



# How Mercury From Dental Practices Gets Into Sewage Sludge and What That Means for a Wastewater Treatment Plant



METROPOLITAN DISTRICT  
HARTFORD WATER POLLUTION CONTROL PLANT



# Presentation Topics



- 💧 Water Pollution Control Overview
- 💧 Hartford Plant Operations
- 💧 Source of Mercury and Dental Amalgam
- 💧 Impacts for Hartford Wastewater Treatment

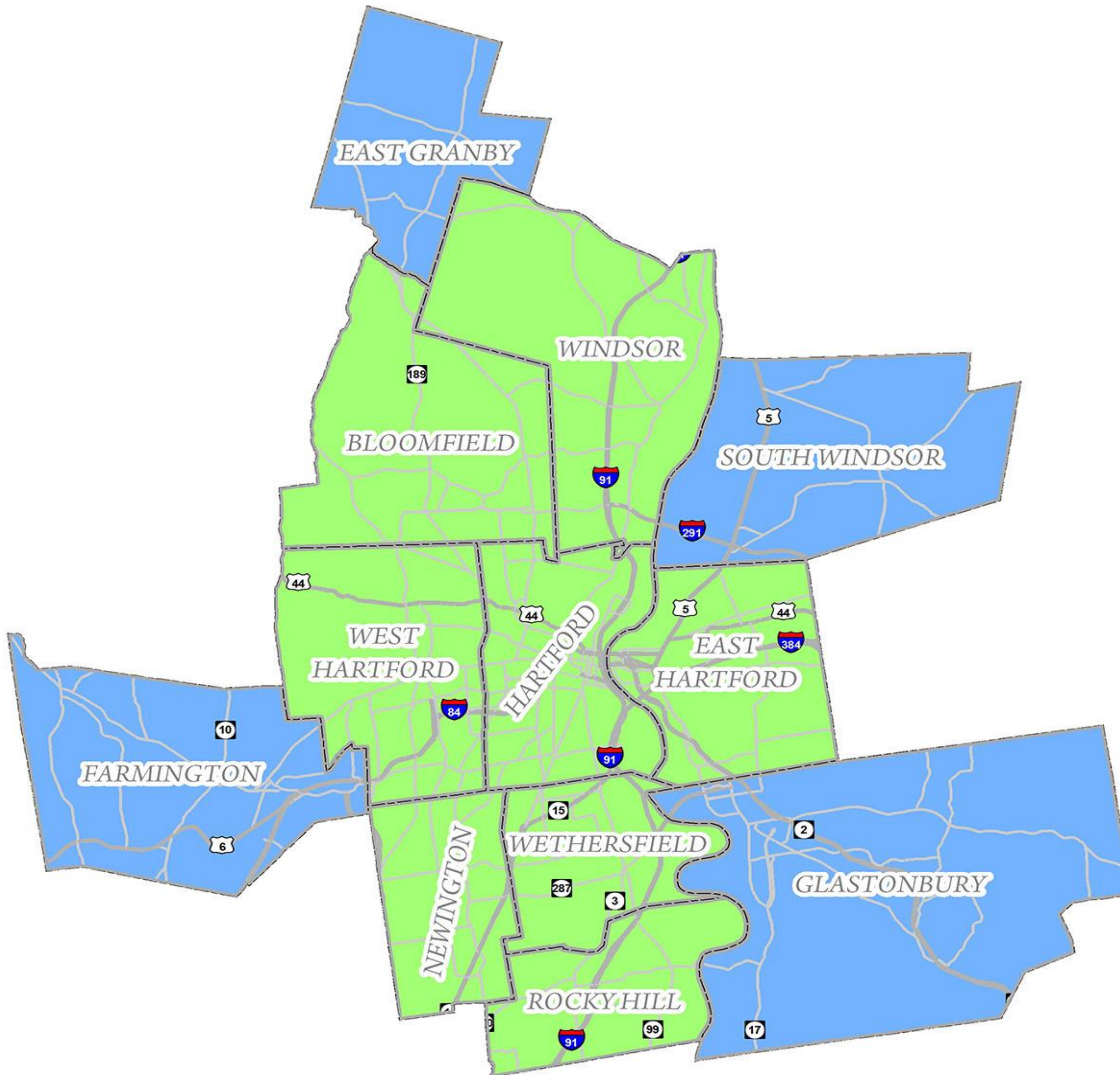


# The Metropolitan District

- ◆ The MDC is a nonprofit municipal corporation chartered by the Connecticut General Assembly in 1929.
- ◆ Largest water/wastewater utility in Connecticut.
- ◆ The MDC provides water, sewer and household hazardous waste collection services to its member municipalities: Bloomfield, East Hartford, Hartford, Newington, Rocky Hill, West Hartford, Wethersfield and Windsor.
- ◆ Services provided to approximately 400,000 population
  - Water Supply – 40 billion gallons in 2 main reservoirs
  - Water Treatment – 2 plants, 85+ MGD capacity
  - Water Distribution & Wastewater Collection
    - 2,700+ miles of distribution and collection system piping
    - 80+ water and wastewater pump stations
  - Wastewater Treatment – 4 plants, 135 MGD capacity
- ◆ Under a series of special agreements, the District supplies treated water to portions of Glastonbury, South Windsor, Farmington, East Granby and Portland.
- ◆ ~500 employees with an annual operating budget of ~\$150M



# MDC Service Area



## MDC Water and Sewer System

### Legend

Member Towns

### Service Type

Water Service Only

Water and Sewer Service

3  
Miles





# Sources of Mercury at a Wastewater Plant

- Naturally occurring in extremely small amounts
- Industrial sources
- Commercial products – many have mercury in extremely small (parts per billion or trillion) amounts
- Residential
- Dental offices may be significant source – overall in US dental offices are third largest user of mercury (NEIWPC).



# EPA Statement on Dental Amalgam

- If improperly managed by dental offices, dental amalgam waste can be released into the environment. Although most dental offices currently use some type of basic filtration system to reduce the amount of mercury solids passing into the sewer system, **dental offices are the single largest source of mercury at sewage treatment plants.**
- The installation of amalgam separators, which catch and hold the excess amalgam waste coming from office spittoons, can further reduce discharges to wastewater. **Without these separators, the excess amalgam waste will be released to the sewers.**

SOURCE: <https://www.epa.gov/mercury/mercury-dental-amalgam>



# Path of Amalgam

- From sewers, amalgam waste goes to sewage treatment plants. POTWs have around a 90% efficiency rate of removing amalgam from wastewaters. Once removed, the amalgam waste becomes part of the POTW's sewage sludge, which is then disposed:
  - **in landfills.** If the amalgam waste is sent to a landfill, the mercury may be released into the ground water or air.
  - **through incineration.** If the mercury is incinerated, mercury may be emitted to the air from the incinerator stacks.
  - **by applying the sludge to agricultural land as fertilizer.** If mercury-contaminated sludge is used as an agricultural fertilizer, some of the mercury used as fertilizer may also evaporate to the atmosphere.
- Through precipitation, this airborne mercury eventually gets deposited onto water bodies, land and vegetation



# Special Medical Waste Disposal of Amalgam

- ◆ Some dentists throw their excess amalgam into special medical waste containers, believing this to be an environmentally safe disposal practice.
- ◆ If waste amalgam is improperly disposed in medical waste bags, however, the amalgam waste may be incinerated and mercury may be emitted to the air from the incinerator stacks.
- ◆ This airborne mercury is eventually deposited into water bodies and onto land.

SOURCE: <https://www.epa.gov/mercury/mercury-dental-amalgam>





# Wastewater 101

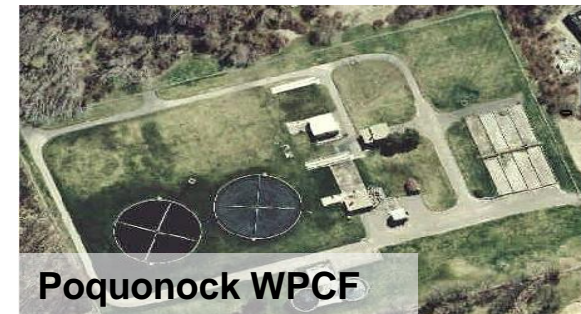
- The ultimate goal of a treatment plant is to make clean water by:
  - Separating pollutants (solids) from wastewater
  - Treat the water to a high level safe for discharge back to the environment
- Treat the solids to a high level
- It is an important part of water recycling & the water cycle



# Water Pollution Control (WPC)

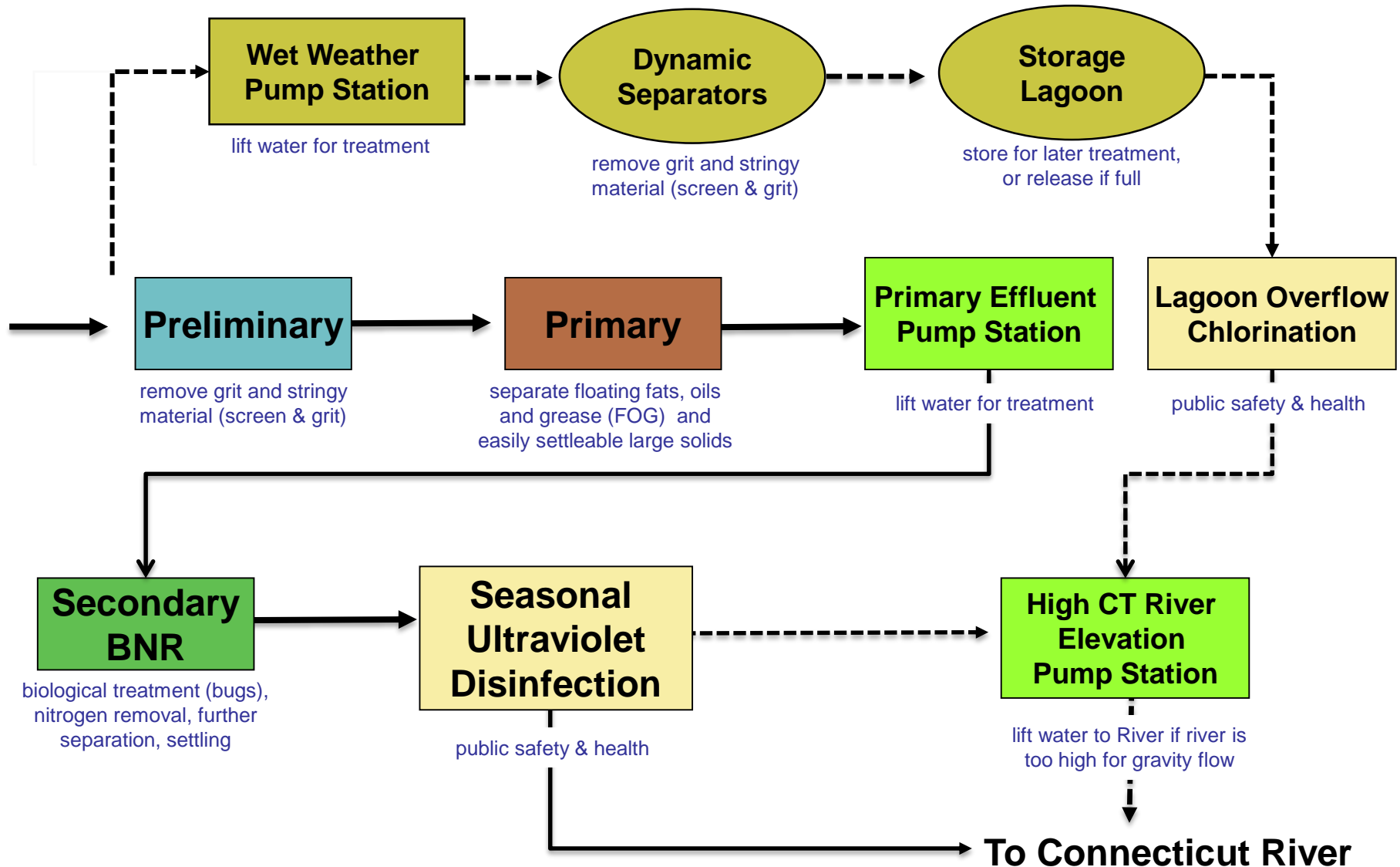
## WPC operates 4 treatment facilities

- East Hartford – 12.5 MGD
- Rocky Hill – 7.5 MGD
- Poquonock – 5.0 MGD
- Hartford – 80 MGD secondary & 30 MGD wet weather
  - Largest wastewater treatment plant in CT
  - HWPCF average daily flow is 60 MGD  $\approx$  42,000 gpm
    - ❖ fill an Olympic sized pool (600,000 gallons) in 14 minutes
    - ❖ a line of milk jugs about 5,700 miles long, like going from Hartford to Los Angeles and back (plus a few hundred miles) -- everyday)
  - During this presentation (20 minutes) the Hartford plant will treat more than 800,000 gallons of water!

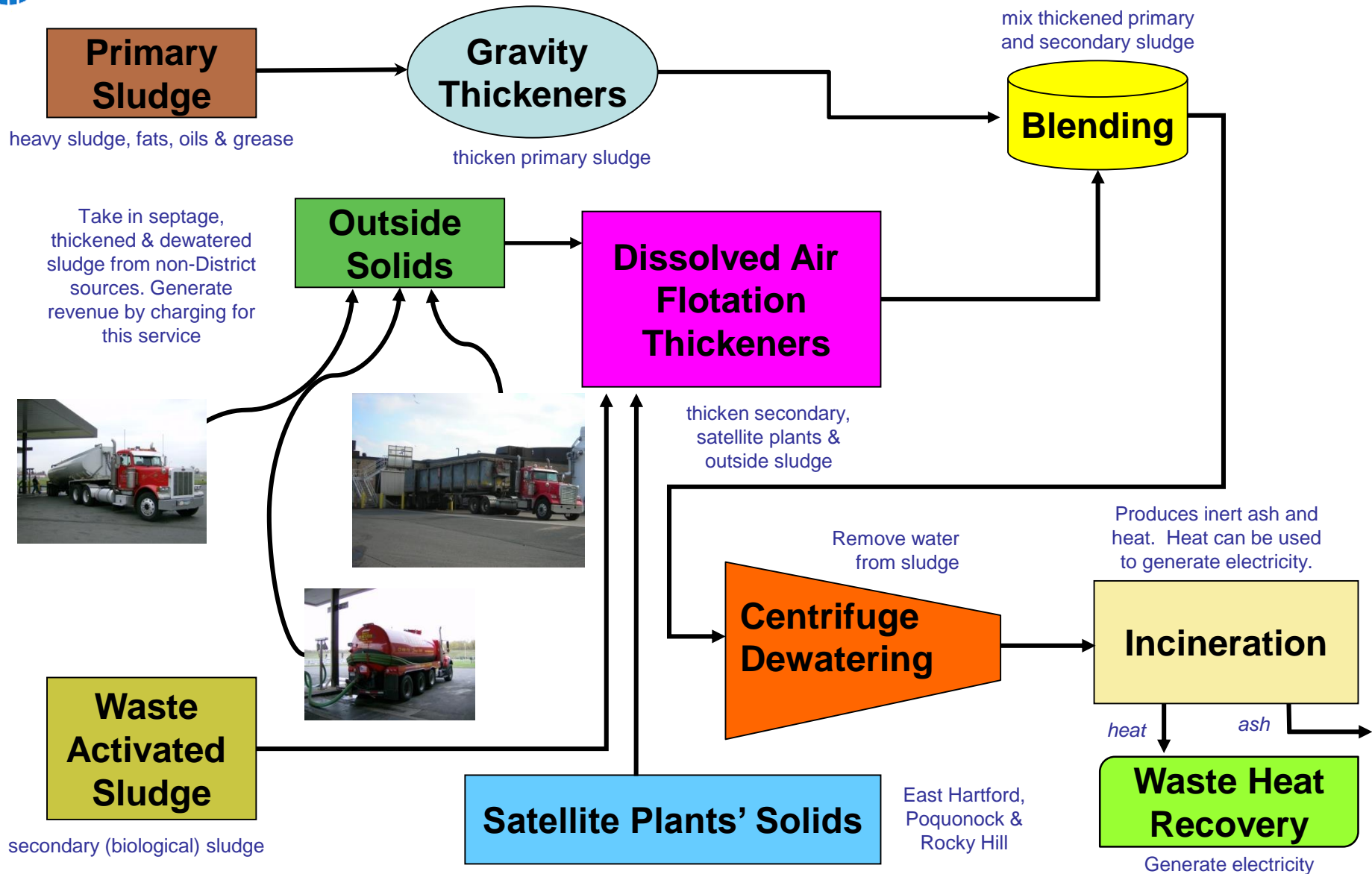




# Hartford Liquid Treatment



# Hartford Solids Treatment





# The Path of Mercury in Hartford Wastewater Treatment

- Mercury enters into the plant in two main paths:
  - Raw sewage from member towns' residents, businesses, etc.
  - Septage or sludge from other towns or industries
- Wastewater is treated in the plant, producing:
  - clean effluent (typically very low in mercury)
  - solids removed from the raw sewage (mercury present)
- Sludge is incinerated, producing two products:
  - An air stream, treated and released to the environment (mercury is present)
  - Ash, a product of combustion (mercury is present)



# WPC Permit Compliance

- All four MDC wastewater treatment facilities are governed by CT DEEP Wastewater Permits
- These permits provide guidance on:
  - How the facilities are to be operated
  - What numerical standards must be met
  - How & when to report to CT DEEP
- There are other permits that we must comply with:
  - Air permits – incineration, generators, pumps that have diesel motors
  - Nitrogen – set “goals” for amount of nitrogen we can discharge
  - Stormwater – sets limits on water quality from stormwater surface discharges

# Mercury Limits



*A MILLION SECONDS IS 12 DAYS.  
A BILLION SECONDS IS 32 YEARS.*

- ◆ Detection Limits in water: 0.0002 mg/l (1 mg/l = 1 part per million, so this represents 2 parts per 10 billion)
- ◆ Limits for ash landfill: 10 mg/kg
- ◆ Limits in air:
  - Current: 0.28 mg/dscm (dry standard cubic meter), or about 0.00028 mg/l, 2.8 parts per 10 billion
  - Future: 0.15 mg/dscm, about a 50% reduction!
  - MDC recent tests range from about 0.05 to 0.10 mg/dscm



# Summary

- ◆ Typical treatment processes excel at removing sewage-related pollutants from sewage, but are not designed specifically to remove mercury.
- ◆ Wastewater treatment plants are the “last line of defense” in protecting the environment. Any pollutant not removed during treatment is released into the environment
  - For the Hartford plant that is the Connecticut River and ultimately the Long Island Sound
- ◆ Separation at the source is often the easiest, least costly and most environmentally sensitive method of mercury control – once it’s out, it’s best to keep it out.
- ◆ A very small amount released from each dental office can accumulate into a very large amount at a treatment plant – every bit matters.

Questions?