Metropolitan Water Reclamation District of Greater Chicago

Welcome to the February Edition of the 2022 M&R Seminar Series

NOTES FOR SEMINAR ATTENDEES

- All attendees' audio lines have been muted to minimize background noise.
- A question and answer session will follow the presentation.
- Please use the "Chat" feature to ask a question via text to "All Panelists."
- The presentation slides will be posted on the MWRD website after the seminar.
- This seminar has been approved by the ISPE for one PDH and approved by the IEPA for one TCH. Certificates will only be issued to participants who attend the entire presentation.

GREG YARNIK

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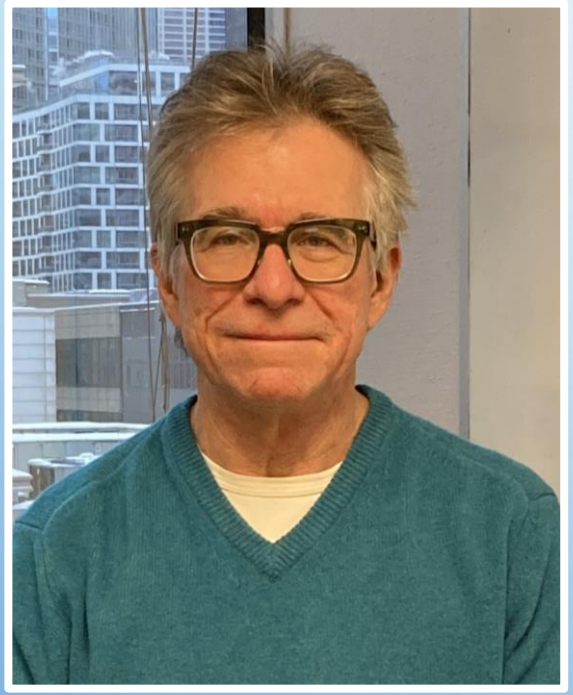

Greg Yarnik is a Supervising Environmental Specialist in the District's Monitoring and Research Department, Industrial Waste Division. He has over 35 years of experience in industrial wastewater monitoring, regulation and pretreatment, both from field and administrative perspectives. In addition, since 1988, he has served as an Adjunct Professor of Biology at the College of DuPage in Glen Ellyn, Illinois, teaching introductory and environmental biology courses. He has a B.S. in Biology and Philosophy from MacMurray College in Jacksonville, Illinois and an M.S. in Aquatic Biology from Illinois State University in Normal, Illinois. In his spare time he serves as a volunteer naturalist with the Cook County Forest Preserve District's Deer Grove East Prairie and Woodland Restoration Group and the Buffalo Creek Clean Water Partnership Watershed Restoration Group.

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Regulating the Water Environment at the District and Beyond:

A Brief Evolutionary History

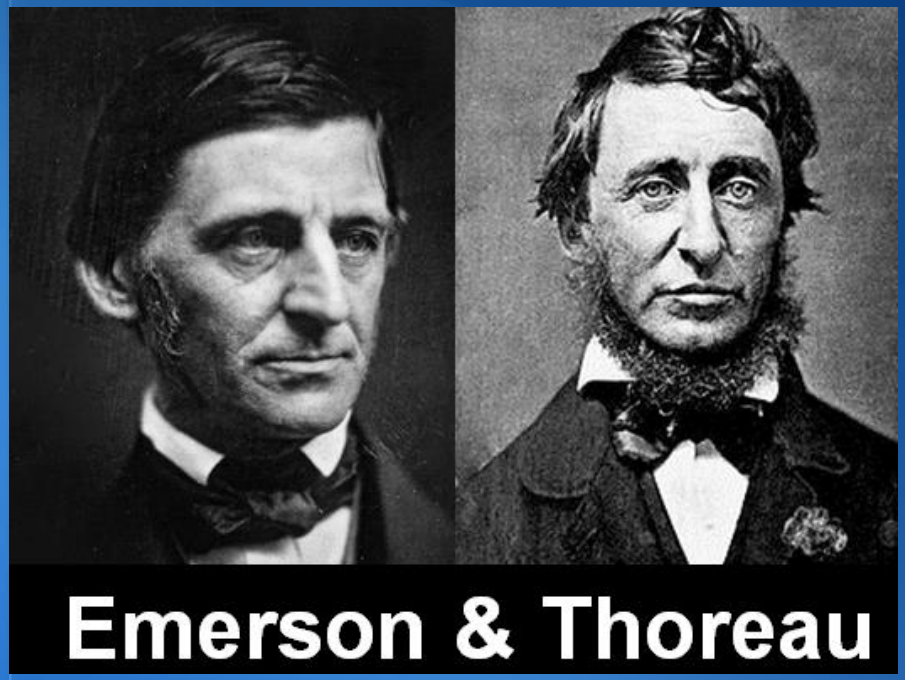
Early Environmental Advocacy in the United States 1830 – 1930

Prior to European settlement of North America, Indigenous cultures practiced environmental stewardship as ethical/religious principle.

Early Environmental Advocacy in the United States 1830 – 1930

As Industrial Revolution spread from Europe to US in early to mid 1800s, urbanized development, fossil fuel-powered industry and technology began to displace prevailing agrarian society and brought rampant disease and environmental impairment, especially water pollution.

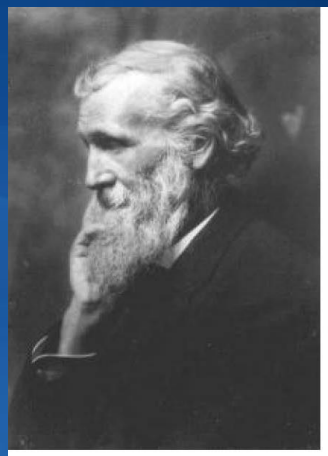
Early Environmental Advocacy in the United States 1830 – 1930



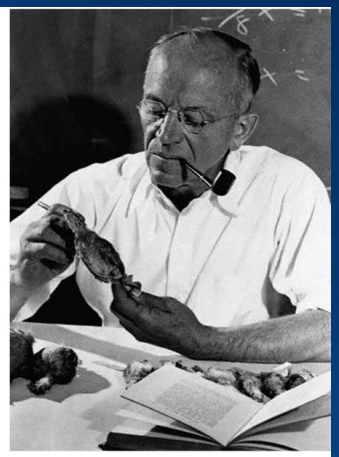
The philosophical movement known as Transcendentalism, comprised of a loose coalition of literary figures and artists, became vocal in pushback against unfettered technology and development at expense of nature. Referred to as Romantic Naturalism, its major proponents included journalist Margaret Fuller, poet Walt Whitman, essayist Ralph Waldo Emerson, and its most famous advocate, naturalist Henry David Thoreau.

Early Environmental Advocacy in the United States 1830 – 1930

In late 19th and early 20th centuries, naturalist John Muir, ecologist Aldo Leopold, geologist John Wesley Powell, President Theodore Roosevelt and USFS chief Gifford Pinchot were major advocates for long-term environmental sustainability and stewardship from natural history and conservation-based perspective.



John Muir

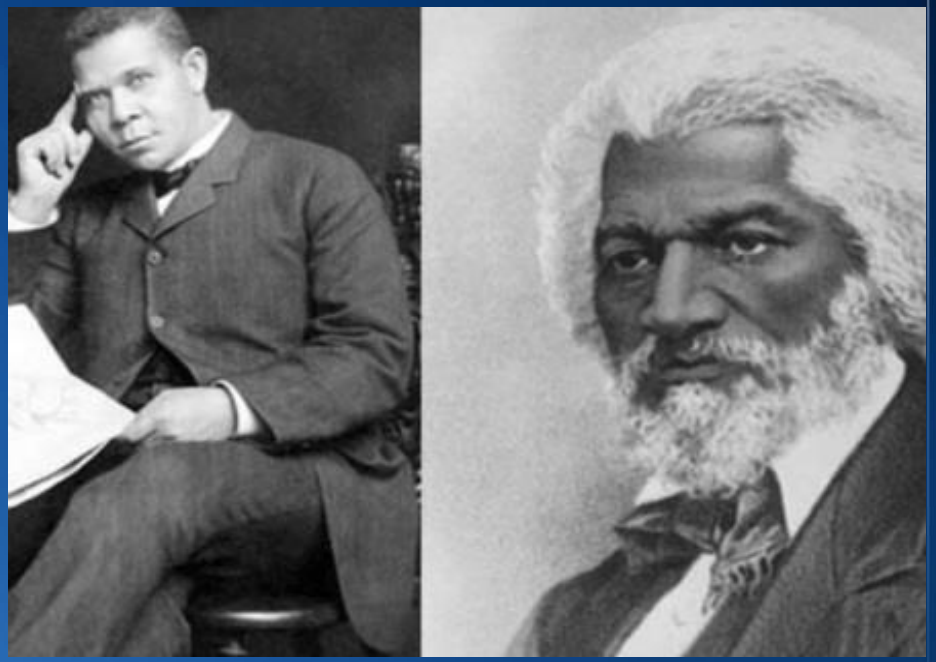


Aldo Leopold

Roosevelt and Pinchot aboard a Mississippi River steamer during a 1907 Department of Interior Inland Waterways Commission Expedition.

Early Environmental Advocacy in the United States 1830 – 1930

Prominent African Americans from abolitionist movement, such as activist and statesman Frederick Douglass and educator Booker T. Washington, up through Harlem Renaissance, including NAACP cofounder W.E.B. Du Bois and philosopher Alain Locke, also lent their voices to causes of environmental justice and stewardship as basic elements of human rights.



Booker T. Washington and Frederick Douglass

Early Scientific Progress

- 1850s London – "Father of Epidemiology" John Snow is first to recognize relationship between water quality and disease (cholera), although not able to identify actual causative agent (*Vibrio cholerae*).

- Collective works of Louis Pasteur and Robert Koch in mid-late 1800s helped establish Germ Theory of Disease by linking bacterial agents to water contamination.

- Late 1800s to 1930 – Water Sanitation Era in U.S.: Jersey City, N.J. is first to disinfect public water supply in 1908. Many public utilities were established to improve water quality and decrease incidence of disease, including SDC.

Koch and Pasteur: Breakthroughs helped establish Germ Theory of Disease – subsequently deployed to combat water-borne disease outbreaks.

Improving Sanitation and Reducing Disease in U.S.

- 1850s – first sewer systems in U.S. constructed in Chicago and Brooklyn to convey human wastewater away from people
- To combat rampant water-borne disease and unsanitary conditions in rapidly expanding urban areas, municipal WWT technology became more widespread in U.S. from 1890s through 1930s.
- First U.S. WWTP - 1890 in Worcester, Mass. Twenty-seven U.S. cities had some degree of WWT by 1892, and by 1960, 50 percent of U.S. population had access to WWT.
- Locally, first SDC WWTP – Calumet in 1922. Northside and Stickney WWTPs followed later in 1920s/1930s

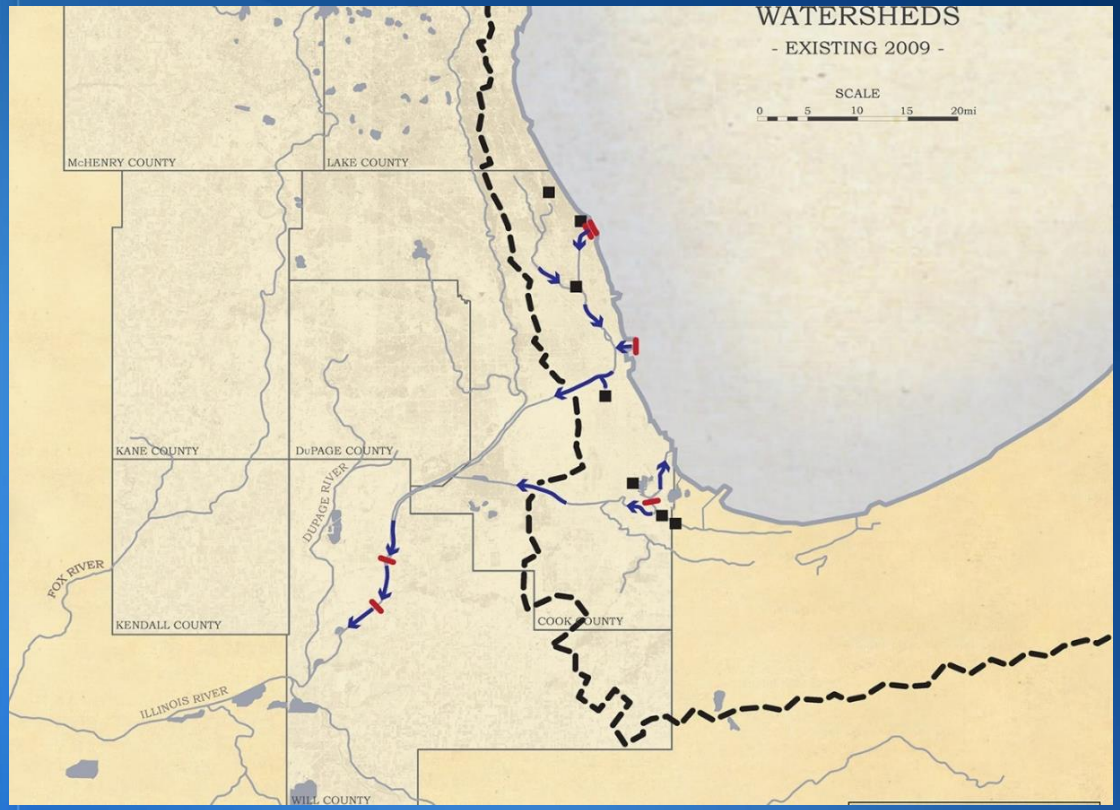
Rachel Carson's "Silent Spring"

Rachel Carson, author of "Silent Spring," published in 1962, was first book of its kind to address water pollution and environmental health from a data-driven, technical, scientific perspective. Generally recognized as singular catalyst for modern environmental movement that followed.

Major Challenges to Progress by Mid-20th Century

- In 125 years since Industrial Revolution in the U.S., large scale urban development and technological advancements impaired water quality and endangered public health. No region of the U.S. was exempt.
- Regulatory and legal infrastructures, both locally and nationally, were woefully insufficient (or mostly nonexistent) to deal with unrestrained development and subsequent degradation of water environment.

Looking Locally: Two Great Watersheds



Locally, greater Chicago region is uniquely situated at geological and geographical nexus of two largest and most important watersheds in continental U.S., Great Lakes and Mississippi River. This map outlines the subcontinental divide separating Mississippi and Great Lakes watersheds.

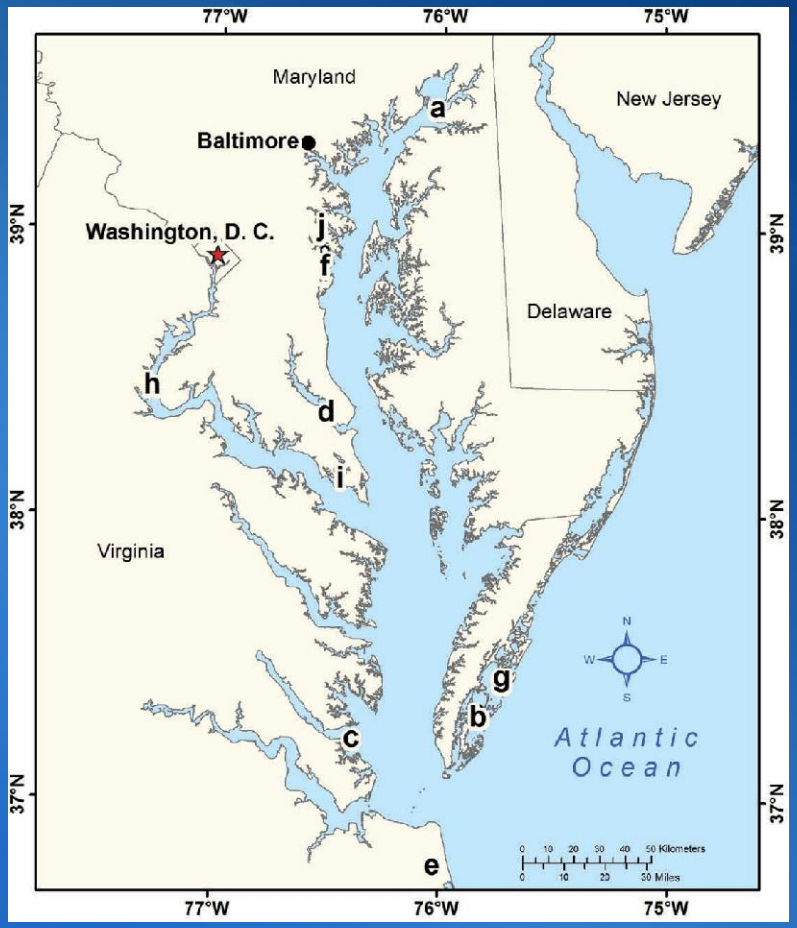
Early Federal Efforts to Legislate Water Quality and Mitigate Pollution

- The Refuse Act of 1899: an obscure provision of the Rivers and Harbors Act of 1899 that prohibited waste dumping in navigable waters without a permit from the U.S. Army Corps of Engineers.
- The Oil Pollution Control Act of 1924 prohibited oil dumping into navigable waters by boat, but failed to address similar actions by stationary, land-based point sources.
- The Water Pollution Control Act of 1948 was a weak first effort to legislate water quality nationally. Authority to enforce the Act was initially granted to the U.S. Surgeon General. There was no regulatory body, numerical standards or pollutant limitations.
- Water Quality Act of 1965: first national legislative effort at developing water quality criteria for waterways and watersheds that crossed multiple state borders (e.g., Mississippi River).
- Clean Waters Restoration Act of 1966: first piece of legislation that provided federal funds for municipal sewage treatment facilities.

Pre-Clean Water Act Water Quality State of the Union

- In 1968, 6 years after *Silent Spring* first sounded alarm on pesticide misuse, DDT measured up to nine times the FDA's limit in 584 of the 590 surface water bodies sampled nationwide by U.S. Fish and Wildlife Service.
- In 1969, bacteria levels in New York's Hudson River were 170X limit considered medically safe.
- Pemigewasset River in New Hampshire, then considered most polluted river in all of New England, was so impaired by noxious, fetid industrial waste, largely from unregulated paper mills, that fumes literally peeled paint off buildings along banks.
- By late 1960s, Boston Harbor and its main tributary, the Charles River, were so polluted The Standells' 1960s hit *Dirty Water* embarrassingly became unofficial city anthem.

Pre-Clean Water Act Water Quality State of the Union



- During 1960s, country's largest estuary, Chesapeake Bay, faced chronic nutrient pollution that cost millions of dollars in annual losses due to drastic reduction in Atlantic Striped Bass, oyster, crab fisheries.
- Bay is fed by 150 major rivers and streams with more than 100,000 tributaries total along the 17,000 Km-long coastline.

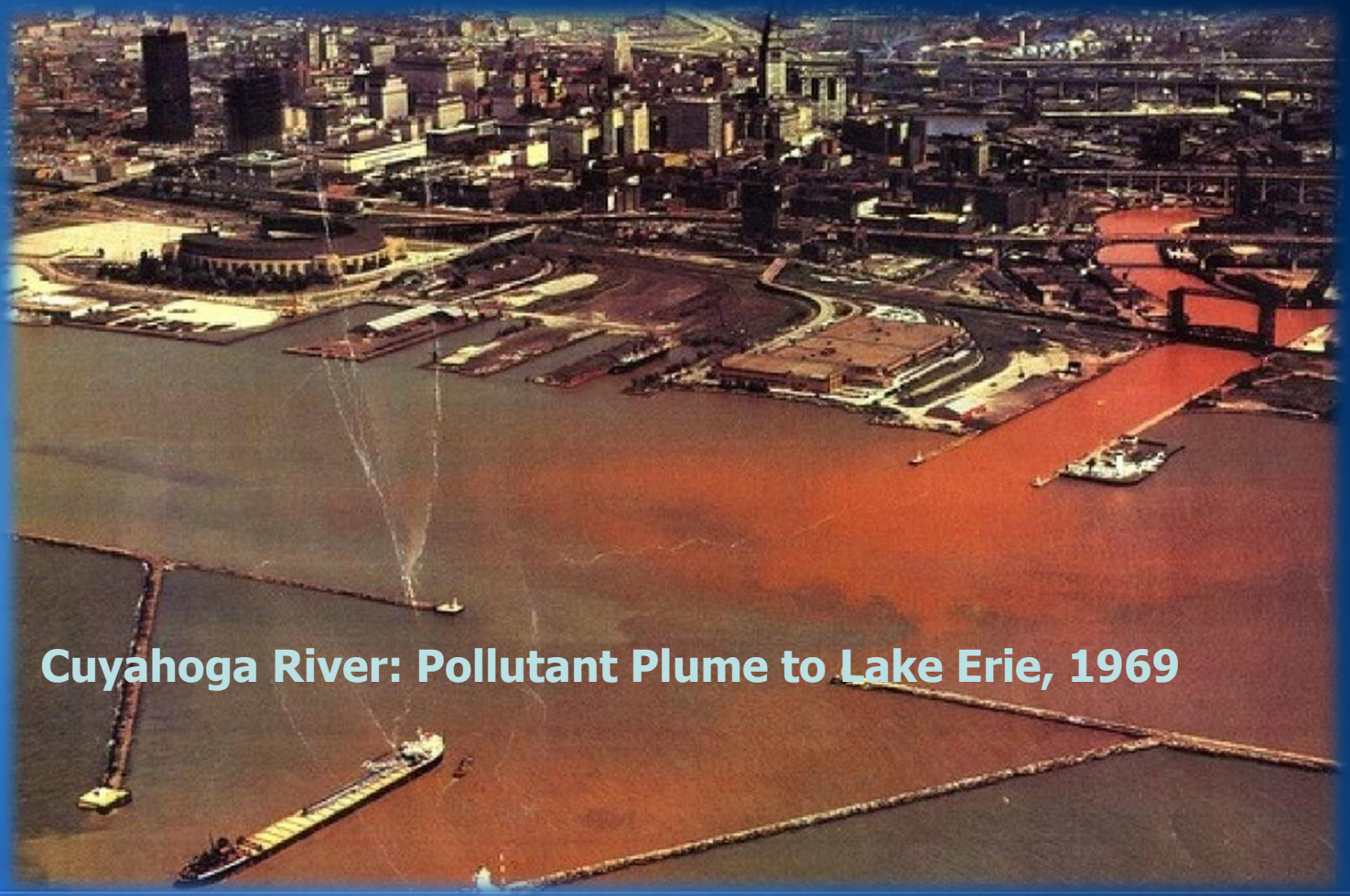
Pre-Clean Water Act Water Quality State of the Union

Twenty-six million dead, rotting fish cover Lake Thonotosassa's shoreline, January 28, 1969, in the single largest fish kill on record. 1969 saw record numbers of fish kill events. The Lake Thonotosassa disaster came from untreated, direct discharges of four food plants.

Pre-Clean Water Act Water Quality State of the Union

In June 1969, Cuyahoga River in Cleveland, Ohio, combusted several times. Investigation pointed to highly-volatile petroleum derivatives in river that ignited by sparks from a passing overhead train.

Pre-Clean Water Act Water Quality State of the Union



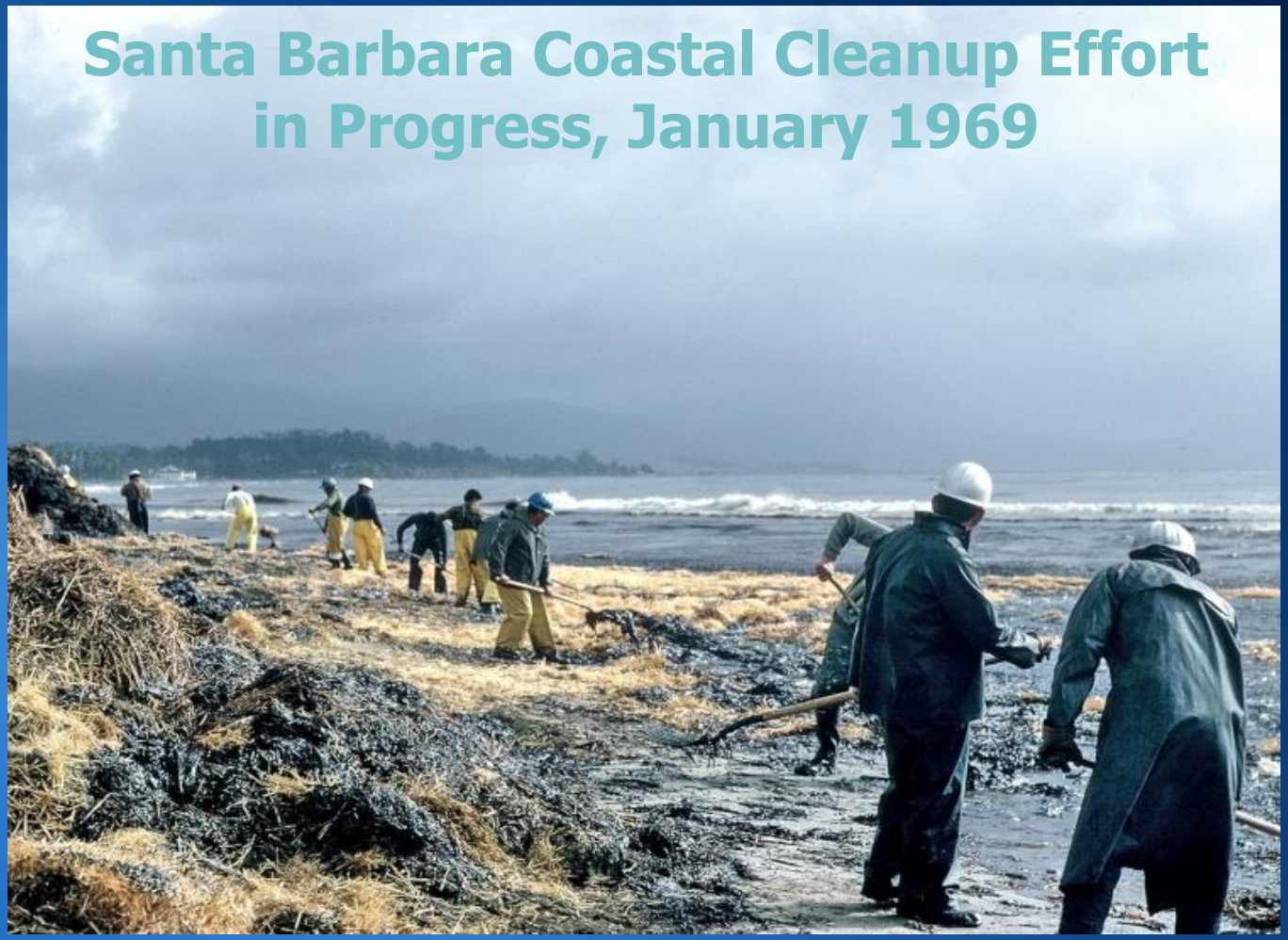
Cuyahoga River: Pollutant Plume to Lake Erie, 1969

A Bad Report Card Gets Worse…

- In January 1969, a 3,500-feet-deep Union Oil Corporation well cap blew five miles off Santa Barbara, Calif., spewing more than 3 million gallons of crude oil over 800 square miles of ocean and 35 miles of shoreline. Oil was 6” thick and muted sound of waves crashing against rocky intertidal zone.

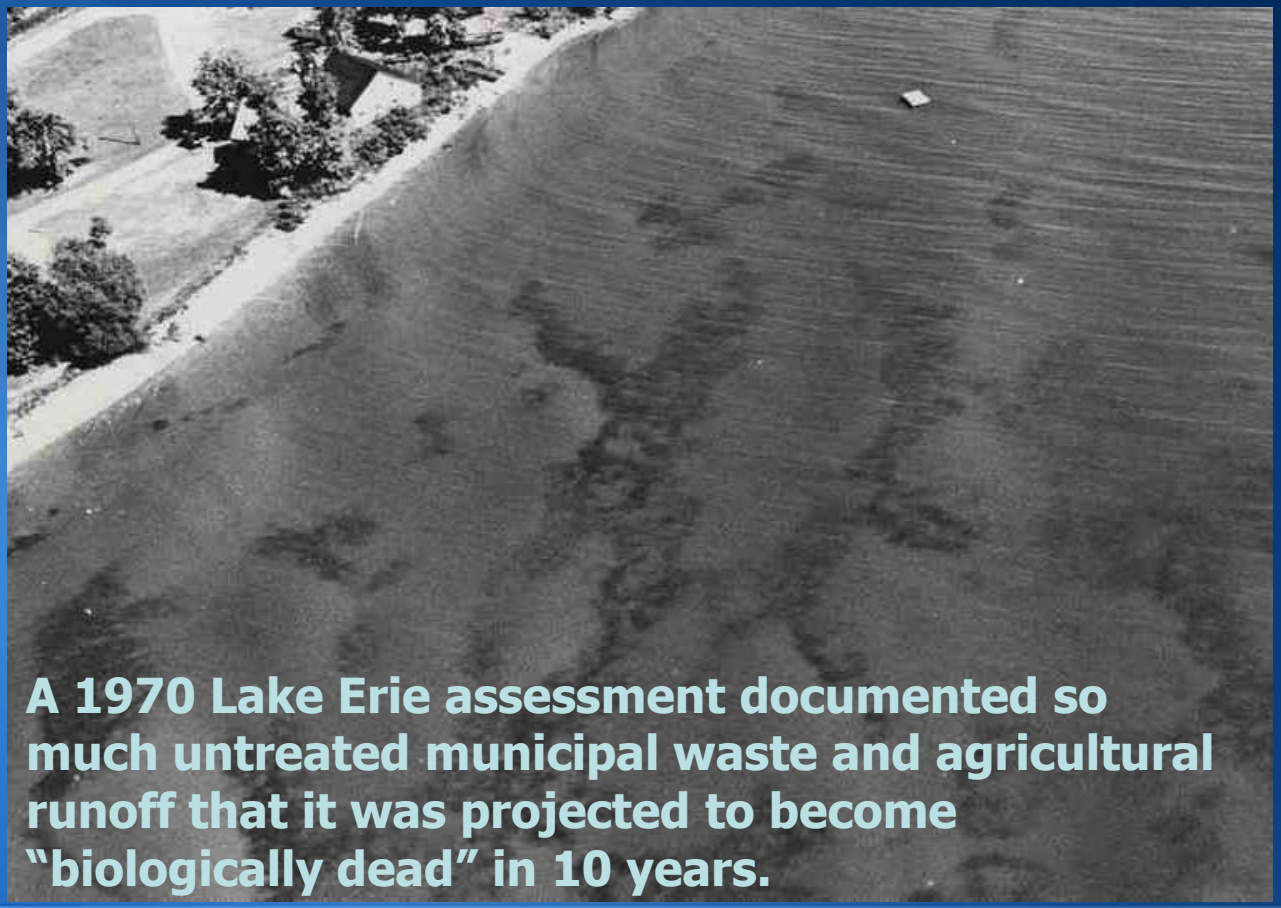
- Michigan Mercury Crisis of 1970: Dow Chemical and other unregulated industries discharged up to 20 lbs/day Hg into St. Clair and Detroit Rivers, tributary to Lake Erie, exceeding U.S. Dept of Public Health limit by 600%.

Santa Barbara Coastal Cleanup Effort in Progress, January 1969



By 1970, health of Everglades National Park, largest subtropical wetland wilderness in US, is extremely dire following decades of overdevelopment, water diversions, nutrient pollution and saltwater intrusion.

Lake Erie Algae Blooms in Currents Off Cleveland



A 1970 Lake Erie assessment documented so much untreated municipal waste and agricultural runoff that it was projected to become "biologically dead" in 10 years.

Satellite Image Showing Extent of Lake Erie Algae Contamination, 1970

The Culmination … A Failing Grade

- 1970 – Department of Health, Education and Welfare's Bureau of Water Hygiene reported that more than 30 percent of all U.S. drinking water sources had chemical contamination exceeding public health limits.
- 1971 – FDA reported that more than 80 percent of Atlantic Swordfish had Hg levels so high species was declared unfit for human consumption.
- 1972 – Over two-thirds of U.S. surface and coastal waters had become so impaired they were declared medically unsafe for primary human contact. Most municipalities simply discharged untreated sewage into receiving streams.

The Aftermath…A Public Reckoning and Consciousness Raising

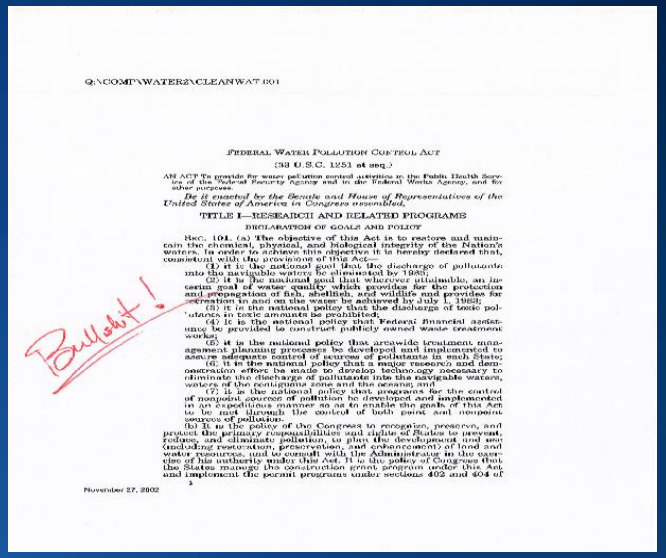
- Incidents in previous slides, and many other less publicized ones, unleashed groundswell of public support for clean water and became national clarion call for stronger water quality legislation and effective environmental stewardship at federal level.

First Earth Day Celebration at the Chicago Civic Center Plaza on April 22, 1970.

- Senator Gaylord Nelson (WI) was leading Congressional sponsor in establishment of first Earth Day, April 22, 1970. Initially planned for schools as national teach-in on environment, but massive protests and marches in its wake helped push for establishment of USEPA later that year.

- **Because the state of the environment became a national embarrassment, Nixon's hand was forced to craft an Executive Order establishing USEPA as a Cabinet-level agency of the Executive Branch effective December 2, 1970. Congress subsequently passed CWA two years later.**

Clean Water Act White House Signing Ceremony, October 18, 1972



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FEDERAL WATER POLLUTION CONTROL ACT

(33 U.S.C. 1251 et seq.)

AN ACT To provide for water pollution control activities in the Public Health Service of the Federal Security Agency and in the Federal Works Agency, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I—RESEARCH AND RELATED PROGRAMS

DECLARATION OF GOALS AND POLICY

SEC. 101. (a) The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. In order to achieve this objective it is hereby declared that, consistent with the provisions of this Act—

(1) it is the national goal that the discharge of pollutants into the navigable waters be eliminated by 1985;

(2) it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983;

(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited;

(4) it is the national policy that Federal financial assistance be provided to construct publicly owned waste treatment works;

(5) it is the national policy that areawide treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State;

(6) it is the national policy that a major research and demonstration effort be made to develop technology necessary to eliminate the discharge of pollutants into the navigable waters, waters of the contiguous zone and the oceans; and

(7) it is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution.

(b) It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this Act. It is the policy of Congress that the States manage the construction grant program under this Act, and implement the permit programs under sections 402 and 404 of

November 27, 2002

Bullshit!

CWA Draft with Nixon's Comment, 1972.

- **Although often credited with signing CWA legislation, Nixon actually objected strenuously and vetoed it only to be overridden by Congress.**

"A Change Is Gonna Come": The Clean Water Act and New Hope for the State of the Water Environment

- The CWA's origins date to the Federal Water Pollution Control Act of 1948 – The Act was amended and expanded in scope in 1972.
- Codified initial references to TMDL, BAT, and BMP associated with water quality at federal level.
- Additional federal funds given to construct/upgrade municipal sewage treatment facilities.
- First recognition of critical need to regulate non-point sources of pollution.
- Critics: Focused too much on costly "command-and-control" legal remedies, and not enough on preventative source control strategies.
- Overall stated goal of legislation: All surface waters of the U.S. should be fishable and swimmable by 1983.
- Amended and further expanded in scope in 1977 – Officially renamed CWA.

"Big Blue Marble" image – December 7, 1972, Apollo 17 Mission

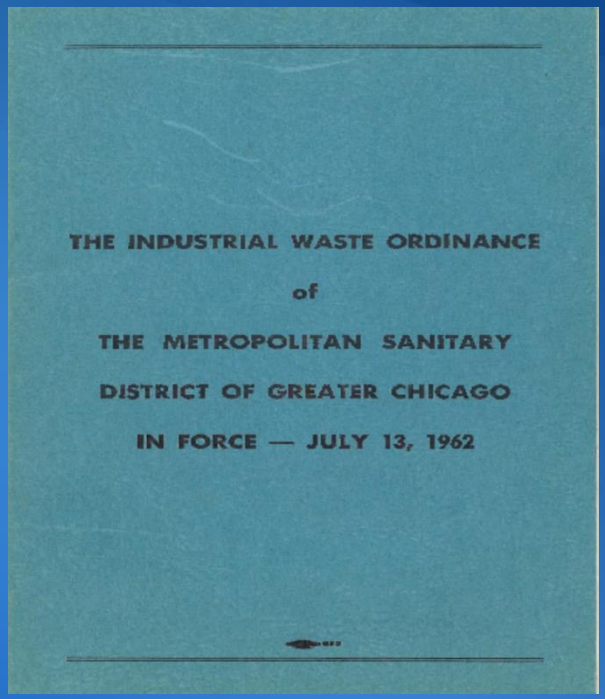
"How inappropriate to call this planet Earth, when it quite clearly is planet Ocean."

- Arthur C. Clarke

CWA Amendments of 1977 Demand Greater Accountability

- Set wastewater standards for industry.
- Set water quality standards for pollutants in surface waters.
- Introduced the NPDES, a permitting system for regulating direct, point source discharges.
- Called for fishable and swimmable waters by 1983 and zero discharge into navigable waters by 1985.
- Directed U.S. border states to partner with Canadian border provinces to mitigate Great Lakes pollution.

The Local Front: Early District Efforts to Mitigate Water Pollution



Original Industrial Waste Ordinance Adopted in 1962 - MSDGC

- 1946 – Ordinance providing for control of pollution of waters within Sanitary District of Greater Chicago. Earliest District attempt to control pollution in any way, shape, or form in natural waterways only.

- 1962 – The Industrial Waste Ordinance of the MSDGC. Earliest District attempt to regulate wastewater in sewerage system.

The Local Front: Early District Efforts to Mitigate Water Pollution (Continued)

Both ordinances were administered/enforced by the District's Engineering Department – A new work unit was created/approved by BOC in 1962:

Engineering Department > Sanitary Division > Waterways and Industrial Waste Investigations Section.

The Research and Development Department was approved by the BOC in 1963. The Industrial Waste Control Division was established under R&D in 1972.

The District's Sewage and Waste Control Ordinance and Federal Pretreatment Program

- The SWCO was first adopted in 1969 - Provided the legal framework to abate pollution by regulating sewage and industrial wastes discharged to District's collection system and surface waters under its jurisdiction. Local limits/pollution prohibitions for storm sewers/surface waters encoded in Appendix A and local limits/pollution prohibitions for sanitary sewers encoded in Appendix B. Pre-dated CWA and has been amended 36 times through 2021.
- Federal General Pretreatment Requirements codified under 40 CFR 403 of CWA on January 28, 1981, as pollution from indirect industrial dischargers to POTWs reached epic proportions in 1970s. Established unique categorical pollutant standards for industries of concern and designated "SIU" as a primary regulated class.
- 40 CFR 403 provisions were adopted by the District and approved by the USEPA in 1985 under Appendix C to SWCO. Permitting control mechanism (Discharge Authorization) procedures were established in 1992 under Appendix D. ERP was also established in 1992 under Appendix F to SWCO.

Criteria for SIU Designation

- Any user subject to federal categorical pretreatment standards.
- Any user that discharges > 25K gpd of process wastewater to sewerage system (excludes domestic sanitary waste, NCCW, boiler/cooling tower blowdown, other utility waste streams).
- Discharges process wastewater > 5% of hydraulic load or organic capacity of receiving WRP.
- Designated as having reasonable potential to adversely impact operations of WRPs/facilities or for violating any other water quality standard or requirement under SWCO

Each SIU must secure a District-approved Discharge Authorization prior to conducting operations and must self-report its continued compliance twice annually at 6-month intervals.

Numbers of SIUs Through the Years

1986 – 530*	1997 – 553	2008 – 394	2019 - 334
1987 – 407*	1998 – 539	2009 – 373	2020 - 333
1988 – 439*	1999 – 600	2010 – 363	2021 - 333
1989 – 439*	2000 – 533	2011 – 361	2022 - 332
1990 – ??*	2001 – 511	2012 – 357	
1991 – 1,100	2002 – 495	2013 – 356	
1992 – 750	2003 – 477	2014 – 354	
1993 – 600	2004 – 456	2015 – 348	
1994 – 600	2005 – 447	2016 – 343	
1995 – 600	2006 – 423	2017 – 343	
1996 – 600	2007 – 407	2018 – 334	

*Inaccurate early annual counts – Pretreatment Program still under development and not fully implemented.

2022 SIU Breakdown by Industrial Category Under 40 CFR 403 (N = 332)

Non-cat = 137*
433 = 100
413 = 31
413/433 = 13
414 = 8
442 = 7
420 = 7
439 = 5
437 = 4
465 = 3
421 = 2
464 = 2
455 = 2
415 = 1
417 = 1
419 = 1
425 = 1
430 = 1
463 = 1
467 = 1
468 = 1
464/468 = 1
433/469 = 1
420/433 = 1

* Food processing
Soft drink bottling
Breweries
Industrial laundries
Bakeries
Meat/poultry processors
Candy manufacturers
Sugar/corn syrup refiners

The ERP: Escalating Enforcement Actions Available Under SWCO and Pretreatment Program

- Notice of Noncompliance (NON) – effluent limitations (minor).
- Cease and Desist Order (C&D) – effluent limitations (major) or reporting requirements.
- Show Cause Proceeding – recommended after chronic patterns of major noncompliance. BOC-appointed Hearing Officer presides over technical hearing.
- Court Proceeding – legal action in Circuit Court of Cook County that allows for immediate injunctive relief in extreme cases.
- Civil/Criminal Referral – violations of state/federal statutes may be referred to State's Attorney, IEPA, U.S. Attorney, or USEPA.

Pretreatment Program Streamlining Rule Reduces Administrative Burden

- Federal Streamlining Rules adopted in 2005 in order to reduce IU compliance burden and costs without weakening 40 CFR 403. Provided for extended SMR deadlines, allowance of mass-based pollutant limits, and authority for POTWs to waive monitoring requirements for pollutants not present at IUs or in waste streams.

- Streamlining Rule also codified requirements for Spill/Slug Discharge Control Plans and clarified definition of and criteria used to determine SNC, and subsequent rules for publication.

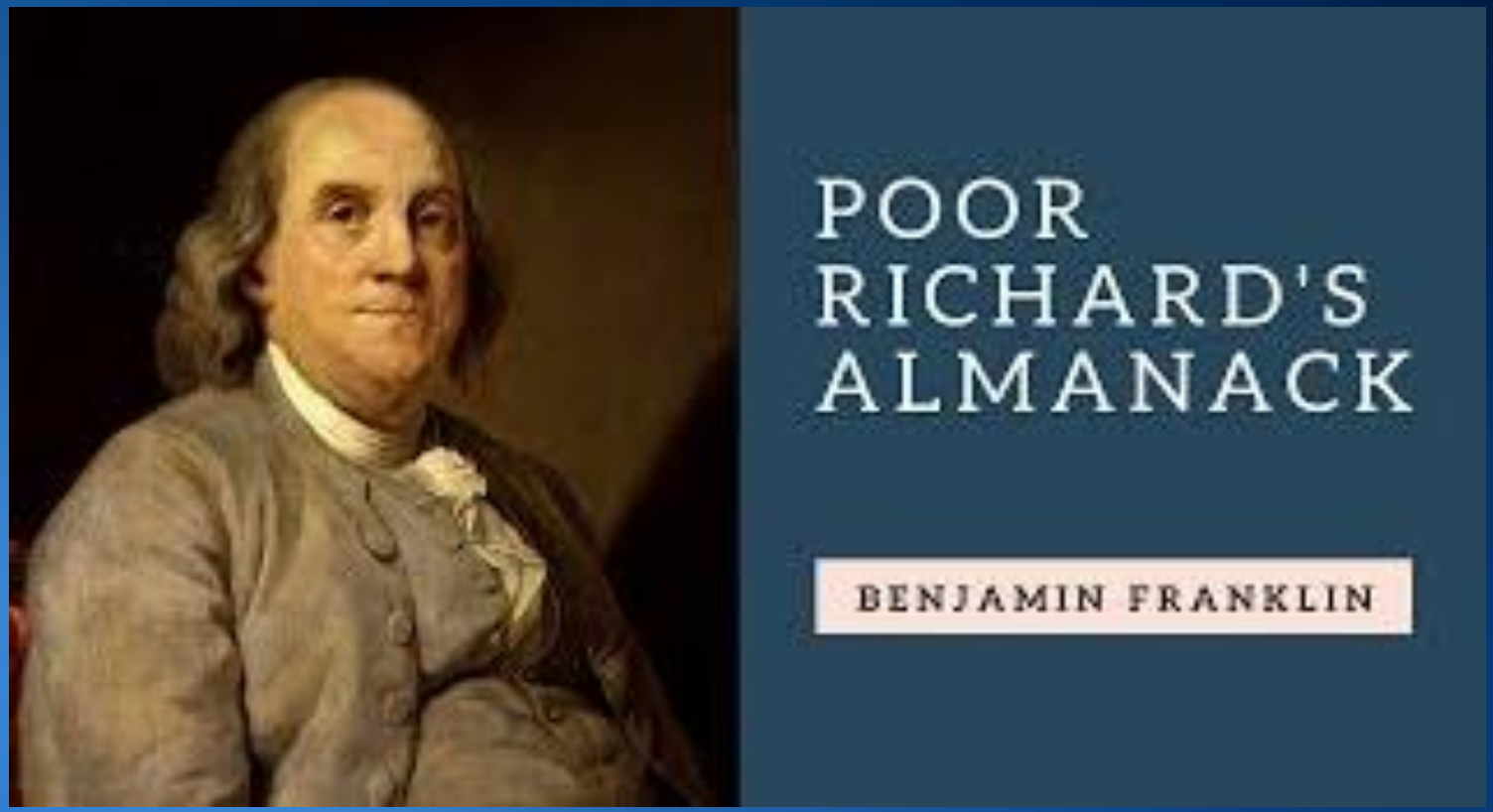
Federal Oversight of District's Pretreatment Program

USEPA Region 5 Conducts Pretreatment Program Oversight of Local Control Authorities within Its Jurisdiction

The District serves as local control authority under USEPA for water quality in its service area. USEPA Region 5 serves as Great Lakes region federal oversight authority for POTWs in IL, IN, OH, MN, MI, WI and federally held land trusts of 35 indigenous tribes.

Federal Oversight of District's Pretreatment Program (Continued)

- Must report regulatory performance annually to both USEPA and IEPA.
- Must publish significant violators of SWCO and pretreatment standards; Users demonstrating exemplary annual compliance are also published by the District (although not required under 40 CFR 403).
- USEPA approval required in advance for all SWCO amendments and revisions. "Substantive" changes must be accompanied by 30-day public notice/comment period and posting of relevant program documents.
- District's pretreatment program administration subject to periodic audits and compliance inspections (last ones conducted in Oct 2009 and Dec 2018, respectively) by USEPA investigators.
- Must periodically reevaluate local limits to verify firm technical basis and adjust to changing conditions. Local limits must protect water quality, biosolids quality, worker health/safety, collection system, air quality and biological integrity of WRPs (last evaluation completed December 2017).



"When the well runs dry, we learn the worth of water."

- Benjamin Franklin, 1746

Thank You!

Questions/Comments?

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