

Water and Our Environment

**Where have we been, and where are we
going?**

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Presentation Objectives

- Gain an appreciation for the good work that has been accomplished in our environment
- Understand how we do what we do now
- Discuss the challenges ahead
- Encourage participation in solving the remaining problems with our waters
- Reinforce that there is no more valuable resource than our awesome water!

Nearly 50 years since the first “Earth Day” April 22, 1970

- The Androscoggin River listed among the 10 dirtiest rivers in the United States.
- Most U.S. Cities not served by sewage treatment facilities
- Boston had primary treatment only -- Boston Harbor considered “Dead”
- Famously, the Cuyahoga River in Cleveland caught fire in 1969.







Federal Involvement in Water

- 1886, 1889 Prohibited impediments to navigation.
- 1912 Public Health Service Act contained a section on waterborne diseases.
- 1948 Water Pollution Control Act (PL 80-845)
- Extended and strengthened in 1952 and 1955
- Clean Waters Restoration Act 1966– applied to intrastate waters, first water quality standards

Water Pollution Control Act 1972

- Sponsored by Maine Senator Edmund Muskie
- Technology based Effluent limits
- Greatly increased Federal Funding of WWTF
- Created National Permit System
- By 1983 provide fishable and swimmable
- Eliminate the discharge of pollutants into navigable waters by 1985

Water Pollution Control Act of 1972 (con't)

- Construction Grants Program
- Industries required to install best available technology
- POTW's must meet secondary treatment standards
- Section 208 –watershed planning
- Recycling of sewage pollutants through agriculture. silvaculture

Making it Real – Getting Local

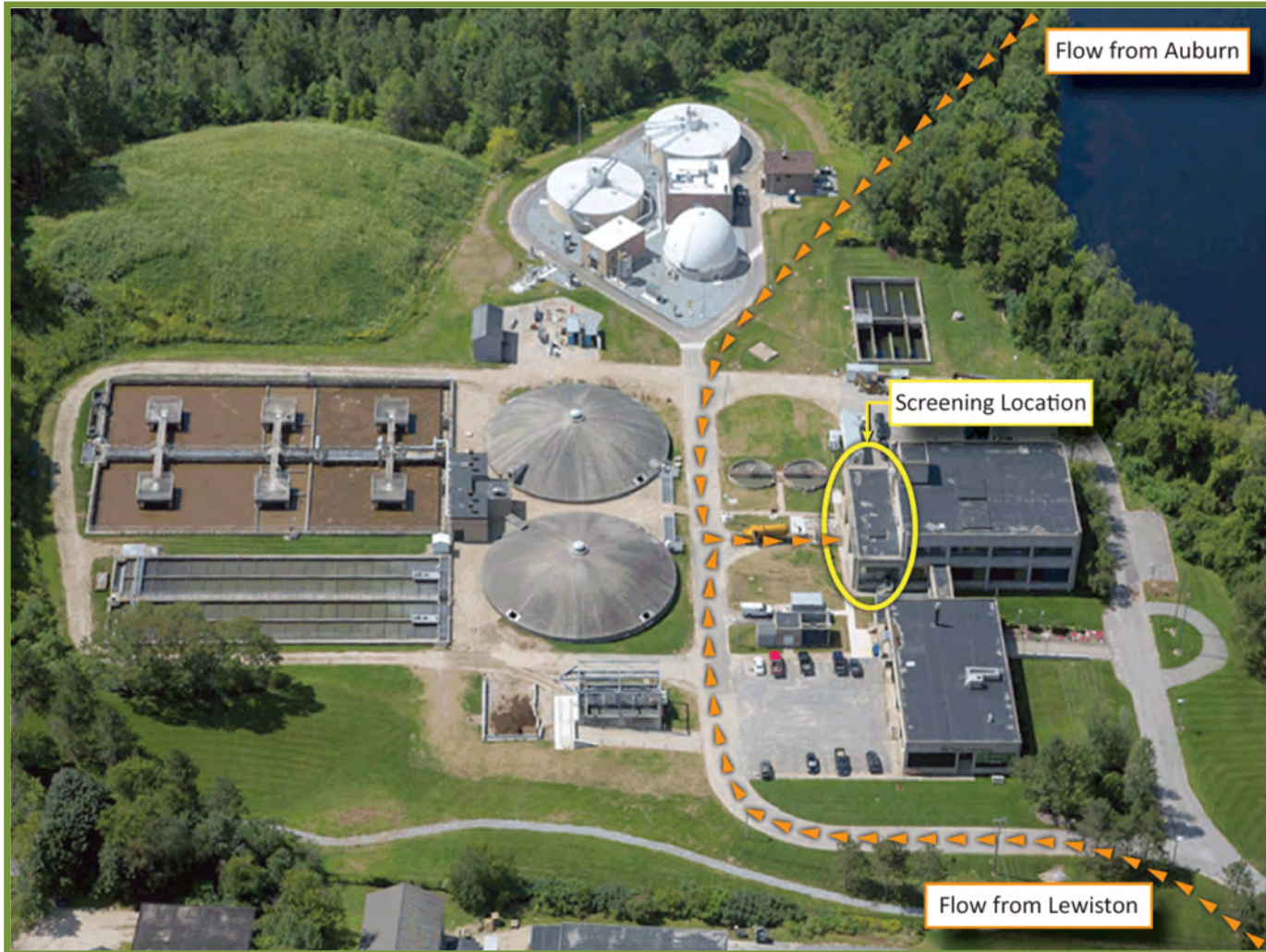


Lewiston-Auburn Water Pollution Control Authority

- Chartered by the Maine Legislature in 1967
- One of the First times Lewiston and Auburn worked together
- Significant Financial incentive 5% local share
- Estimated average day 1990 flow @14.2 mgd
- Combined Sewers – maximum plant capability of 32.2 mgd.
- To serve a 1990 population of 65,000.

How Do We Treat Wastewater?

Step I – Screening



Wastewater enters the plant from Auburn and Lewiston

Screening removes materials $\frac{3}{4}$ -inch or larger including rags, leaves, etc.

Screening material is landfilled

How Do We Treat Wastewater?

Step II – Grit Removal

The grit facility uses air to separate heavy inorganic particles from the waste-water, leaving lighter organic particles

Grit and debris are removed from the wastewater and landfilled



How Do We Treat Wastewater?

Step III – Primary Sedimentation



Wastewater flows to primary sedimentation tanks where more than one-half of the solids are removed

Grease, oils, and other floatable materials are also removed

How Do We Treat Wastewater?

Step IV – Aeration



Wastewater flows to secondary treatment tanks where air is bubbled into it, allowing naturally occurring bacteria to use the waste as their food

Oxygen, mixing, and nutrients provided

How Do We Treat Wastewater?

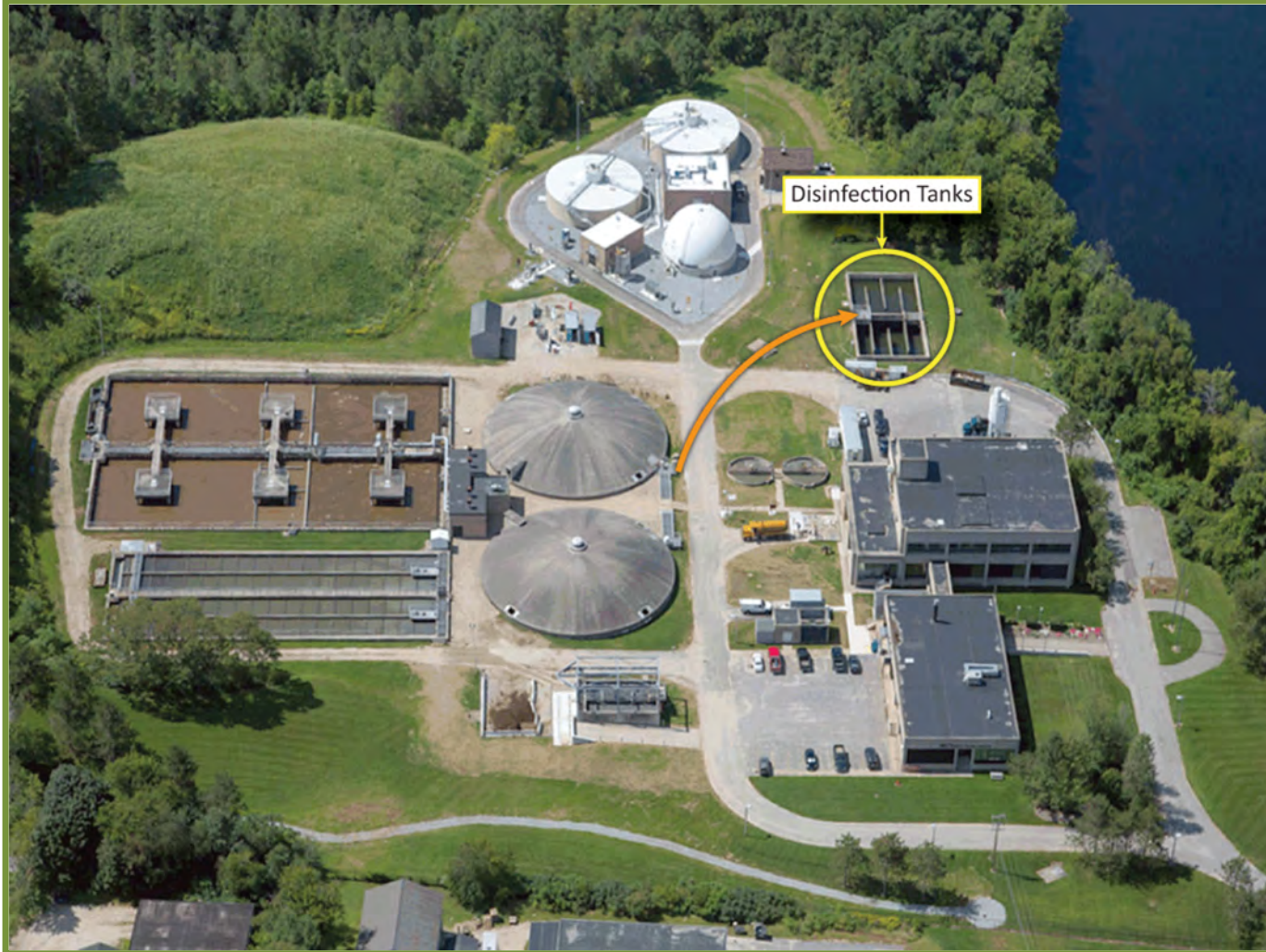
Step V – Secondary Clarifiers

Wastewater flows to secondary clarifier tanks where the bacteria from the aeration basins are settled out of the wastewater



How Do We Treat Wastewater?

Step VI – Disinfection



Treated wastewater is then chlorinated for disinfection with Sodium Hypochlorite

Prior to discharge, the water is dechlorinated with Sodium Bisulfite

Wastewater Treatment Today

Key Points

- Biological Process – microbes work cheap!
- Nature's process, faster and contained
- Disinfection -- Summertime only! ?
- Combined Sewers and stopping CSOs
- Waste Load and stream capacity
- Industrial Pretreatment
- Sludge ⇒ Biosolids.

Toady's Emerging Challenges

- Biosolids management
- Micro constituents – smaller and smaller
- Non Point source control
- Energy and Cost
- Old and Obsolete Infrastructure
- Nutrients and Eutrophication
- An Aging Workforce

BIOSOLIDS

- Why biosolids are not sludge
- When WWTF were built little thought was given to management of what is removed
- Nutrients and organic matter belongs in soil
- How to deal with pathogens?
- Farmland Application
- Composting
- Anaerobic Digestion
- Incineration and Landfilling

Step V – Biosolids Utilization



90+% of the biosolids are used on area farms for fertilization

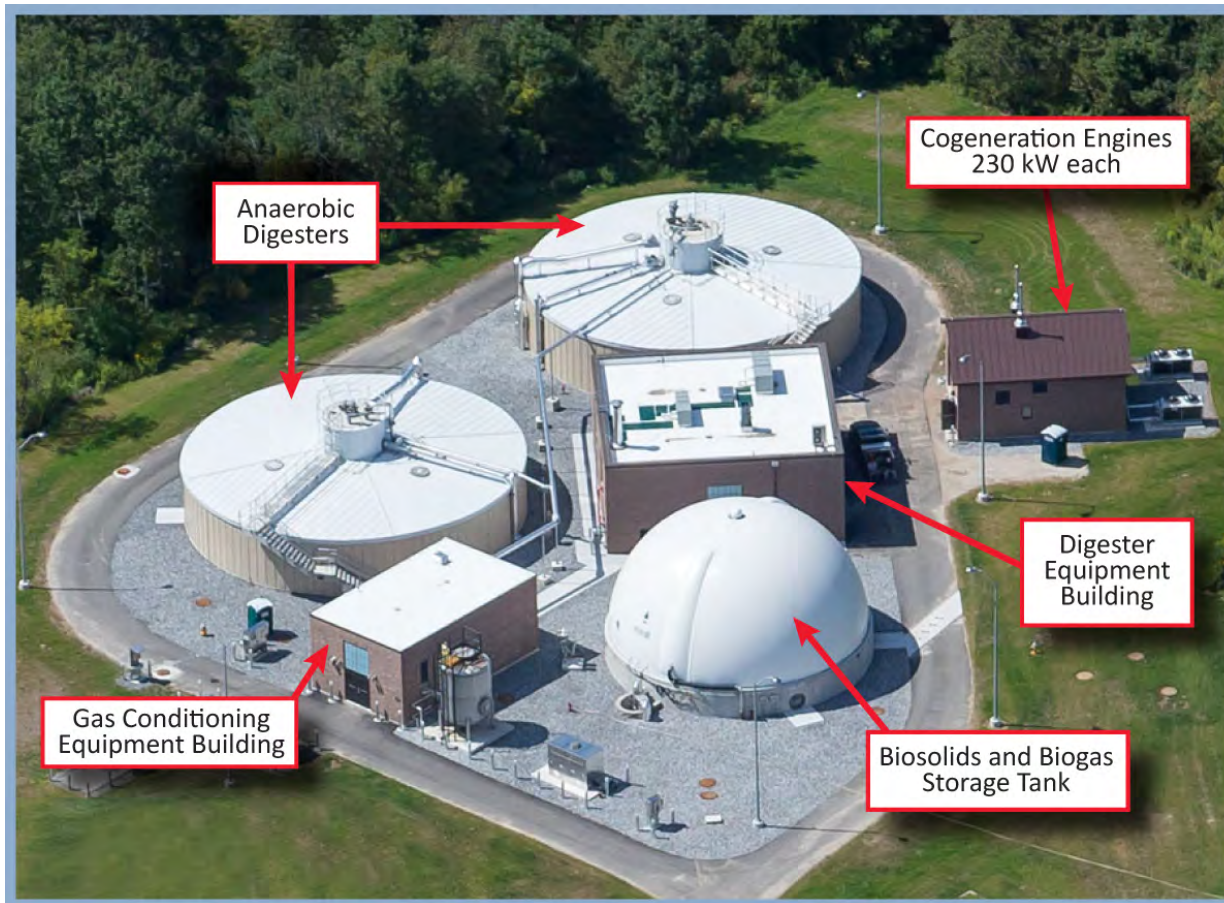
LAWPCA biosolids have helped sustain area farms *for over 30 years!*

Step V – Biosolids Utilization

- Biosolids can be composted to a salable product



Anaerobic digestion and energy recovery facilities



MICROCONSTITUENTS

- mg/L , ug/L, ng/L and Analytical methods
- The great dioxin scare of 1988
- Heavy Metals
- Mercury
- Pharmaceuticals and Personal Care Products
- PFAS and PFOA

Non Point Source Control

- Today 40% of American Waterways do not meet fishable/swimmable standards
- What role does stormwater play?
 - Detention ponds, rain gardens, bioswales
- Combined Sewer Overflows
- Agricultural runoff

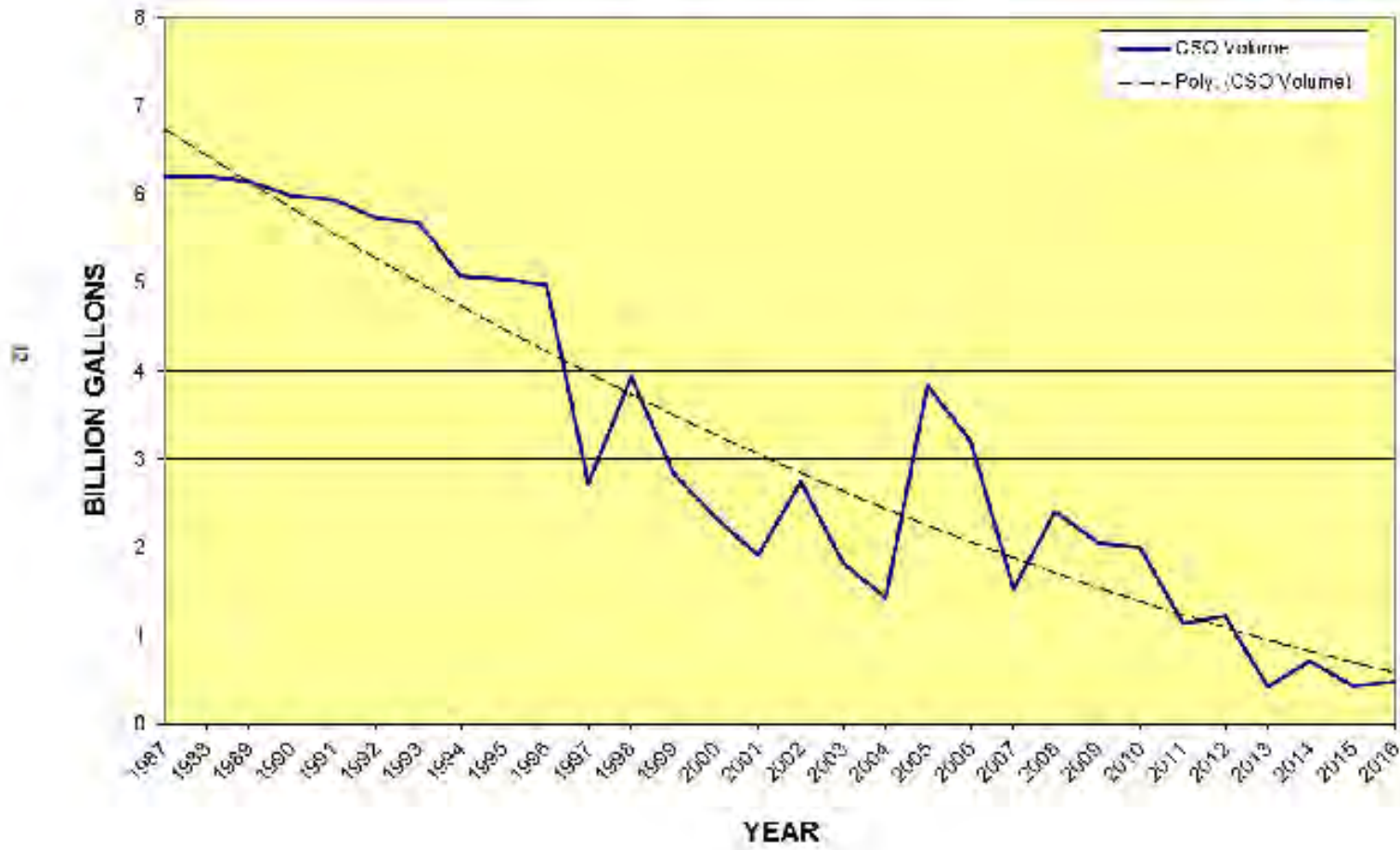




Southland
WATER RESOURCES

NO DUMPING
MARCO BAY

MAINE - STATEWIDE COMBINED SEWER OVERFLOW (CSO) VOLUME DISCHARGED



Energy and Cost

- Wastewater treatment uses 2-3% of the electricity in many communities
- Pumping and Aeration
- Anaerobic Digestion produces methane rich biogas
- Anaerobic Digesters can produce 40-100% of the power for treatment (with outside waste)





Eutrophication

- Natural Process or Green Scourge?
- Phosphorus controlling nutrient for fresh
- Nitrogen controlling nutrient in salt waters
- Biological nutrient removal
 - Bio N removal down to 1-2 mg/L
 - Bio P removal down to 0.5-1.0 mg/L
- When permits are lower, Chemical Polishing
- Costs, Env Impacts, Strategies?

Aging Workforce Means Opportunity

- 1972 was 46 years ago!
- Baby Boomers are retiring.
- Stable Good Paying Jobs
- Work that matters.