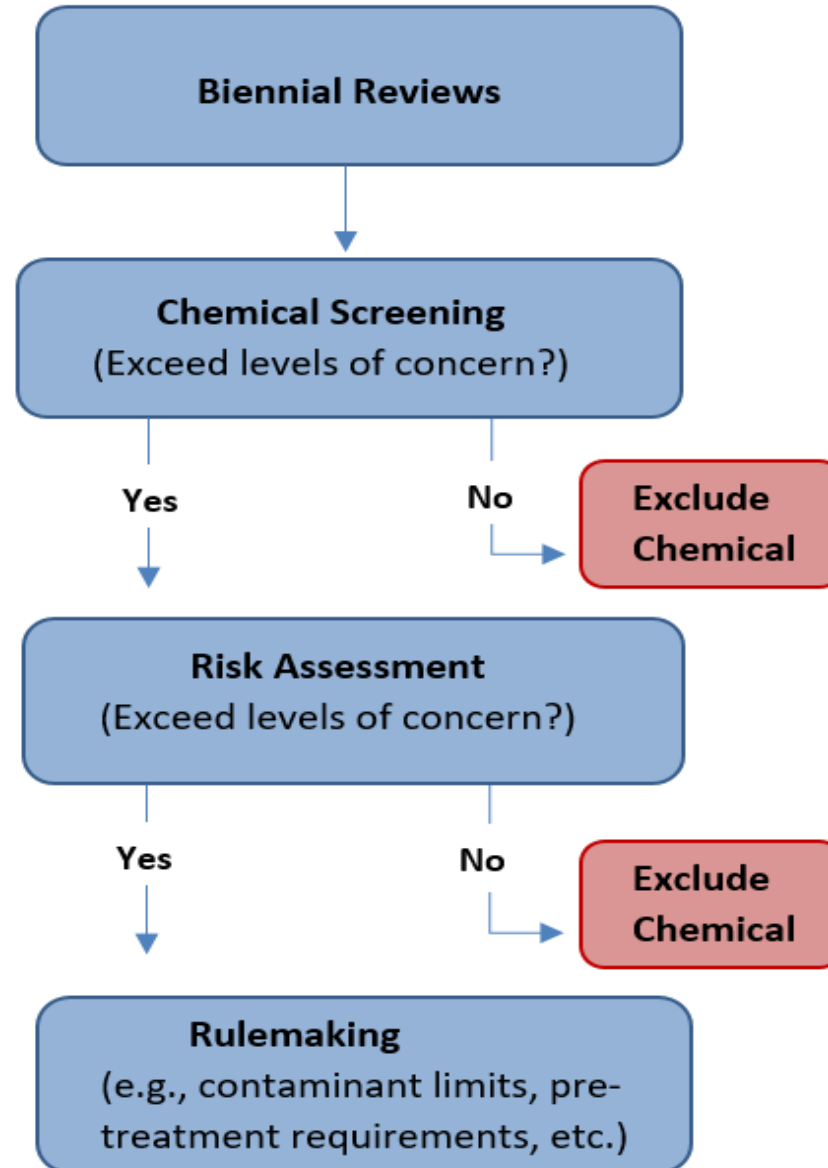
- Established in 2013 by EPA's Office of Enforcement and Compliance Assurance.
- Located in EPA Region 7 (Kansas City).
- Lead for all EPA biosolids enforcement activities across the country.
- Coordinates with EPA Regions and Headquarters.
- Issues informal and formal enforcement actions for biosolids violations discovered through:
 - Tips and complaints
 - Review of annual biosolids reports
 - Inspections
- Informal actions include letters of warning.
- Formal actions include compliance orders and administrative penalties.



Enforcement and Compliance History Online (ECHO)

- ECHO is a web tool developed and maintained by EPA's Office of Enforcement and Compliance Assurance for public use.
- ECHO Biosolids Facility Report is available for facilities that have biosolids compliance monitoring data, biosolids enforcement data, or submitted biosolids annual reports electronically through the NPDES eReporting Tool (NeT).
 - Displays biosolids permit, enforcement and compliance, and biosolids-specific program data submitted on NPDES biosolids annual reports.
- Biosolids Facility Report contains biosolids data submitted in annual reports from 2016-2018:
 - Reporting obligation, treatment processes, amount generated, management practices, analytical methods, etc. for individual years and as trends (for some data).

Meeting CWA § 405 Requirements





Biennial Reviews

- Purpose: review publicly available information on occurrence, fate and transport in the environment, human health and ecological effects, and other relevant information for pollutants found in biosolids.
- Data gleaned from the biennial review process is used to conduct risk screens and refined risk assessments for pollutants found in biosolids.
- Biennial reviews are posted to the EPA's website for 2005, 2007, 2009, 2011, 2013, 2015 and 2016-2017: <https://www.epa.gov/biosolids/biennial-reviews-sewage-sludge-standards>



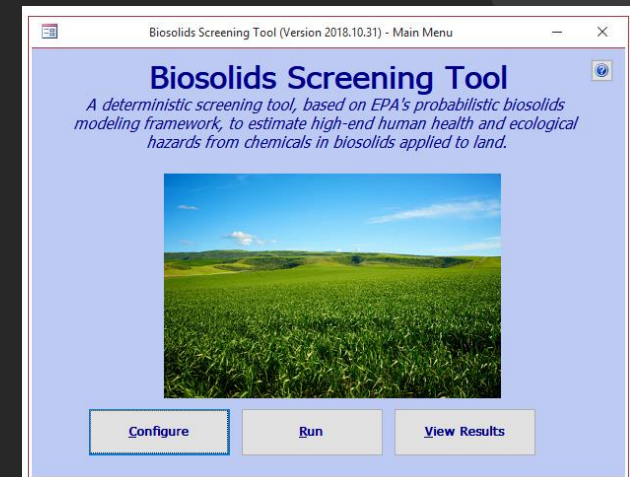
Chemical Occurrences

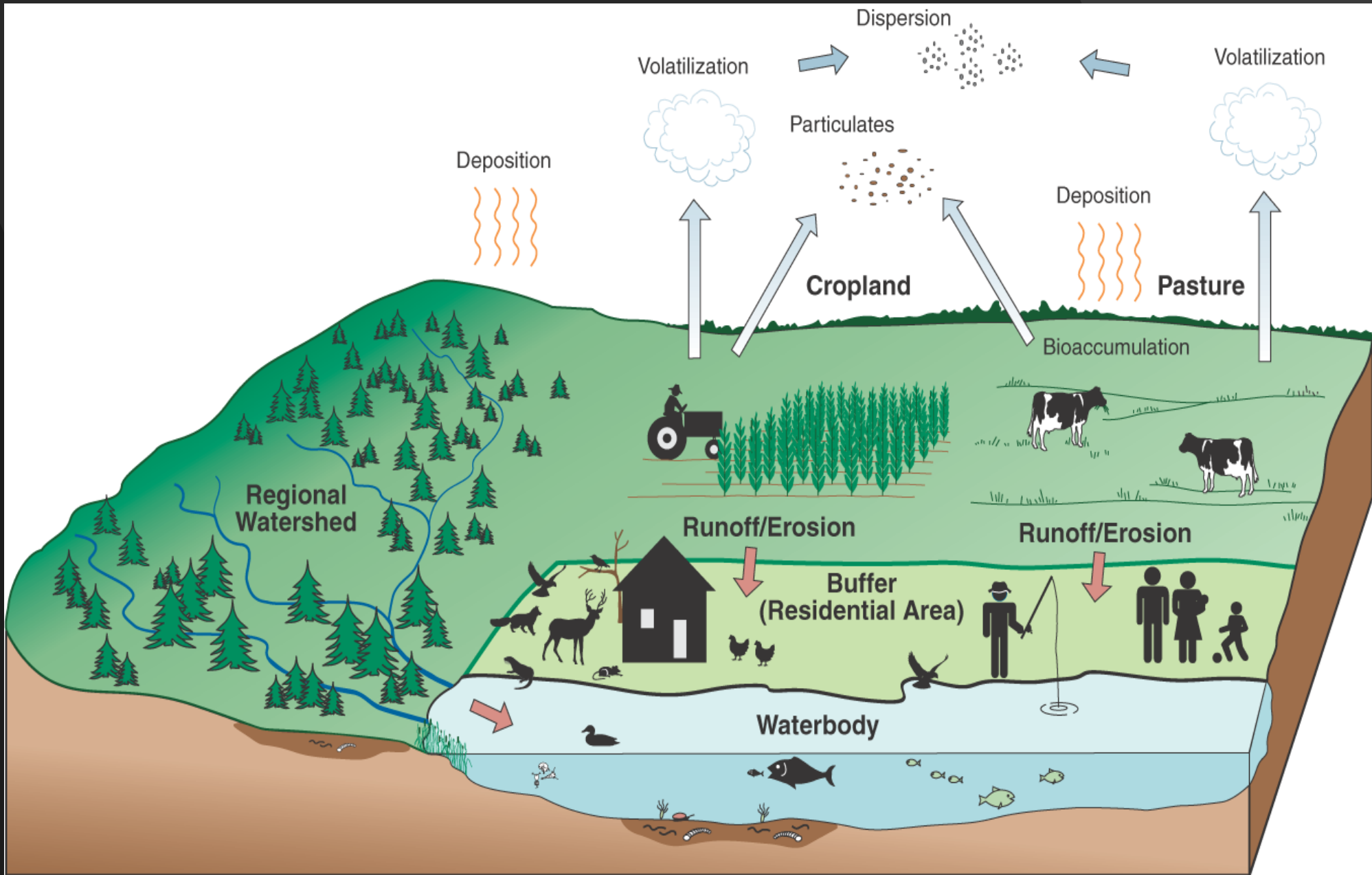
- EPA's national sewage sludge surveys:
 - 1988 (conducted in support of the Part 503 Rule).
 - 2001 (conducted in support of the dioxins assessments and published in 2007).
 - 2006 (Targeted National Sewage Sludge Survey: updated concentration values for some pollutants previously evaluated and obtained information on whether certain contaminants of emerging concern may be present in sewage sludge, published in 2009).

Biosolids Screening



- EPA is evaluating options for a screening-level deterministic model with high end human and ecological hazard estimates.
- ID pollutants, pathways, and receptors of greatest interest that can facilitate decisions regarding whether to perform more refined modeling / address data gaps / uncertainties.
- Revisions ongoing; chemical screening anticipated 2020.





Not to scale



Risk Assessments

- Section 405(d) of the Clean Water Act requires the EPA to establish the numeric limits and management practices that protect public health and the environment from the reasonably anticipated adverse effects of chemical and microbial pollutants during the use or disposal of sewage sludge.
- Risk assessment serves as the technical basis for the determination if adverse effects of a chemical and microbial pollutants result from the use or disposal of sewage sludge. The assessment informs whether numeric standards are warranted under the Part 503 regulation.
- Key elements for developing a risk assessment are:
 - Planning and Scoping
 - Problem formulation
 - Risk Assessment (exposure and effects assessment & risk characterization)
 - Public, stakeholder and community involvement



Per- and Polyfluoroalkyl Substances

- EPA initiating problem formulation for PFOA and PFOS in biosolids.
 - Identified in EPA PFAS Action Plan.
 - Estimated Completion 2020.
- Problem formulation is part of the risk assessment (RA) framework that:
 - Articulates the purpose for the assessment.
 - Defines the problem.
 - Determines conceptual plan for analyzing and characterizing risk (EPA 2014, EPA 1998).
- Problem formulation provides information on:
 - Chemical's sources and occurrence.
 - Fate and transport in the environment.
 - Toxicological characteristics and factors affecting toxicity.
 - Analysis plan describing the scientific approach.
- Includes engagement with states and tribes, risk managers, scientists, and members of the biosolids community regarding foreseeable science and implementation issues.



Other Biosolids Program Efforts

- Resource Recovery
 - A consistent process for evaluating products derived from sewage sludge that are intended for land application is needed.
 - 40 CFR Part 503 does not consider or anticipate current and future innovative resource recovery technologies and products.
 - Work in this area is ongoing.

- EPA Biosolids Meeting
 - Spring 2020.
 - Formerly referred to as the “states meeting”.
 - EPA to pay for one representative from each state and three tribes.



Office of Inspector General Report

- The EPA's Office of Inspector General (OIG) report is entitled, "*EPA Unable to Assess the Impact of Hundreds of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment*" (November 15, 2018).
- While EPA agrees that the Biosolids Program can be improved, many of the OIG recommendations were already underway by the EPA prior to the audit, which began in June 2017.
- The EPA's response to the *draft* OIG report can be found in Appendix D of the final report.
- The EPA did not concur on 5 of 13 Recommendations/Corrective Actions
 - Resolution process final.
 - EPA's response memo on final report, resolution process and final corrective actions found on the OIG website: <https://www.epa.gov/office-inspector-general/report-epa-unable-assess-impact-hundreds-unregulated-pollutants-land>
- Assessing pollutants found in biosolids is the top priority of the Biosolids program. The Agency's position on biosolids has not changed.



Thank you!

- Please visit:
www.epa.gov/biosolids
- Contact:
 - Liz Resek ressek.elizabeth@epa.gov
 - Reuben Baris baris.reuben@epa.gov
 - Tess Richman richman.tess@epa.gov
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