Lake Erie Phosphorus Task Force

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Point Source Discussion

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Today's Talk

Point Source: Wastewater (Sewage) Plants and Overflows From Municipal Sewer Systems (CSOs)

- Wastewater Treatment Plants
- CSO Communities – Lake Erie
- CSO and WWTP Load Contribution
- Conclusions/Discussion

Wastewater Treatment Plants: 2011

- Statewide 188 WWTPs Have TP Limits[1]
  - Most 1.0 mg/L (monthly average)
  - Some 0.5 mg/L
- Lake Erie Basin
  - 1.0 mg/L WWTPs With Flow Greater Than 1 MGD
- Statewide 353 WWTPs Monitor P
  - Many Will See P Limit

1-(Jeyanayagam, 2011)

Phosphorus Removal Technology/Costs

- Limit of 1 mg/L
  - Chemical Precipitation
  - Can Operate Close to 0.5 mg/L
  - Costs Reasonable (NEORSD – Several Hundred Thousand Dollars per Year)
- Limit 0.5 mg/L
  - Chemical Precipitation and Filtration (Expensive)
  - Many WWTPs Don't Have Filtration
- Limit Under 0.2 mg/L
  - More Chemical and Filtration – Even More Expensive
- Limit 0.1 mg/L
  - More Chemical and Membrane Filtration (Very Expensive)

Phosphorus Loading Trends WWTPs

- Wastewater Treatment Plants
  - Number Wastewater Plants/Population Stable
  - No Regulatory Requirement Lower P limits

- Conclusion - Phosphorus Loading Expected Stable From WWTPs

Questions for WWTPs …

- Lower P limits to 0.5 mg/L or Lower
  - Filtration Needed – NEORSD/Toledo/Akron and Others
- Require POTWs Maximize P Removal of P With Existing Equipment – Push to 0.5 mg/L – Minimal Cost
- Require WWTPs Under 1 MGD Meet 1 mg/L
  - Happening Some With TMDLs
  - Load Reduction Not as Great (Smaller Plants)
  - Operationally More Difficult Smaller Facilities

Sewage Overflows Municipal Sewer Systems: CSOs

A **Combined Sewer System** is a wastewater collection system which conveys **sanitary wastewater** and **storm water** through a **single pipe system to a treatment plant**

During a **storm event**, the combined sewer is overloaded with water and **some of the combined sewage and storm water is discharged to stream prior to receiving treatment**

Combined Sewage is a **mixture** storm water runoff and whatever is in the sanitary sewer: waste from industries, commercial establishments, medical facilities and individual homes

Combined Sewer System During Dry Weather

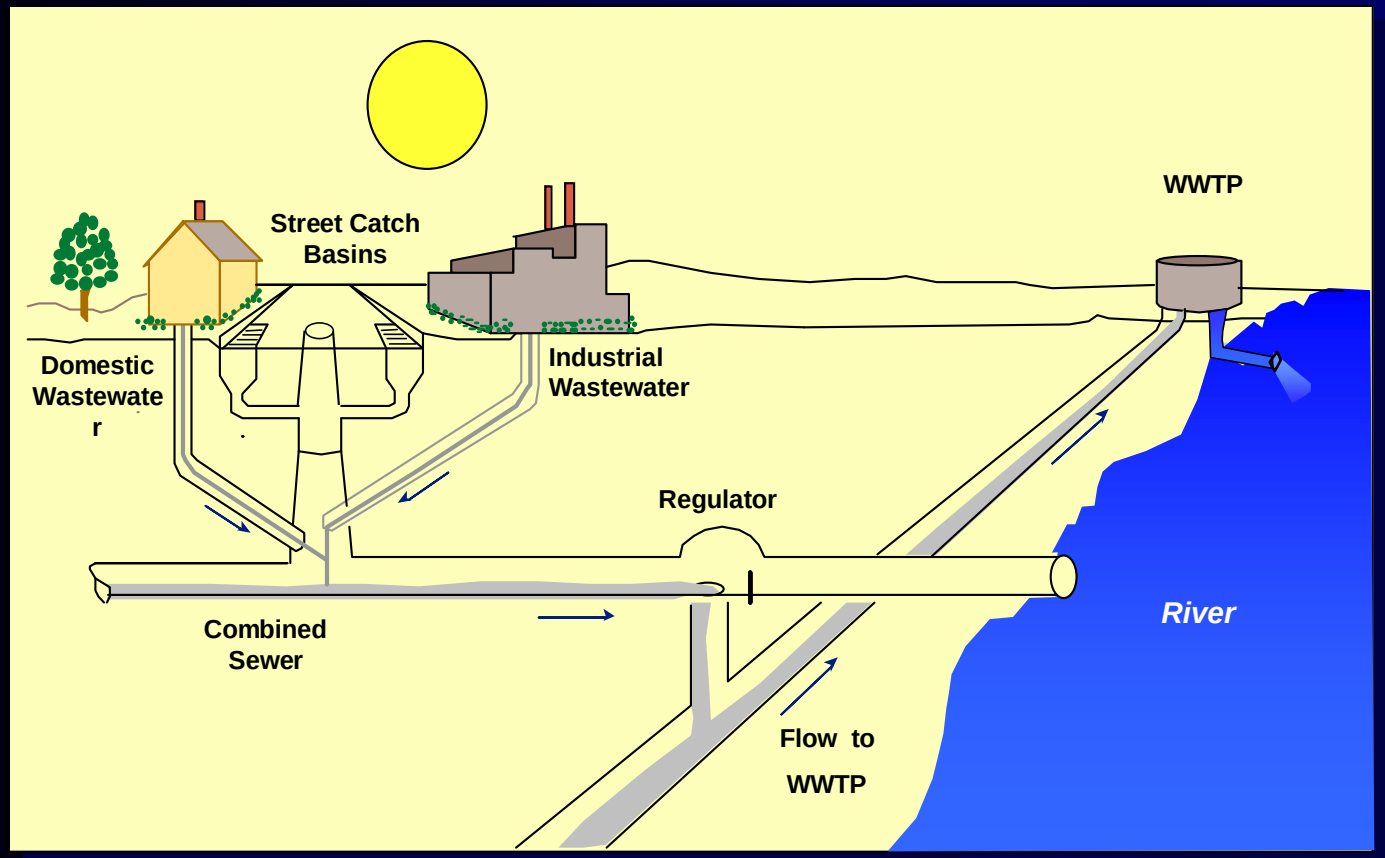


Photo: CSO Education: NEORSD.

Combined Sewer System During Wet Weather

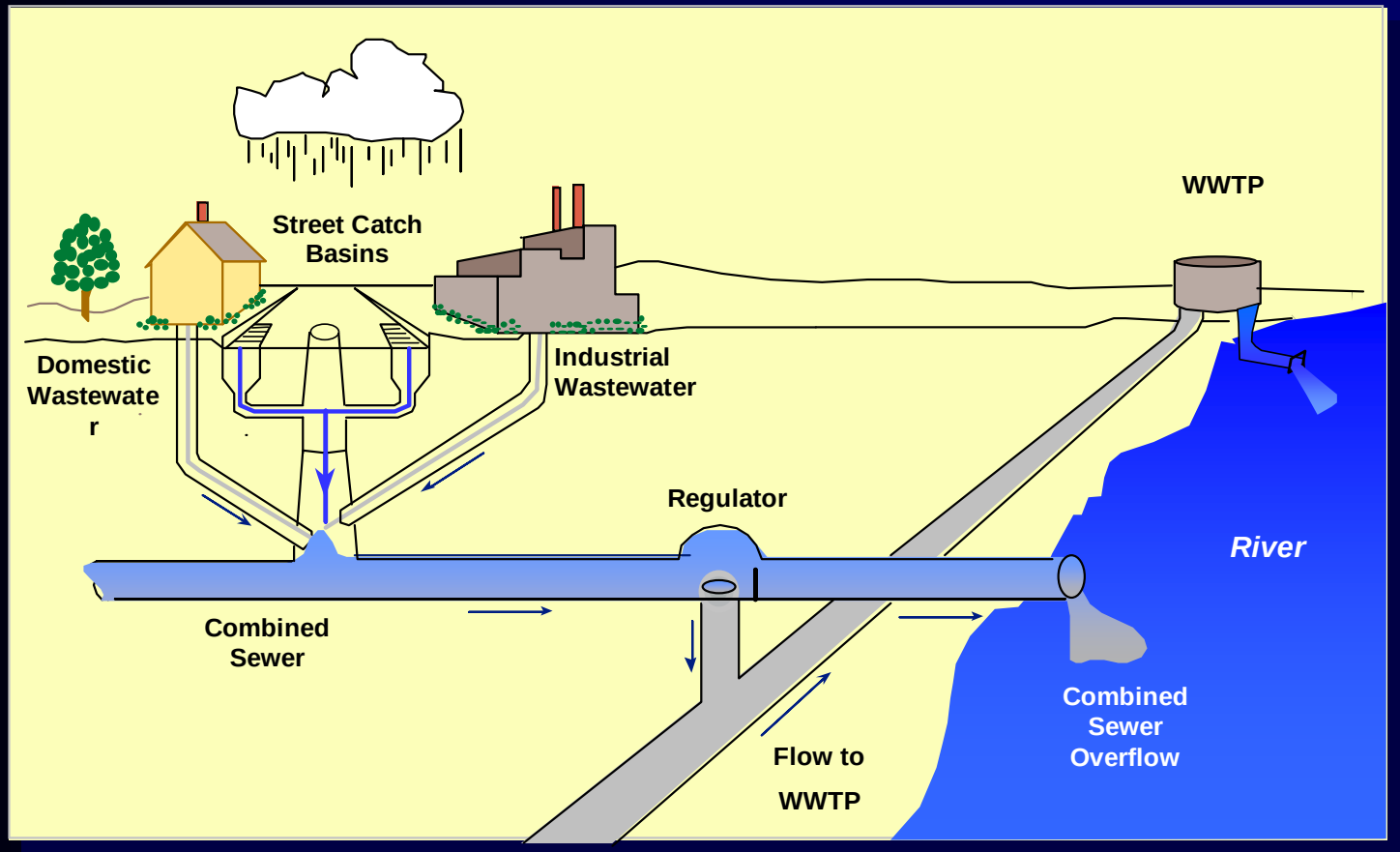
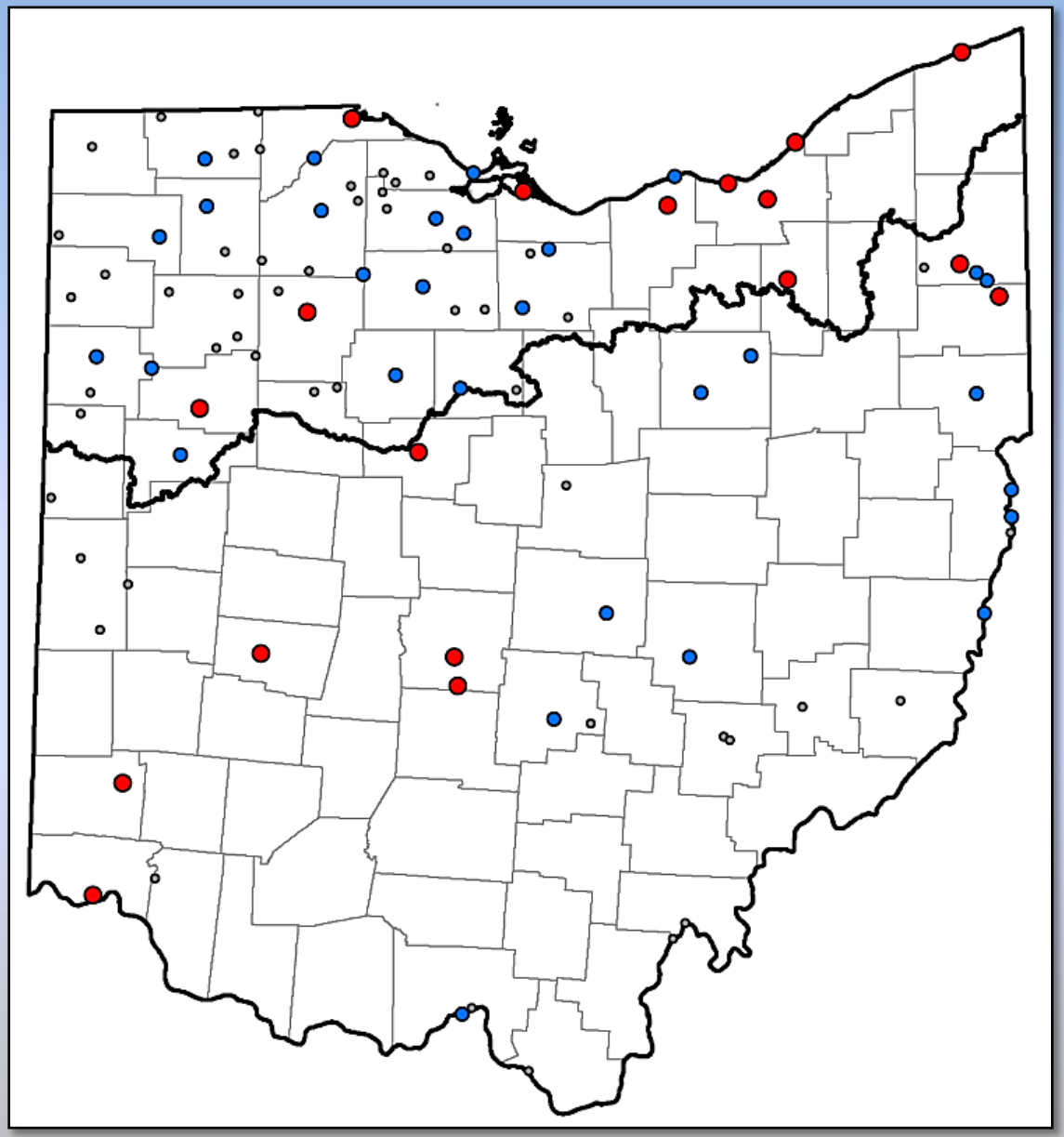


Photo: CSO Education: NEORSD.

Ohio Combined Sewer Overflow Communities

- 101 Ohio CSO Communities
- 62 in the Lake Erie Basin



Long Term Control Plans

- Develop Long Term Control Plan (LTCP)
  - Level Control Usually <4 Overflows per Year
  - City's incorporate any combination of:
    - Sewer Separation
    - Storage Tanks - Tunnels
    - Wastewater Treatment Plant Upgrades
    - Physical/Chemical High Rate Treatment
- Consent Order or NPDES Permit Requires Implementation of LTCP Projects

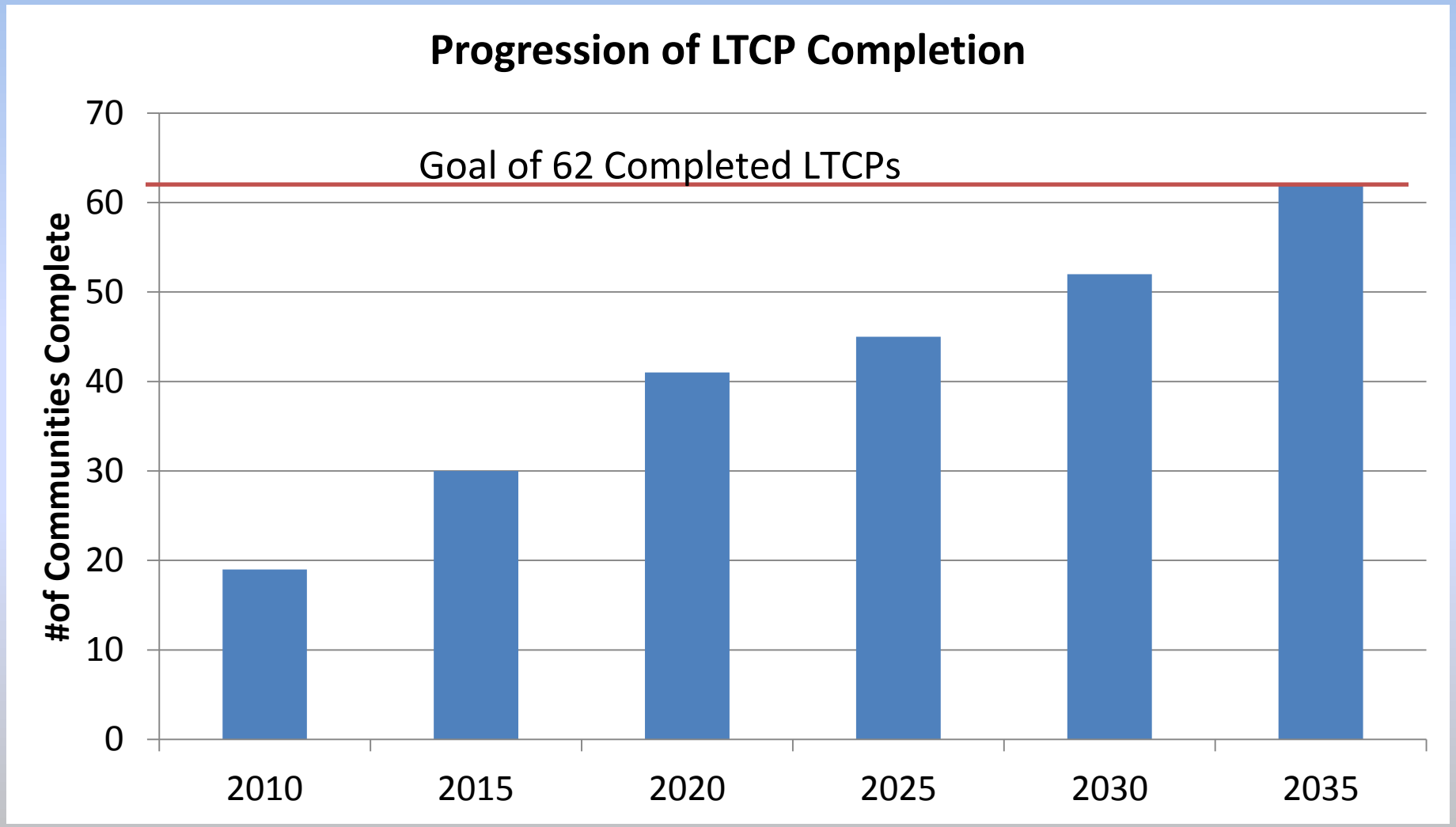
Long Term Control Plans

Almost All Communities Have Approved LTCP and are Implementing LTCP Projects

- Lima, Lakewood Exception
  - Federal cases – No Approved LTCP

Ohio LTCP Completion

- When will the Long Term Control Plans be Complete?



Long Term Control Plans

Largest Volumes of CSO From NEORSD, Akron, Toledo, Fremont and Sandusky

- Significant Progress Underway NEORSD, Akron, Toledo and Sandusky

Cleveland (NEORSD) LTCP

- Long Term Control Plan Completion – 2035
  - Total cost -$3 Billion
  - <4 CSO events/year
  - 5 Underground Storage Tunnels
  - Plant Upgrades, Conveyance, and Storage

Photos: CSO Long-Term Control Plan presentation to NEORSD Trustees 2010 1118. NEORSD. 2010. Web. 4 Feb. 2013.

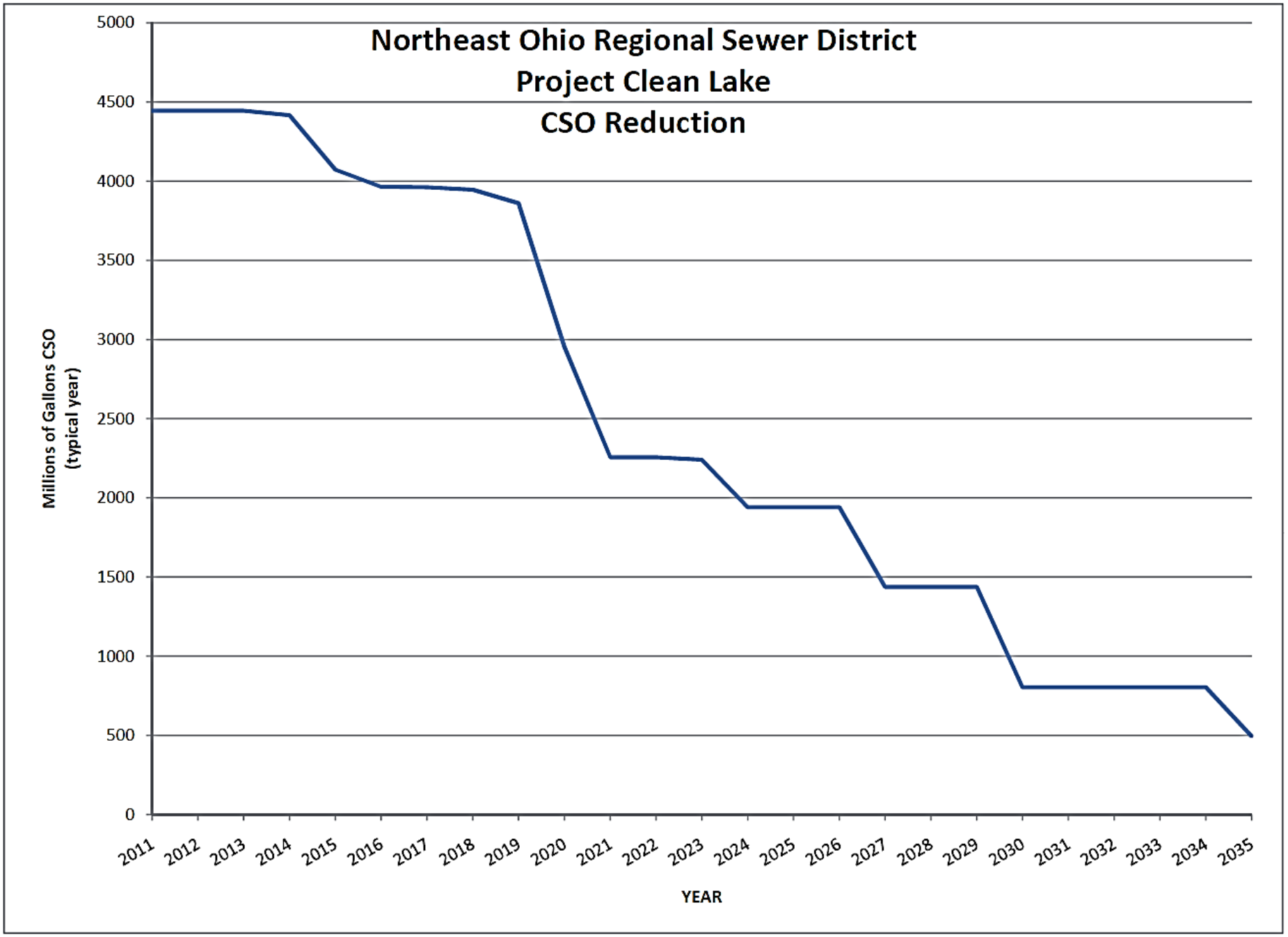
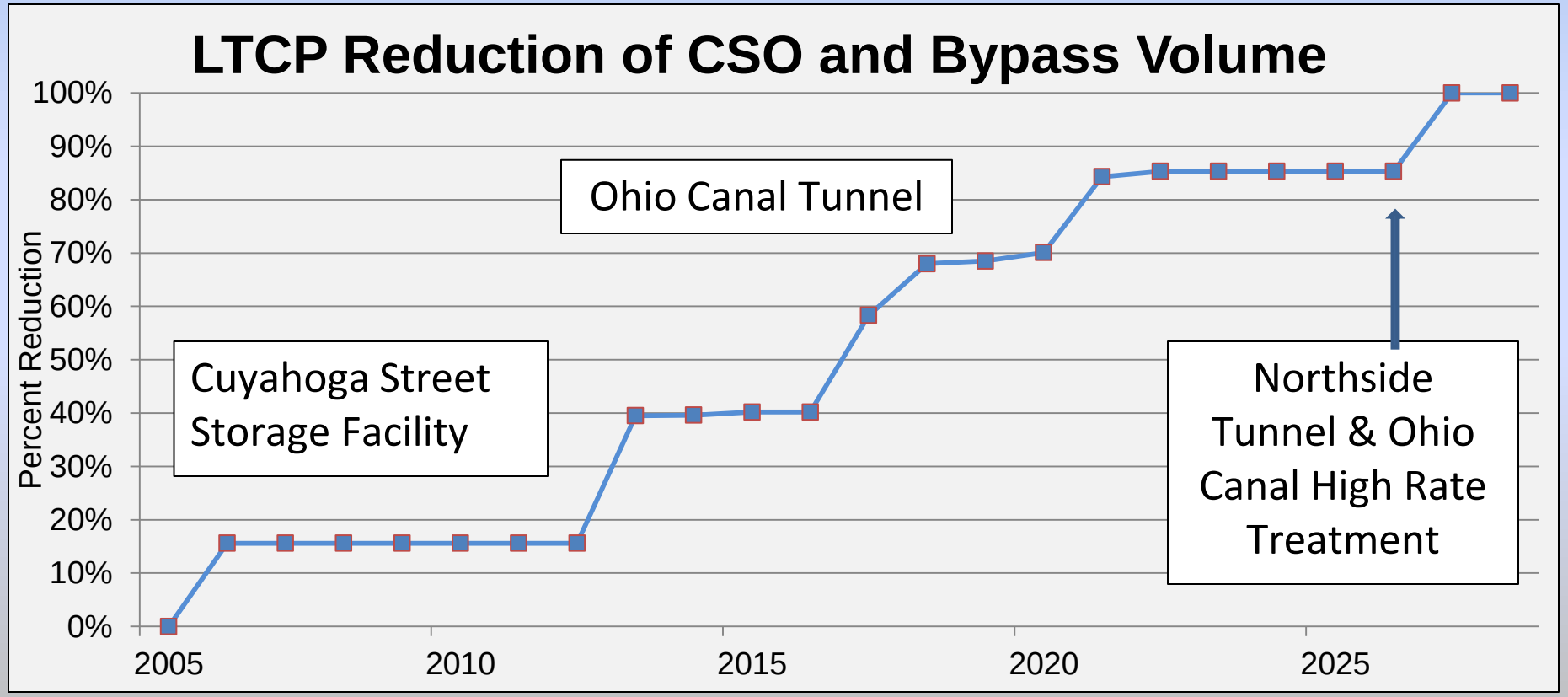


Photo: CSO Long-Term Control Plan presentation to NEORSD Trustees 2010 1118. NEORSD. 2010. Web. 4 Feb. 2013.

Akron LTCP

- Long Term Control Plan Completion– 2028
  - Total Cost - $900 Million
  - 2 Underground Storage Tunnels
  - Plant Upgrades, Sewer Separation, Storage Basins



Toledo LTCP

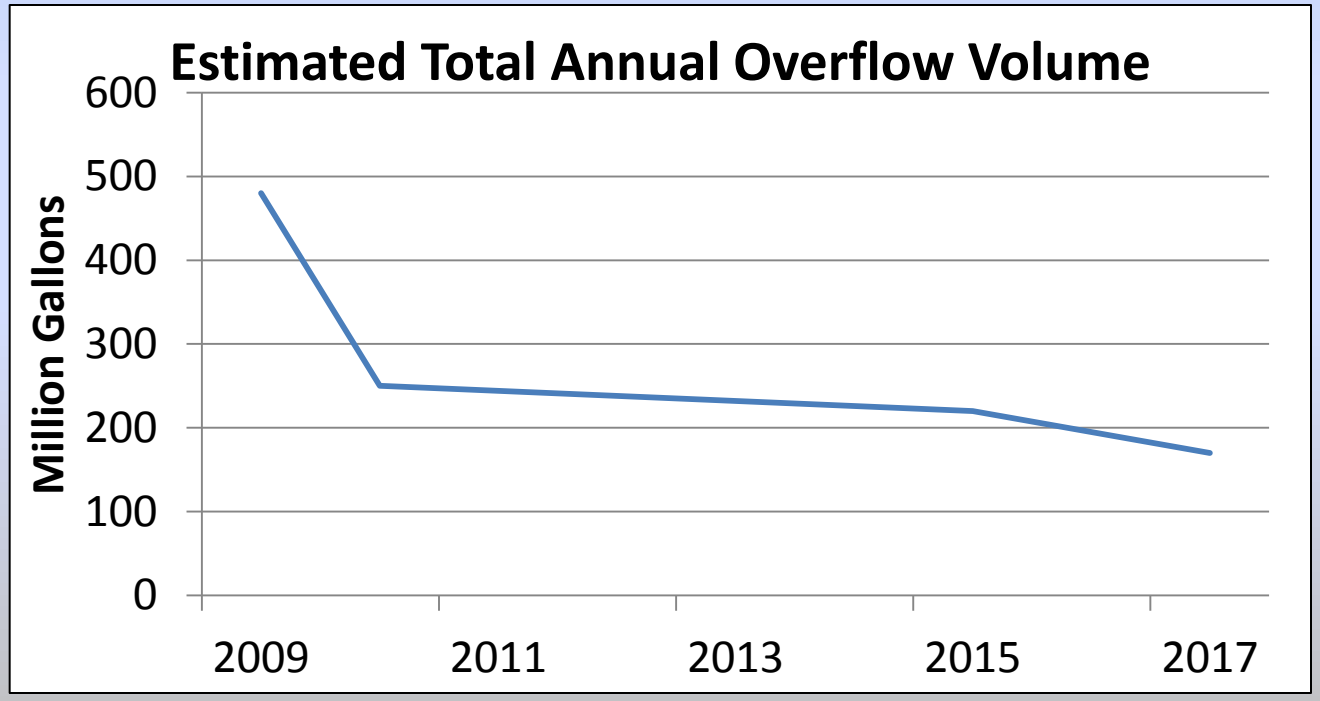
- Long Term Control Plan Completion– 2020
  - Total Cost - $500 Million
  - <4 overflows/year
  - Wastewater Treatment Plant Expansion
  - Storage, Sewer Separation, I&I Removal

CSO Volume Reduction	
Year	***CSO Volume*** *(MG/yr)*
1997	890
2001	400
2020	70

photo: The Plan. 2010. Toledo Waterways Initiative. Web. 4 Feb. 2013.

Sandusky LTCP

- Long Term Control Plan
  - Wastewater Treatment Plant Expansion - 2010
  - Negotiating Additional Improvements: Storage, Conveyance, Pumping Upgrades – 2020



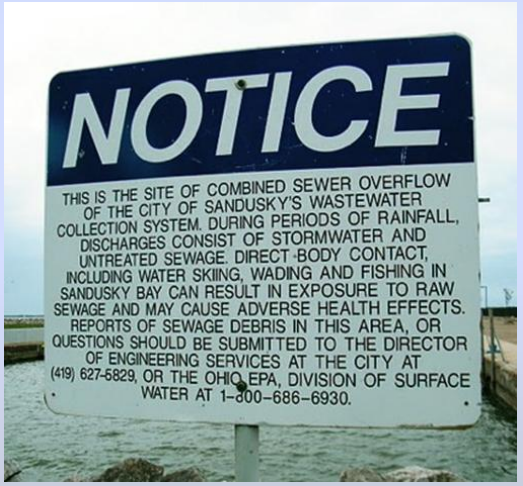


photo: Lagunzad, Cassandra. The Erie Wire, 2010. Web. 4 Feb. 2013

Cleveland Proposed Rate Increases

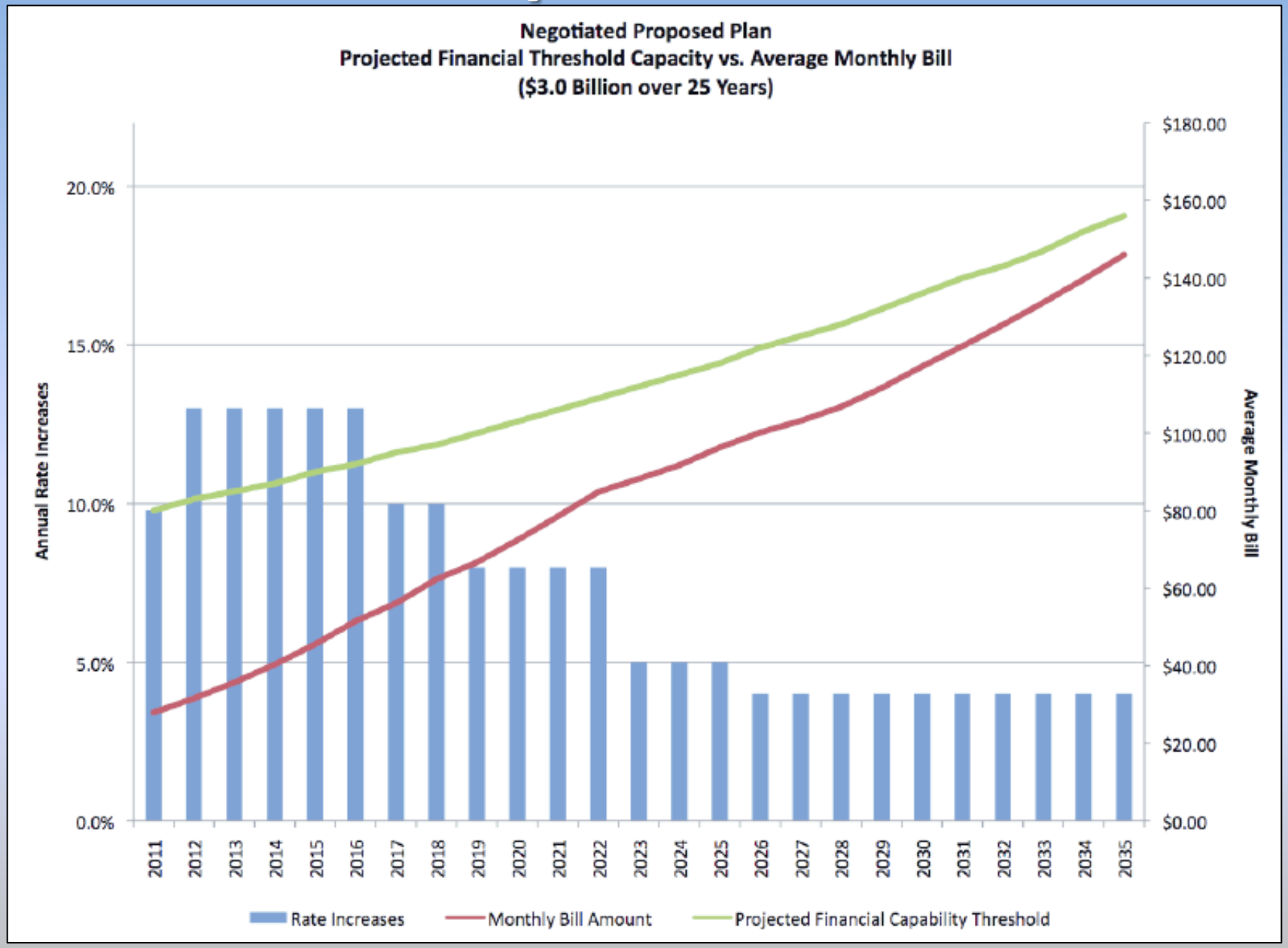


Photo: CSO Long-Term Control Plan presentation to NEORSD Trustees 2010 1118. NEORSD. 2010. Web. 4 Feb. 2013.

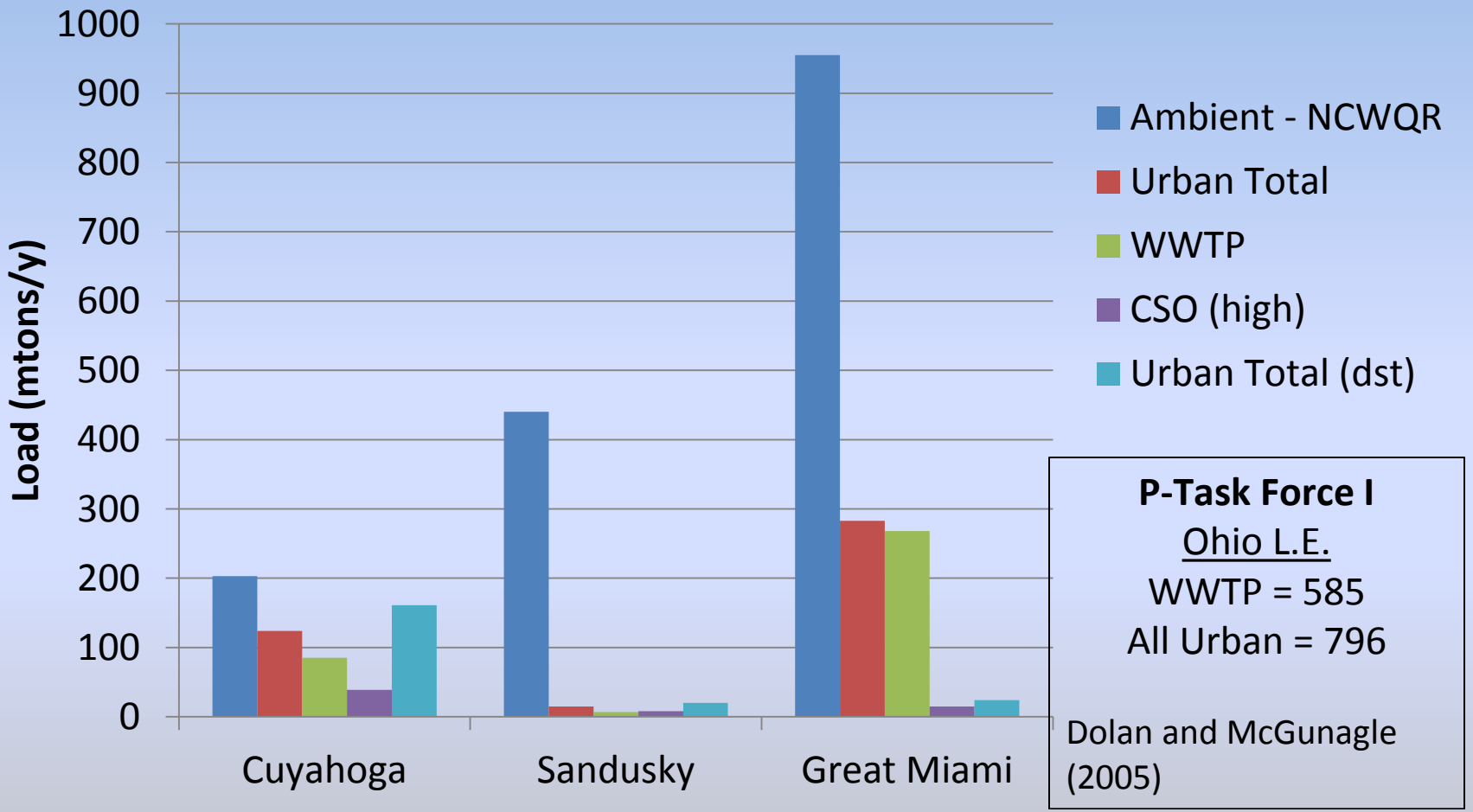
Relative Loading WWTPs and CSOs

CSOs Smaller Contribution Overall Compared to Wastewater Treatment Plants

OEPA (Dale White) Presentation November Nutrient Workshop

Comparison Among Basins – **TP**

1996-2001 averaging period



P-Task Force I

Ohio L.E.

WWTP = 585

All Urban = 796

Dolan and McGunagle (2005)

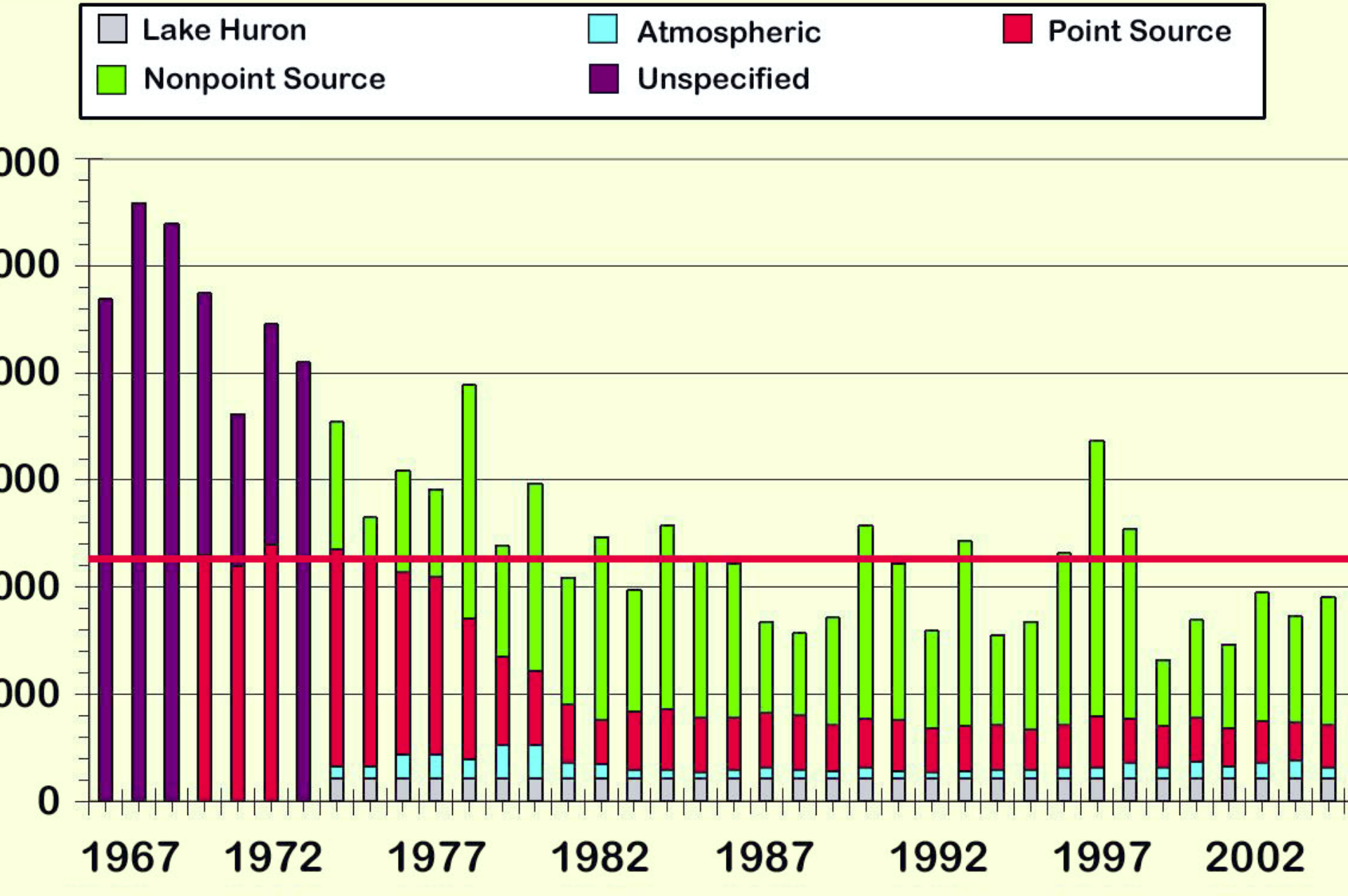
Conclusions

- CSOs
  - Communities Addressing Overflow Problem
  - Significant Progress Already
  - Additional and Substantial Improvement Next Ten Years
  - Billions of Dollars Improvements, Borne by Local Ratepayers, Significant Economic Burden

Conclusions

- WWTPs (Municipal Sewage Treatment)
  - Phosphorus Loading expected to Remain Stable Unless Lower P Limit
  - Lowering P Limit to 0.5 mg/L or Lower Likely Require Filtration - Costly
  - Operational Changes Can Lower P Discharge to Close to 0.5 mg/L
- WWTPs and CSOs ‘Relatively’ Small Part of Overall Load

Lake Erie Total Phosphorus Load by Major Source[1]



Questions???

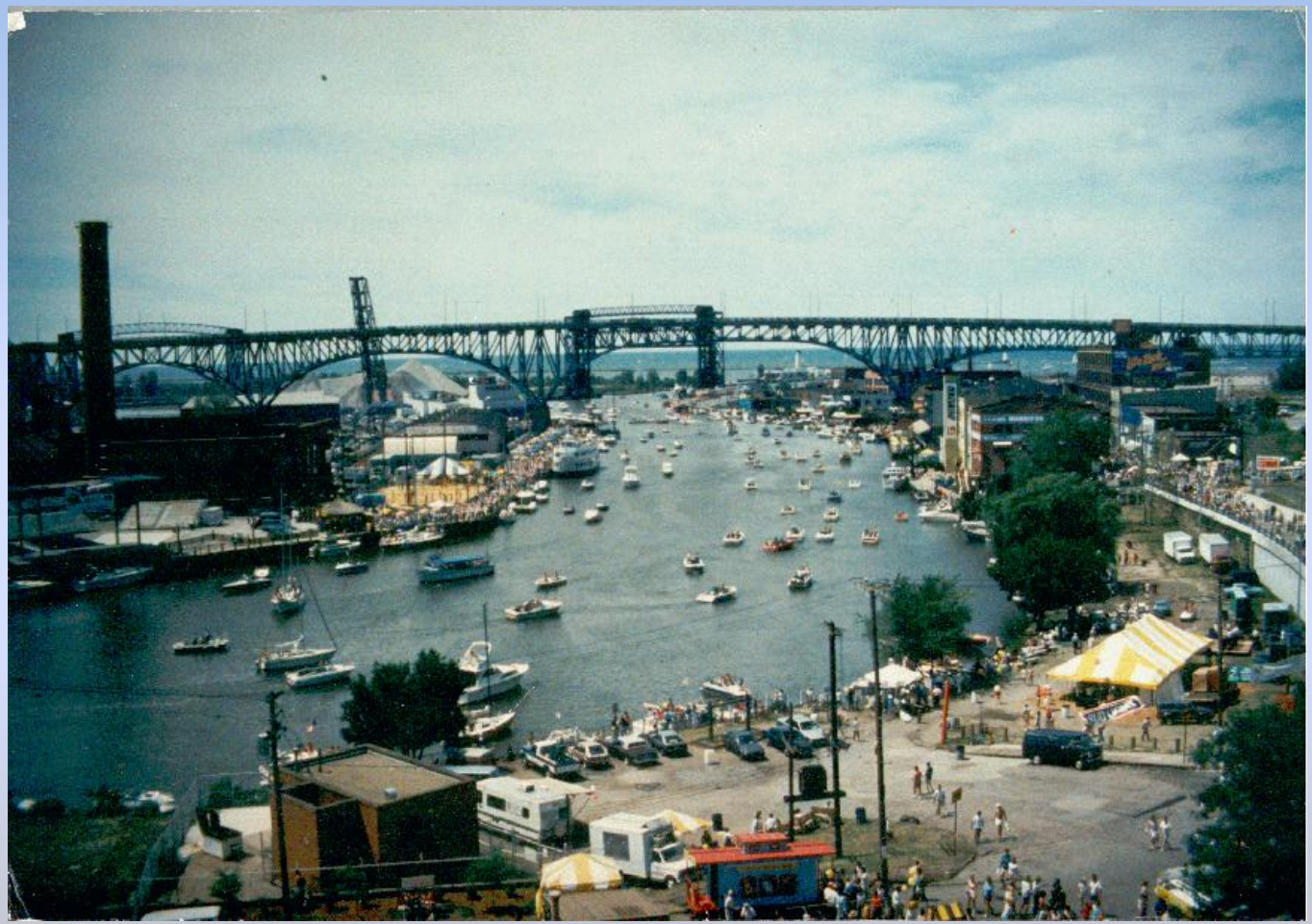


Photo: Northeast Ohio Regional Sewer District

References

- Dolan, D. and McGunagle, K. *Lake Erie Total Phosphorus Loading Analysis and Update: 1996-2002.* J. Great Lakes Res. 31(Suppl. 2):11–22 Internat. Assoc. Great Lakes Res., 2005.
- CSO: Education. Northeast Ohio Regional Sewer District. Photo. Accessed at : <*http://www.neorsd.org/cso_edu.php*>
- CSO Long-Term Control Plan presentation to NEORSD Trustees 2010 1118. 2010. Photo. NEORSD. Accessed Feb. 4, 2013 at: <*http://scribd.com/doc/42219588/CSO-Long-Term-Control-Plan-presentation-to-NEORSD-Trustee-2010-1118*>
- Jeyanayagam, S. *Sustainable Approaches to Meeting Potential Future Nutrient Limits – Part 1.* June 23, 2011. Powerpoint Presentation.
- Lagunzad, Cassandra. *Combine Sewer Overflow sign located next to the Sandusky Bay Pavilion and Damon's Restaurant.* 2010. Photo. The Erie Wire. Accessed Feb. 4, 2013 at: <http://www.eriewire.org/archives/5516/section/environment-science-health/>
- The Plan. 2010. Photo. Toledo Waterways Initiative. Accessed Feb. 2, 2013 at: <*http://www.toledowaterwaysinitiative.com/about/waterway-plan/* >