




Industrial Pretreatment Program and Waste Minimization

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Our Goals Tonight

- Clean Water Act
- Federal Pretreatment Program
- Pollution Prevention Programs
- Industry Examples

Introduction

- Clean Water Act was passed by Congress in 1972 to restore and maintain the integrity of the nation's waters.
- **Only 39 years ago** – in my lifetime!
- The Act establishes regulations for commercial and industrial process wastewaters.
- Made it illegal to discharge to waters of the United States without a permit



Wastewater Basics

- POTWs collect wastewater and transport via a collection system to the wastewater treatment plant.
- Treatment processes to remove harmful organisms and other pollutants
- Designed to treat typical residential wastewater and biodegradable commercial / industrial wastewater (conventional pollutants)
- Municipal POTWs are not designed to treat toxic pollutants.




Wastewater Treatment Plants have Three Types of Capacity


- Hydraulic Capacity
- Organic Load (BOD₅) and Suspended Solids Capacity or Biological Treatment Capacity
- Solids Handling Capacity

- Each type of capacity must be protected and not exceeded for the WWTP to function




Treatment Capacity Utilized by Domestic and Industry

- Many industries discharge their wastewaters, with or without pretreatment, into sewers servicing Publicly Owned Treatment Works (POTWs)
- Non-regulated industries and light commercial activities often get lumped in with domestic wastewater sources
 - Schools
 - Day Camps
 - Restaurants
 - Churches
 - Offices





- POTWs have a fixed capacity to handle
 - Unexpected increases in industrial loads
 - Population growth
 - Stormwater flows (I&I)
- POTWs must meet tighter effluent limits
 - Ammonia, Nitrate, and Phosphorus
 - Metals
 - Can limit loads accepted (local limits)
- Sometimes **dilution is the solution** – it's amazing what 45 inches of rain a year will do for your discharge limits!
 - Wind River Ranch
 - Town of Meeker



Possible Solutions

- Expand the POTW facility to meet the increased demand - \$\$\$\$\$
- All Colorado discharge permits require
 - Planning for expansion at 80% of capacity
 - Must be under construction at 95% of capacity
- Exception is limited service area



Possible Solutions


- More expensive for smaller facilities due to economy of scale

• Wild Basin Lodge, 2000 gpd, \$0.35 Million	\$175/gal
• Wind River Ranch, 4000 gpd, \$0.5 Million	\$125/gal
• Brush, at 1.7 mgd, \$16.2 Million	\$9.50/gal
• Carbondale, at 1.5 mgd, \$12.5 Million	\$8.33/gal
• Clifton, at 4.0 mgd, \$22.8 Million	\$5.70/gal
• L/E WWTP, at 50 mgd, \$75 Million	\$1.50/gal
- Funding?????





Possible Solutions


- Water Conservation?
- Initiate an **industrial pretreatment program** to reduce the strength of the waste
- Sometimes municipalities and industry collaborate to build or expand a POTW
 - City of Brush, Colorado
 - Town of Dinuba, California
 - City of Allendale, Michigan
- Institute a **pollution prevention program**

Clean Water Act


- Technology Based Limits (BMP)
- Water Quality Standards
 - Use Protection
 - Stream Standards
- Permits Required for All Dischargers; direct and indirect
- Revolving Fund Construction Loan for Municipalities



Two Classes of Dischargers

- Direct Dischargers
 - Discharge to surface water
 - National Pollution Discharge Elimination System
 - Permit issued by State or EPA
- Indirect Dischargers
 - Discharge to collection system
 - National Pretreatment Program
 - Permit Issued by POTW




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Pretreatment Program Components

- Industrial Waste Survey
- Permitting
- Inspections
- Sampling
- Reporting
- Data Management/Compliance Evaluations
- Enforcement
- Other controls—BMPs, Sector Controls and Spill/Slug Control


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The Big Picture: Why Enact Pretreatment?

- Prevent
 - Interference
 - Corrosion
 - Explosions
 - Worker Health and Safety
 - Biosolids Contamination
 - Pass Through
- Industrial Users Contributing Toxic Pollutants to POTWs
- NPDES/CDPS Requirement


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Generator's Responsibility:

- The purpose of the pretreatment program is to ensure that the Industrial User that generates the pollutants is responsible to manage the waste stream.
- Do not pass the responsibility and liability onto the taxpayers – average sewer bill in Colorado
- **Internalizes the real cost of doing business**
- *Tragedy of the Commons* by Harding
- When everyone must absorb their real costs, it levels the playing field in the business world


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Who Must Have a PT Program?

- POTWs with
 - Combined design flow > 5 MGD AND
 - Receiving flow from SIUs, CIUs and/or
 - Receiving pollutants which pass through or interfere
- Approval Authority (EPA or State) may require program be developed, regardless.
- Defines categories of industrial users
- Hauled wastes have special rules

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Pretreatment Chain of Command

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    graph TD
      AA["APPROVAL AUTHORITY  
Oversee POTW & IU Compliance  
Review POTW Reports/Submissions  
Inspect POTWs & IUs"]
      CA["CONTROL AUTHORITY  
Implement Pretreatment Program  
Regulate Industrial Users  
Submit Reports to Approval Authority"]
      IU["INDUSTRIAL USER  
Comply with Pretreatment Requirements  
Submit Reports to Control Authority"]
      AA --- CA
      CA --- IU
    
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POTW Legal Authority

[40 CFR § 403.8(f)(1)]

- ◆ Deny or condition discharges
- ◆ Require compliance
- ◆ Control through permit or similar means
- ◆ Require compliance schedules to comply
- ◆ Inspect, survey, and monitor
- ◆ Enforce
- ◆ Comply with confidentiality requirements

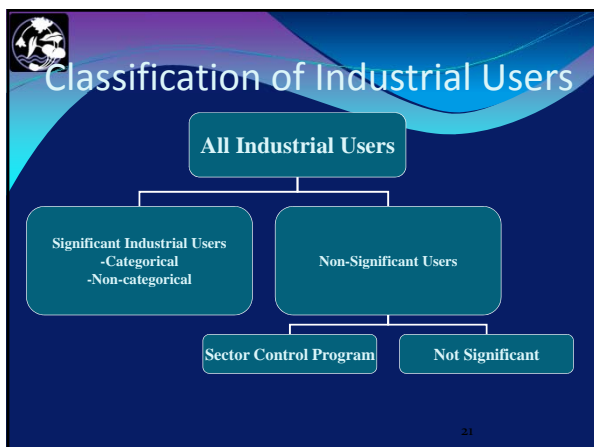

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Industrial Waste Survey

- Identify sources of indirect discharge--the introduction of pollutants into a POTW from any non-domestic source
- Identify and locate all possible Industrial Users which might be subject to the POTW's Pretreatment Program
- Identify and locate all possible Significant Industrial Users which might be subject to your POTW's Pretreatment Program

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Significant Industrial User

- Subject to Federal categorical standards
- Discharges 25,000 GPD or more of process wastewater
- Contributes 5 % or more of hydraulic or organic **capacity** of the POTW treatment plant
- Has a reasonable potential for adversely affecting the POTW or for violating any standard or requirements

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Categorical Industrial User

- Applicable to specific industry categories
- Arose from 1976 EPA/NRDC agreement
- Currently at 55 categories
 - (4 are being proposed)
- Found in 40 CFR Parts 405-471
- Applicable to direct & indirect dischargers




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Categorical Industries

- Part 405 - Dairy Products Processing
- Part 406 - Grain Mills
- Part 407 - Canned and Preserved Fruits and Vegetables Processing
- Part 408 - Canned and Preserved Seafood Processing
- Part 409 - Sugar Processing
- Part 410 - Textile Mills
- Part 411 - Cement Manufacturing
- Part 412 - Feedlots
- Part 413 - Electroplating
- Part 414 - Organic Chemicals, Plastics and Synthetic Fibers
- Part 415 - Inorganic Chemical Manufacturing
- Part 417 - Soap and Detergent Manufacturing
- Part 418 - Fertilizer Manufacturing

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- Part 419 - Petroleum Refining
- Part 420 - Iron and Steel Manufacturing
- Part 421 - Nonferrous Metals Manufacturing
- Part 422 - Phosphate Manufacturing
- Part 423 - Steam Electric Power Generating
- Part 424 - Ferroalloy Manufacturing
- Part 425 - Leather Tanning and Finishing
- Part 426 - Glass Manufacturing
- Part 427 - Asbestos Manufacturing
- Part 428 - Rubber Manufacturing
- Part 429 - Timber Products Processing
- Part 430 - Pulp, Paper and Paperboard
- Part 431 - The Builders' Paper and Boardmills

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- Part 432 - Meat Products
- Part 433 - Metal Finishing
- Part 434 - Coal Mining
- Part 435 - Oil and Gas Extraction
- Part 436 - Mineral and Mining Processing
- Part 437 - Centralized Waste Treatment
- Part 439 - Pharmaceutical Manufacturing
- Part 440 - Ore Mining and Dressing
- Part 442 - Transportation Equipment Cleaning
- Part 443 - Paving and Roofing Materials (Tars and Asphalt)
- Part 444 - Hazardous Waste Combustors
- Part 445 - Landfills
- Part 446 - Paint Formulating
- Part 447 - Ink Formulating
- Part 454 - Gum and Wood Chemicals Manufacturing
- Part 455 - Pesticide Chemicals


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- Part 458 - Carbon Black Manufacturing
- Part 459 - Photographic Processing
- Part 460 - Hospitals
- Part 461 - Battery Manufacturing
- Part 463 - Plastics Molding and Forming
- Part 464 - Metal Molding and Casting
- Part 465 - Coil Coating
- Part 457 - Explosives Manufacturing
- Part 466 - Porcelain Enameling
- Part 467 - Aluminum Forming
- Part 468 - Copper Forming
- Part 469 - Electrical and Electronic Components
- Part 471 - Nonferrous Metals Forming and Metal Powder

The CWA (304(m)) requires that every two years EPA develop and publish plans for effluent guidelines, review, revision, development, and adoption.

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Pretreatment Program is Based on "End-of Pipe" Standards




- Technology Based Limits
- Prohibited Discharges
- Categorical Limits
- Local Limits
- Consensus between IU and POTW
 - Communities sometimes put up with a lot of abuse to retain jobs

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Prohibited Discharges

- Corrosive
- Flammable
- Hazardous – D or F listed waste under RCRA
- Pass Through
- Interfere with operation of POTW or sludge disposal



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Pass Through and Interference

- The POTW has a fixed treatment capacity for flow and load
- Not just toxics interfere with operation
 - Excessively high concentrations of BOD and TSS
 - Septic material
 - Grease (give example)
 - Seemingly benign substances like salt (give example)
 - Slug loading or "binge" treatment (give example)


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Characteristics of Industrial Wastewaters

- High strength
- Low nutrient to BOD ratios
- Often high temperature
- Most flow occurs during shift change and/or cleaning processes (CIP)
- May have weekly or seasonal variations
- **LOTS of opportunities** for prohibited discharges, pass through, and interference

Brewery Wastewater




- BOD > 1200 mg/L
- HIGHLY variable
- Mostly soluble
- Lots of VFAs
- Primaries remove 10-15% of influent BOD
- Hops and Grains = TSS
- Nutrient deficient

Brewery Wastewater

- TS can be very high
- TSS = 10 - 60 mg/L
- BOD = 1,000 - 15,00 mg/L
- Nitrogen = 30 -100 mg/L
- Phosphorus = 10 - 30 mg/L
- Temperature = 30°C


Dairy Wastewater



- BOD of whole milk = 100,000 mg/L
- Influent averages 900 - 5000 mg/L BOD
- High temperature ~35°C from clean in place (CIP) process
- Not usually nutrient limited
- High fat and grease
- DAFT often used as front end process



Dairy Wastewater

- TS can be very high
- TSS = 100 - 1,000 mg/L
- BOD = 900 - 5,000 mg/L
- Nitrogen = 6 -60 mg/L
- Phosphorus = 10 - 100 mg/L
- Temperature = 30°C



Petroleum Refinery WW

- Main influent compounds are ammonia, phenols, and sulfide
- Activated carbon sometimes added to adsorb organics
- May be P and/or micronutrient limited
- High temperatures

Petroleum Refinery WW

BOD = 150 – 250 mg/L
 Phenol = 20 - 200 mg/L
 Oil = 100 – 300 mg/L

Salts, chromium, and lead

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Categorical Limits

- BACT for specific industry
- Establish national pollution control requirements
- Organized by the industrial process used by the IU
- Categorical standards are applied to regulated wastewaters at the end-of-process or treatment
- Can seem unfair to municipalities with tighter standards

- Phosphorus limit for CIU versus Municipal WWTP
- Industrial WWTP versus Municipal WWTP




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Local Limits

- Protect the POTW
- Protect the receiving waters
- Improve biosolids disposal options
- Protect POTW personnel
- Examples
 - Grease – the number one cause of sanitary sewer overflows and blockages
 - Copper at the Boulder WWTP
 - Copper at the Frisco WWTP
 - Hauled waste age at the Meeker WWTP




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Local Limits

- Local limits are specific to the POTW
- POTWs are required to assess and revise, if necessary, every five years
- Not industry-specific, apply to all SIUs in the service area.
- Water Quality-based standards, may be enforced at the end-of-pipe
- Sometimes forces an industry to treat in excess of their categorical standards


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Types of Permit Limits

- Limits may be concentration based or mass based
- Concentration based is good because accurate flow data can be hard to get
- Mass based loads (ppd) don't always protect the treatment plant
 - Cheese brine discharge
 - Turkey Processing Plant
 - Town of Dinuba, California
 - WTP residuals discharge impacts wastewater plant
 - Nevada cyanide discharge
 - Septage receiving


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Bad Actors in POTWs and Industry – Blame the Other Guy

- End of Pipe Limits cost money
- Industry attitude can be to get as close to the limit as possible
- In some cases (really bad actors) industry may even plan to violate periodically
- Corporate pays for infrastructure, local pays for operations, maintenance and fines
- **Corporate sets local up for failure**
- Creative sampling can hide a lot of problems


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Bad Actors in POTWs and Industry – Blame the Other Guy

- Operators at POTW often blame industry for all their problems, whether cause and effect can be shown or not
 - WTP Residuals Dump
 - Turkey Plant and Municipal WWTP
- POTW levy fees for processing BOD, TSS, etc.
- IU often feels unfairly penalized by POTW
- Sometimes, IU find that being a direct discharger is better
 - City of Fort Morgan has 4 direct IU dischargers
 - When Industry has control, they often do better


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Enforcement

- Civil Penalties or Fines
- Sometimes Criminal Penalties
- Supplemental Environmental Projects
 - Violating industry and POTW agree to include commitments by industry to implement specific P2 activities in the settlement as partial relief for the original violations
- Reduces the fine that must be paid
- Provides “extra” environmental benefits to the public
- Gives regulator a way to channel funds outside of a budget cycle

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Significant Noncompliance

(will be published in largest local newspaper)

- Chronic violations
- Technical Review Criteria (TRC) violations
- Failure to meet, within 90 days, a compliance schedule milestone
- Failure to submit a report within 30 days of the due date


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SNC (continued)

- Violation that causes pass-through or interference
- Discharge that causes imminent endangerment
 - Example: Elko, Nevada and that sweet smell
 - Example: Corroded concrete pipe
- Failure to accurately report noncompliance
- Other violations that adversely affect the POTW Pretreatment Program

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Enforcement

- Enforcement Response Plans
- Reflect POTW's responsibility to enforce pretreatment requirements & standards.
- Identify how the POTW will investigate noncompliance.
- Specifies officials responsible for each type of enforcement.
- Specifies types of and time frames for taking escalating enforcement for anticipated types of violations.

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Informal vs. Formal Enforcement

- Informal
 - phone calls
 - meetings
 - warning letter
 - show cause notices/meetings
- Formal
 - administrative orders
 - civil suites
 - criminal suites
 - termination of service


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Administrative vs. Civil vs. Criminal Enforcement

- Administrative - Authorized by Control Authority's legal authority without involvement of a court.
- Civil - Lawsuit filed in a civil court.
- Criminal - Prosecution for willful, negligent, knowing, and/or intentional violations.


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Administrative Penalties

- EPA - \$32,500 per violation/day
- POTW enforces lesser penalties per violation/day
- Penalties Warranted for:
 - Significant Noncompliance
 - Repeated Instances of Noncompliance
 - Failure to Respond to Informal Enforcement
 - Discharges Causing Harm, Pass Through, and/or Interference
 - Unpermitted Discharges and Bypasses


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Problems with PT Program

- **Penalty Driven**
- Depends on Self-Monitoring
- Focuses discharger on end-of-pipe instead of factory floor
- Doesn't minimize pollution at the source
- May actually encourage more pollution by setting the "minimum" amount of treatment required
- Industry knows industry best


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Regulatory Basis for Pollution Prevention - P2 - Programs


- Until recently, P2 has been an after-thought of environmental regulations
- Hazardous waste minimization first endorsed in 1984 RCRA reauthorization (HSWA) introduced P2 by stipulating that generators must have a P2 plan
- Stated that reduction or elimination of hazardous wastes should take priority over waste management after generation

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Pollution Prevention Act (P2)

- PPA enacted in 1990
- Focus is to Reduce, Recycle, Reuse at the source
- Some grant monies available
- Largely non-regulatory approach – volunteer program
- P2 is inherently a Best Management Practice (BMP)
- Savvy industries can improve operations and profit with a P2 plan




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P2 Act Goals

- Funding of state technical assistance programs
- Integration of P2 into EPA activities
- Establishes a P2 information clearinghouse
- Reporting on P2 activities as an addition to the Toxics Release Inventory Requirements
- Note: non-regulatory except reporting requirement

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Voluntary Programs



- Most P2 programs have been voluntary
- 33/50 Program – Very successful!
- Reduce the emissions of 17 of the most toxic chemicals by 33% by 1992 and by 50% by 1995
- Voluntary programs should emphasize
 - A non-regulatory manner in promoting P2
 - Address non-regulated (small) industries that don't have mandatory requirements

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Types of Voluntary Programs

- Education outreach and technical assistance
- Bill stuffers
- Demonstration projects
- POTW offers amnesty for initial inspection / fix
- Awards for successful companies
- MUST be presented as voluntary


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Problems with Voluntary Programs

- Providing information and training may not be sufficient, especially for smaller industries
- Not everyone has access to expert authority
- Non-participants may gain an unfair competitive economic advantage
- Industries and municipalities appreciate a fixed target for treatment goals

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Problems with Voluntary Programs

- Technical assistance program may pose liability issues to the POTW
- Difficult to provide assistance when many industries consider their waste to be "proprietary"
- Contradictory enforcement vs. assistance roles for POTW
- POTW becomes liable for providing legal advice


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Market Forces are Better Than Peer Pressure

- **Industrial Dischargers Respond to the Bottom Line**
 - Charge per pound or gallon
 - Offer rebates for good behavior
 - Increase water price to encourage smart usage
 - Offer amnesty for trying process changes
- Once P2 programs begin, many industries find they save money
- Much more creative solutions when the goal, and not the methods, are specified

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Rules of Thumb for Starting a P2 Program

- Is that really waste or is it product going down the drain?
- Train employees to recognize the difference
- Examples
 - Brine solution recovery at a cheese processing plant
 - Leak in an orange juice line
 - Employees washing “empty” vessels
 - “Cow Water”
 - Sugar beet pulp at Western Sugar
 - Spent chloroform in an organic laboratory

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If it's already out, keep it out!



- Minor changes to floor practices can mean huge cost savings
- Water brooms are a huge waste of water and source of pollution
 - Reese Foods and grease
 - Hoopston Foods and overspillage
 - Coors Brewing Company and hops / grains


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If it's already out, keep it out!

- Segregate waste streams where possible
 - Mixed wastes are harder to treat almost always
 - If they can be treated separately for less, do it!
- Know the difference between a barrel of wine and a barrel of waste?
- Examples of good segregation practices
 - ConAgra Beef
 - Rocky Flats Environmental Test Site
 - Coors Brewing Company

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Water Audits

- Often find hidden sources of pollutants
- Overflowing tanks
- Sinks running when not needed
- Inefficient equipment
- Lots of little leaks add up!
- Multiple plants can be pitted against one another for greatest reductions


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Not Just for Industry

- Grease traps
- Englewood's Citizen Roundup
- Pollution warnings on storm sewers
- Bill stuffers for service area


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The Emerging Approach

- One goal of a PT or P2 Program is to make sure that pollutants are removed and not just transferred to another media
- Canada is starting to look holistically
- Does removing 1 mg/L of ammonia justify the pollution caused by the coal-fired power plant needed to generate the power required for its removal?
- Europe has some cradle to grave liability for white goods

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Thank You

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