Chesapeake Bay Program -- Real World Wastewater Technologies Workshop

A Survey of Global and National Nutrient Regulatory Approaches

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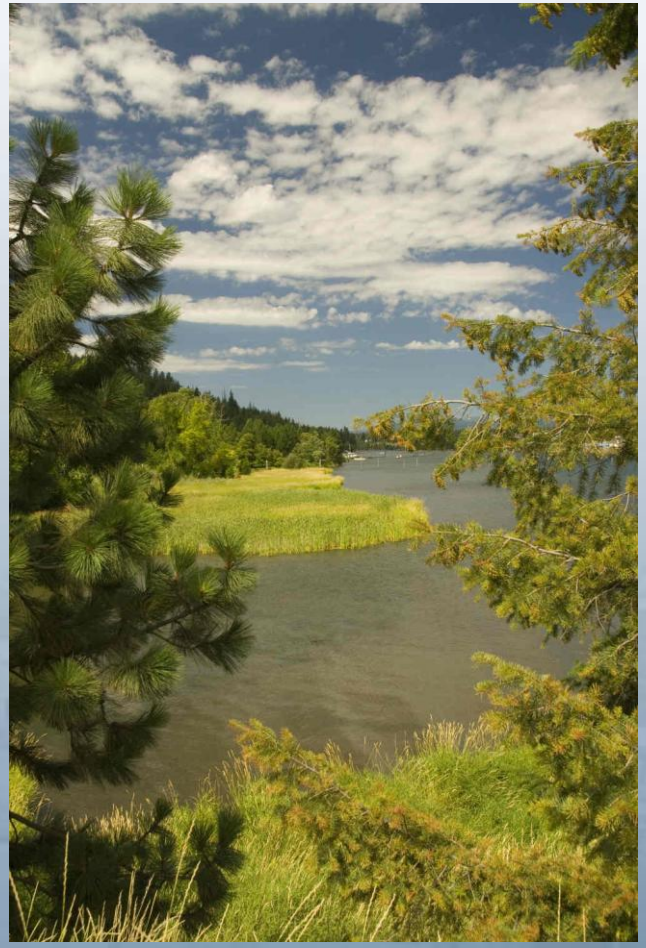
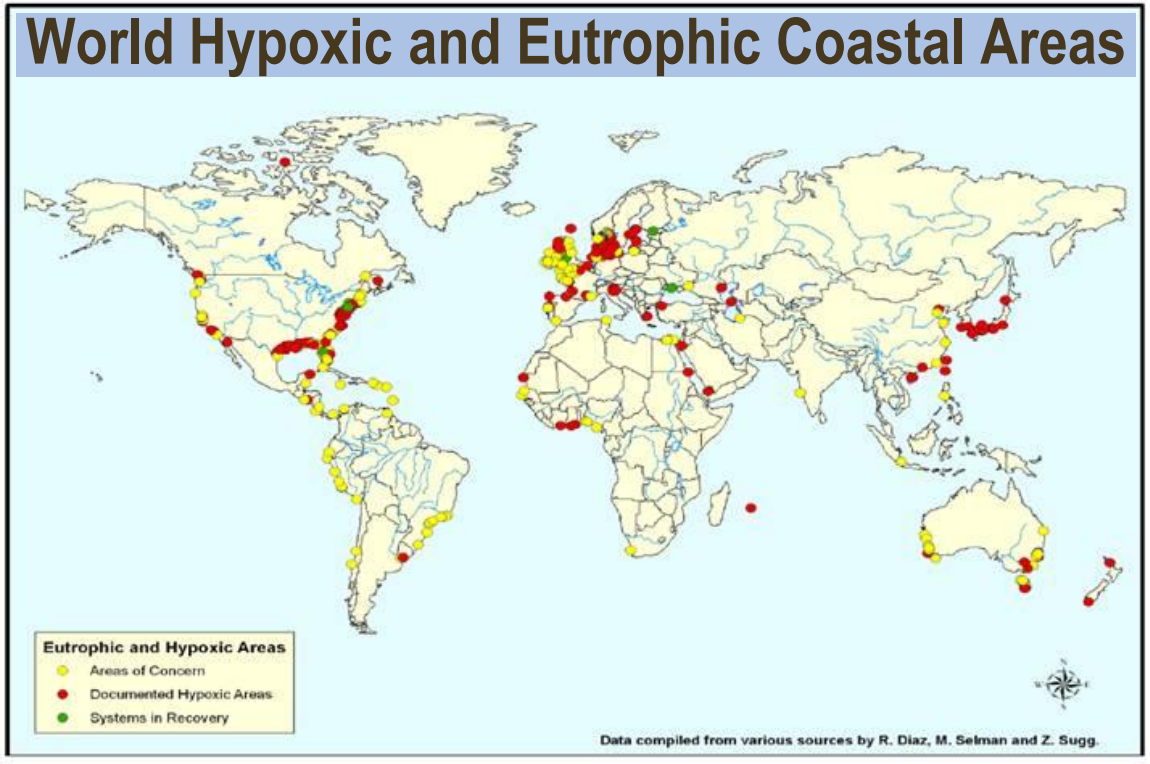
A Survey of Global and National Nutrient Regulatory Approaches

- Nutrient Water Quality Issues
- US Nutrient Regulations
- International Nutrient Regulations
- US Regulatory Solutions



NUTRIENT WATER QUALITY ISSUES

United Nations Environment Programme -- Global Partnership on Nutrient Management



- Worldwide 415 Eutrophic and Hypoxic Coastal Systems
  - 169 Hypoxic Areas
  - 233 Areas of Concern
  - 13 Systems in Recovery

US National Scope of N & P Pollution: Ephraim King, USEPA Office of Science & Technology

- 14,000 Nutrient-related Impairment Listings in
- 49 States
  - 2.5 Million Acres of Lakes and Reservoirs
  - 80,000 Miles of Rivers and Streams
  - And This is an Underestimate. .
- Over 47% of Streams Have Medium to High Levels of Phosphorus and Over 53% Have Medium to High Levels of Nitrogen
- 78% of Assessed Continental U.S. Coastal Waters Exhibit Eutrophication
- Current Efforts to Address Hard Fought but Collectively Inadequate at State and National Level

The Problem……

Ephraim King, USEPA Office of Science & Technology WESTCAS Winter Conference Fort Worth, Texas - February 24, 2011

US NUTRIENT REGULATIONS

EPA's National Strategy for the Development of Regional Nutrient Criteria, June 1998

State and EPA Roles

- States to Adopt Nutrient Criteria as Water Quality Standards
- EPA Development of Waterbody-type Guidance
  - Ecoregion Nutrient Criteria

Key Elements

- Use regional and waterbody-type approach for nutrient criteria.
- Development of waterbody-type technical guidance documents
- Establishment of an EPA National Nutrient Team with Regional Nutrient Coordinators
- Development by EPA of nutrient water quality criteria guidance in the form of numerical regional target ranges
  - EPA expects States to use in development of water quality criteria, standards, NPDES permit limits, and total maximum daily loads (TMDLs).
- Monitoring and evaluation of effectiveness

EPA's National Nutrient Strategy

Ben Grumbles' May 25, 2007, Memorandum to States

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY 25 2007

OFFICE OF WATER

MEMORANDUM

SUBJECT: Nutrient Pollution and Numeric Water Quality Standards

FROM: Benjamin H. Grumbles
Assistant Administrator

TO: Directors, State Water Programs
Directors, Great Water Body Programs
Directors, Authorized Tribal Water Quality Standards Programs
State and Interstate Water Pollution Control Administrators

This memo provides a national update on the development of numeric nutrient water quality standards and describes EPA's commitment to accelerating the pace for progress. EPA published its June 1998 national nutrient criteria strategy and some States and Territories have made notable progress in establishing numeric nutrient standards - most recently in connection with the Chesapeake Bay and Tennessee streams. However, overall progress has been uneven over the past nine years. Now is the time for EPA and its partners to take bold steps, relying on a combination of science, innovation and collaboration.

Why Action is Needed

High nitrogen and phosphorus loadings, or nutrient pollution, result in harmful algal blooms, reduced spawning grounds and nursery habitats, fish kills, oxygen-starved hypoxic or "dead" zones, and public health concerns related to impaired drinking water sources and increased exposure to toxic microbes such as cyanobacteria. Nutrient problems can exhibit themselves locally or much further downstream leading to degraded estuaries, lakes and reservoirs, and to hypoxic zones where fish and aquatic life can no longer survive.

Nutrient pollution is ... spread. The most widely known examples of significant nutrient impacts include th... Mexico and the Chesapeake Bay. For these two areas alone, there are 35 States th... nutrient loadings. There are also known impacts in over 80 estuari... ds of rivers, streams, and lakes. The significance of this impact has ... blic to come together to place an unprecedented priority on public ... h, better science, and improved tools to reduce nutrient pollution.

"…Numeric standards reduce States' time and effort to establish TMDLs and permits to control nutrient levels…"

Nancy Stoner's March 16, 2011 Memorandum to EPA Regional Administrators

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 16 2011

OFFICE OF WATER

MEMORANDUM

SUBJECT: Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions

FROM: Nancy K. Stoner
Acting Assistant Administrator

TO: Regional Administrators, Regions 1-10

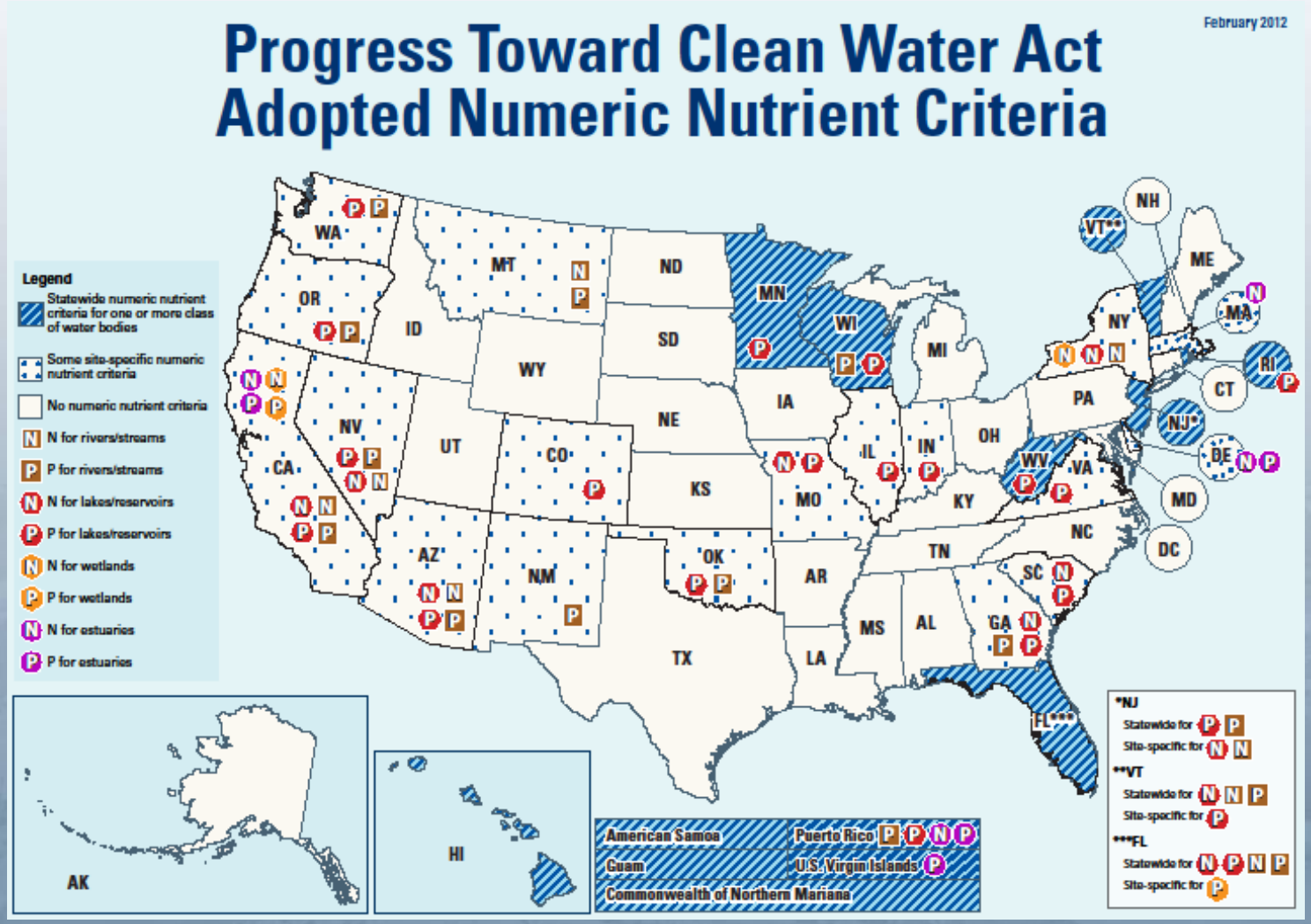
This memorandum reaffirms EPA's commitment to partnering with states and collaborating with stakeholders to make greater progress in accelerating the reduction of nitrogen and phosphorus loadings to our nation's waters. The memorandum synthesizes key principles that are guiding and that have guided Agency technical assistance and collaboration with states and urges the Regions to place new emphasis on working with states to achieve near-term reductions in nutrient loadings.

Over the last 50 years, as you know, the amount of nitrogen and phosphorus pollution entering our waters has escalated dramatically. The degradation of drinking and environmental water quality associated with excess levels of nitrogen and phosphorus in our nation's water has been studied and documented extensively, including in a recent joint report by a Task Group of senior state and EPA water quality and drinking water officials and managers.[1] As the Task Group report outlines, with U.S. popul... growth, nitrogen and phosphorus pollution from urban stormwater runoff, municip... ter discharges, air deposition, and agricultural livestock activities and row ... pected to grow as well. Nitrogen and phosphorus pollution has the poten... he costliest and the most challenging environmental problems we fac... nd include the following:

... dium to high levels of nitrogen and phosphorus.

"…"It has long been EPA's position that numeric nutrient criteria….are ultimately necessary for effective state programs."

State Development of Numeric Criteria for Nitrogen and Phosphorus Pollution

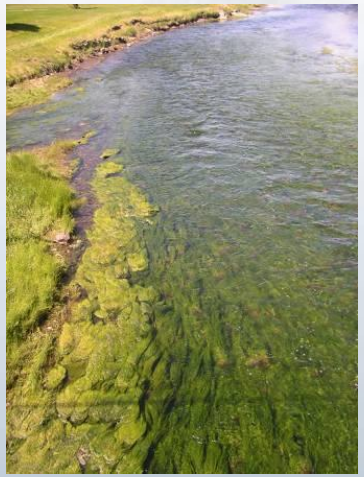


http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/progress.cfm

Challenges in Establishing Nutrient Criteria

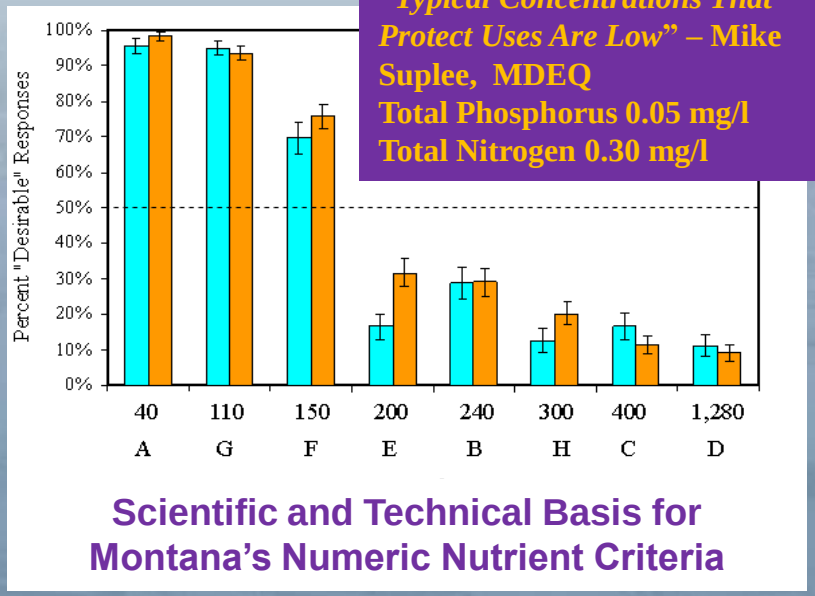
- Identifying Threshold of Harm to Beneficial Uses
  - Numeric Nutrient Criteria
    - Reference Stream Statistics
    - Stressor Response
      - Response Variables
        - D.O., pH
        - Chla, Benthic Algae
        - Macroinvertebrates
        - Fisheries
        - Recreation/Public Perception
- Translation of In-stream Criteria to Effluent Discharge Permit Limits

F 150 mg/m^2 Chla



D 1,250 mg/m^2 Chla

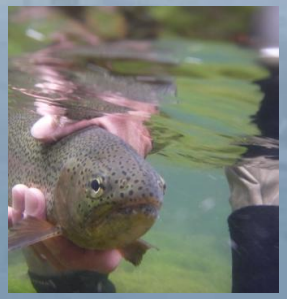
"Typical Concentrations That Protect Uses Are Low" – Mike Suplee, MDEQ
Total Phosphorus 0.05 mg/l
Total Nitrogen 0.30 mg/l



Scientific and Technical Basis for Montana's Numeric Nutrient Criteria

Challenges in Low Effluent Nutrient Discharge Permitting

- In-stream Nutrient Criteria are Low Concentrations
  - Potential for Application at End-of-Pipe
    - Results in Effluent Limits Lower Than Treatment Technology Capabilities
- Traditional Permitting Approaches
  - Water Quality Based Effluent Limits (WQBELs)
    - Linked to Guidance Based on Toxics
      - Mixing Zone Focus
        - Back Calculation from Edge of Mixing Zone
          - Multiple Conservative Assumptions



Interpretation of NPDES Permitting Regulations

- 40 CFR 122.45(d) requires that all permit limits be expressed as average monthly limits and average weekly limits for publicly owned treatment works (POTWs) and as both average monthly limits and maximum daily limits for all others, unless "impracticable."

Maximum monthly, weekly, and daily limits likely to be exceeded by even the best designed and operated low nutrient treatment facilities

Effluent N and P concentration is highly variable for even the best designed and operated low nutrient treatment facilities

Individual permit writers in every nutrient limited watershed must interpret these NPDES regulations and the definition of "impracticable" with limited guidance

In-Stream Standards → Discharge Requirements

Translation of in-stream standards to effluent discharge permit limits is key to understanding facility requirements and costs

Image D 1,250 mg/m^2 Chl<u>a</u>

Image F 150 mg/m^2 Chl<u>a</u>

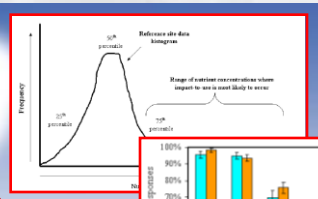
In-Stream Standards → Discharge Requirements

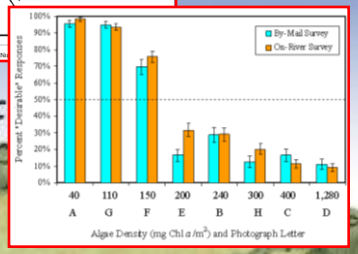
Numeric Nutrient Standard
TP 0.050 mg/l
TN 0.300 mg/l

303(d) Nutrient Impairment

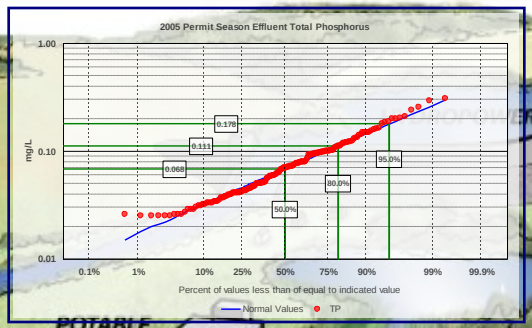
Total Maximum Daily Load (TMDL)
PS Wasteload Allocation
NPS Load Allocation
Water Quality Based Effluent Limit?

Translate to MPDES Permit Limits
Season?
Critical Flow?
Ambient > Standard?





Effluent Limits?
BNR TP 1 mg/l TN 10 mg/l
ENR TP 0.250 mg/l TN 7 mg/l
LOT TP 0.100 mg/l TN 3 mg/l
Basis for Permit Compliance?



ATMOSPHERIC

ERSHED MANAGEMENT

INDUSTRIAL & POWER PLANT DISCHARGE

POTABLE WATER SUPPLY

RESTORATION

NON-POINT SOURCE RUNOFF

COMBINED SEWER OVERFLOW

WASTEWATER DISCHARGE

STORM WATER RUNOFF

EMERGING CONTAMINANTS

WATER REUSE

Summary of Nutrient Discharge Permit Limits for Chesapeake Bay[a]

State	Current Effluent Discharge Limits		2025 Effluent Discharge Limits Under New EPA TMDL[b]	
	TP, mg/L	TN, mg/L	TP, mg/L	TN, mg/L
Delaware	1.43 to 2	5.6 to 8	0.3 to 1	3 to 4
District of Columbia	1 to 3	4.7 to 8.7	0.18	3.9
New York	2 to 4	12 to 18	0.5	8
Maryland	0.5 to 3	6 to 18	0.3	4
Pennsylvania	1 to 3	8 to 12	0.8	6
Virginia	0.3 to 2.5	3 to 18.7	0.1 to 0.3	3 to 4
West Virginia	1 to 2	6 to 12	0.5	5

[a] Source: EPA Final Phase 1 Watershed Implementation Plans (WIPs)

[b] The TMDL targets 60 percent of nutrient reductions to be accomplished by 2017

Water Quality Based Effluent Limits Back-calculated From Numeric Nutrient Criteria in Mixing Zone

$$C_{RP} = \frac{C_E Q_E + C_S Q_S}{Q_E + Q_S} \qquad (eq.\ 1)$$

where:

C_{RP} = receiving water concentration (RWC) after mixing, mg/*L*
C_E = effluent concentration, upper bound estimate, Appendix I, mg/*l*
C_S = RWC upstream of discharge, Appendix IIA, IIIA, mg/L
Q_S = receiving water design low flow, 7-day, 10-year low flow (20 or 23 cfs).
Q_E = effluent design flow (8.97cfs).
(See Appendix IIB, and IIIB for actual values used in calculations for C_{RP}, C_E, C_S)

- ***Mass Balance Calculations at Edge of Mixing Zone***
- ***Most Waterbodies Will Exceed Numeric Nutrient Criteria***
- ***No Assimilative Capacity Available for Point Source Discharges***
- ***Results in Numeric Nutrient Criteria Applied End-of-Pipe***

- Mixing Zone Scale v. Watershed Nutrient Loadings
  - Regulatory Mixing Zones 25% Toatal River Flow
- Critical Flow Assumptions
  - 14Q10 Low Flows
    - 9 Years in 10, Flows >14Q10
- Ambient Water Quality
  - Conditions > Numeric Nutrient Criteria
  - Coefficient of Variation
    - Extremes in Data Set Skew
- Effluent Water Quality
  - High Variability in Low Nutrient Plants
  - Assumed Coefficient of Variation
    - Data Not Yet Available for Low Nutrient Plants in Montana
- Effluent Limits
  - Monthly Average and Weekly Average?
  - Mass and Concentration?

INTERNATIONAL NUTRIENT REGULATIONS

Canada

- Primary Regulations
  - Canadian Environmental Protection Act
  - Fisheries Act
- Wastewater Discharges are Largest Surface Water Pollution Source by Volume
- 2009 Canada-wide Strategy for the Management of Municipal Wastewater Effluent
  - Culmination of a Decade of Consultation
    - National Secondary Standards for Volume > 10 m^3/day
    - Full compliance within 30 years, ~1,000 facilities
    - Concerns from aboriginal communities and organizations that small facilities may experience difficulty meeting requirements
    - Standards being developed for arctic regions

http://www.ccme.ca/assets/pdf/cda_wide_strategy_mwwe_final_e.pdf

Canada – Proposed Effluent Standards "*Authorization to Deposit*"

Parameter	Concentration[1]
Planned Final *Wastewater System Effluent Regulations* in 2012	
Average CBOD	25 mg/L
Average TSS	25 mg/L
Average Total Residual Chlorine	0.02 mg/L
Maximum Un-ionized Ammonia	1.25 mg/L N
1976 Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments	
Total Phosphorus[2]	*1.0 mg/L*

[1] Monthly limits if Q > than 17 500 m^3/day
[2] Applicable where phosphorus removal is required

Source: http://www.ec.gc.ca/eu-ww/default.asp?lang=En&n=0FB32EFD-1
Source: http://www.gazette.gc.ca/rp-pr/p1/2010/2010-03-20/html/reg1-eng.html

European Union Urban Waste Water Directive (1991)

- Minimum Requirements for Treatment
  - Secondary treatment is basic treatment level provided
- Requirements for ***Sensitive Areas***:
  - Currently or expected to become eutrophic
  - Waters that are drinking water supplies
  - Necessary to met the directive for the protection of the environment from the adverse effects
- Both TP and TN
  - Depending on local conditions
- EU Members Responsible for Implementation
  - e.g. The Department of Environment Food and Rural Affairs in England

European Union Urban Waste Water Directive (1991)

- Discharges to *Sensitive Areas* Subject to Eutrophication

Parameter	Minimum Percentage of Reduction (Influent)	Effluent Concentration (by Population Equivalents)
Total Nitrogen	70 to 80	15 mg/l N (10,000 – 100,000 PE) 10 mg/l N (> 100,000 PE)
Total Phosphorus	80	2 mg/l P (10,000 – 100,00 PE) 1 mg/l P (> 100,000 PE)

Source: http://ec.europa.eu/environment/water/water-urbanwaste/directiv.html
Source: http://www.defra.gov.uk/environment/quality/water/sewage/sewage-treatment/

European Union Urban Waste Water Directive

- Sensitive Areas
  - 15 Member States Designated Entire Territory as *Sensitive*
    - Austria, Belgium, Czech Republic, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Slovakia, Sweden, Finland, Bulgaria, and Romania
- *Estimated €35 Billion to Implement the Directive*!

Poland

- European Union Urban Waste Water Directive (1991)
  - Adopted in Poland in Ministry Regulations of 2002, 2004 and 2006
  - All of Poland Designated a Sensitive Area Where Nutrient Removal is Required

Italy

- European Union Urban Waste Water Directive Nationwide
  - Sensitive Receiving Waters ~99% of Cases
  - More Restrictive Regional (basin-wide) Limits Possible
- Yearly Average Basis
  - Limits Based on 24-hr Composite Samples
  - Cannot be Exceeded >15% of Daily Composite Samples

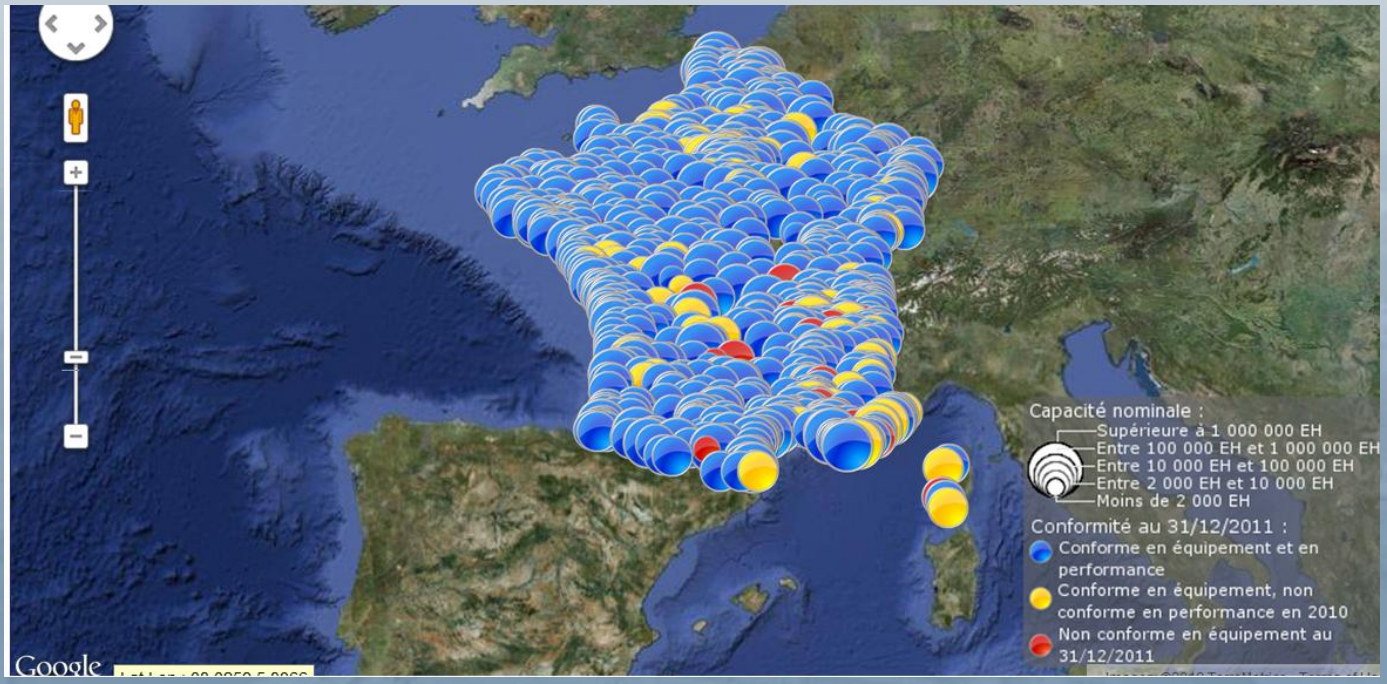
Lorenzo Benedetti, Ph.D., WATERWAYS srl

France

- ***"Brussels criticizes the wastewater treatment practiced in France"*** -- Le Monde Oct 10, 2007
  - *European Commission preparing to send a warning to France for non-compliance with EU Urban Waste Water Directive*
  - Minister of Ecology Jean-Louis Borloo announced a "*battle plan*" for wastewater treatment
  - In terms of polluted water, "*we are one of the worst performers of the European class*" said the Minister

2007 Action Plan in France to Meet EU Urban Waste Water Directive

- 3,400 Treatment Plants Serving Populations >2,000
- Targeted Compliance by 2011
  - 74 WWTPs Scheduled for Dec 31, 2013
  - 123 WWTPs Scheduled for Dec 31, 2015



http://assainissement.developpement-durable.gouv.fr/

Japan -- Gesuidou-hou-shikou-rei (Sewer Regulations Implementation Order)

Parameter	BOD5		TN		TP		
Treatment Processes	AS	AS + high rate filtration	AS	AS + ext carbon addition	AS	AS + coag	AS + coag + filtration
Activated sludge	15	10					
AS with Anox-Ox	15	10			3	1	0.5
Nit-denit	15	10	20	10		3	1
Bio-P	15	10	20	10	3	1	0.5

Roy Tsuchihashi, AECOM

Japanese Water Environment Policies (Japanese Society of Water Environment, 2009)

- Initiated in 1979
  - 6 Phases of Treatment Goals in 5 Year Increments
  - Nitrogen and Phosphorus Included in 5-yr Goals Since 5th Phase
    - Goals to be Achieved by 2004
  - 6th Phase Loading Goals, following loading reduction goals
    - Goals to be Achieved by 2009

Waterbody	COD, ton/d		T-N, ton/d		T-P, ton/d	
	Goals	As of 2004	Goals	As of 2004	Goals	As of 2004
Tokyo Bay	196	211	199	208	13.9	15.3
Ise Bay	167	186	123	129	9.6	10.8
Setonai-kai	537	561	465	476	29.5	30.6

China – Effluent Limits

TN

NH_3N

TP

GB18918-2002

表 1　基本控制项目最高允许排放浓度（日均值）　　单位　mg/L

序号	基本控制项目		一级标准		二级标准	三级标准
			A 标准	B 标准		
1	化学需氧量（COD）		50	60	100	120①
2	生化需氧量（BOD_5）		10	20	30	60①
3	悬浮物（SS）		10	20	30	50
4	动植物油		1	3	5	20
5	石油类		1	3	5	15
6	阴离子表面活性剂		0.5	1	2	5
7	总氮　（以 N 计）		15	20	-	-
8	氨氮（以 N 计）②		5（8）	8（15）	25（30）	-
9	总磷（以 P 计）	2005 年 12 月 31 日前建设的	1	1.5	3	5
		2006 年 1 月 1 日起建设的	0.5	1	3	5
10	色度（稀释倍数）		30	30	40	50
11	pH		6-9			
12	粪大肠菌群数（个/L）		10^3	10^4	10^4	-

注：①下列情况下按去除率指标执行：当进水 COD 大于 350mg/L 时，去除率应大于 60%；

BOD 大于 160mg/L 时，去除率应大于 50%。

②括号外数值为水温>12℃ 时的控制指标，括号内数值为水温≤12℃ 时的控制指标。

China – Effluent Limits

Maximum Discharge Concentration (daily average), mg/L

No.	Parameters		Level 1 Water Bodies		Level 2 Water Bodies	Level 3 Water Bodies
			Level A	Level B		
1	COD		50	60	100	120[1]
2	BOD_5		10	20	30	60[1]
3	SS		10	20	30	50
4	Oil/grease (non petroleum)		1	3	5	20
5	Oil/grease (petroleum)		1	3	5	15
6	Anionic surfactant		0.5	1	2	5
7	TN		15	12	-	-
8	Ammonia-N		5(8)[2]	8(15)[2]	25(30)[2]	-
9	TP	Built before 12/31/2005	1	1.5	3	5
		Built after 1/1/2006	0.5	1	3	5
10	Color (dilution times)		30	30	40	50
11	pH		6-9			
12	Fecal Coliform (cfu/L)		10^3	10^4	10^4	-

China – Waterbody Designations

- Level 1A
  - Effluent suitable for reuse and discharge to recreational water bodies with limited dilution
    - Advanced treatment is required
- Level 1B
  - Discharges to Type III water bodies (defined by China National Standards GB3838), Type II coastal areas (GB3097), and lakes and reservoirs where eutrophication is a major concern
    - Improved secondary treatment to reduce N and P is required
- Level 2
  - Discharges to GB3838 Types IV and V surface water bodies and GB3090 Types III and IV costal ocean areas
    - Secondary treatment is required
- Level 3
  - Standards for water bodies not used for water supply and recreation purposes.
    - Enhanced primary treatment can be applied

US REGULATORY SOLUTIONS

State Remedies: *Interim Treatment Technology Standards, Water Quality Variances, Affordability Tests, Response Criteria*

Key Issues

- Permit Requirements Below the Capabilities of Wastewater Treatment Technology
- Reconciliation with Water Quality Standards
- Attainable Effluent Limits

Case Study Examples

- ***Wisconsin Dual Legislation***
  - *Numeric Nutrient Criteria*
  - *Treatment Technology Standard*
- ***Colorado Regulation #31 and #85***
  - *Numeric Nutrient Criteria*
  - *Treatment Technology Standard*
- ***Montana Senate Bill 95 and Senate Bill 367***
  - *Affordability Test*
  - *Limit of Technology*
  - *Treatment Technology Std*
- ***Maine Decision Matrix***
  - *NNC and Response Criteria*

Wisconsin

- Midwest Environmental Advocates Notice of Intent to Sue EPA Nov 23, 2009
  - Failure to Perform its Non-discretionary Duty to Promulgate Numeric Nutrient Criteria
- 2010 Rulemaking
  - Phosphorus Criteria for Streams
    - Streams 0.075 mg/L
    - Large Rivers 0.100 mg/L
  - Chapter NR217 Effluent Standards and Limitations for Phosphorus
    - Implementation by Adaptive Management
      - Watershed Adaptive Management Option
      - NPS + Stormwater

- Numerical Effluent Limitations
  - **1st Permit**
    - **TP 1 mg/L**
      - **Rolling 12 Mo. Ave**
  - **2nd Permit**
    - **TP <0.6 mg/L**
      - **6-Mo. Ave**
  - **3rd Permit**
    - **TP <0.5 mg/L**
      - **6-Mo. Ave**
    - **Adaptive Watershed Plan**
  - *Water Quality Based Effluent Limitations (WQBELs)*

Colorado

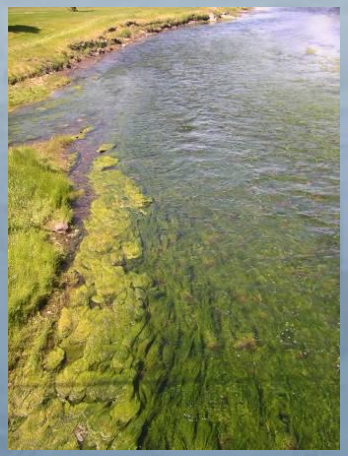
- Initial Nutrient Criteria for Rivers and Streams – February 9, 2010
  - Selecting Numeric Nutrient Criteria That Allow 5% Decrease in Biological Condition
    - Multi Metric Macroinvertebrate Index
- Regulation #31 Basic Standards and Methodologies for Surface Water
  - New Section 31.17 Nutrient Interim Values
    - After May 31, 2017 and Prior to May 31, 2022
- Regulation #85 – Nutrients Management Control Regulation
  - **Establishes Numerical Effluent Limitations**
    - **Existing Plants**
    - **First Level BNR (3-stage)**
      - **TP 1 mg/L**
      - **TIN 15 mg/L**
    - **New Plants**
    - **Enhanced BNR (4 & 5-stage)**
      - **TP 0.7 mg/L**
      - **TIN 7 mg/L**
  - **Running Annual Median**

Rivers and Streams	Cold Water	Warm Water
Chl a mg/m^2	150	150
TP, ug/L	110	160
TIN, ug/L	400	2,000

Montana

- Benthic Algae 150 mg Chl*a*/m^2 Considered Nuisance Threshold by Public
  - Rarely Occurs in Western Montana Reference Streams
  - Harm-to-Use Threshold for Salmonid Streams
    - Salmonid Growth Enhanced by Productivity Up to 150 mg Chla/m^2
      - DO Problems Begin at Higher Levels

150 mg/m^2 Chl*a*



1,250 mg/m^2 Chl*a*

- 2009 Senate Bill 95 Variance
  - Temporary Nutrient Standards
  - Economic Hardship
    - Substantial and Widespread
    - Targeted 1% Median Household Income
  - Limits of Technology
- 2011 Senate Bill 367
  - Nutrient Standards Variances
    - Individual, General, Alternative
  - **Numerical Effluent Limitations**
    - **TP 1 mg/L TN 10 mg/L (Q>1 mgd)**
    - **TP 2 mg/L TN 15 mg/L (Q<1 mgd)**
    - **Lagoons (Maintain Performance)**
  - Monthly Average Limits

Maine DEP Nutrient Criteria for Surface Waters (Draft, 2011)

Maine Decision Framework	Mean TP < Table 2 Criterion (or site-specific criterion)	Mean TP > Table 2 Criterion (or site-specific criterion)
All measured response indicators meet criteria in Table 3	**Box A. Not Impaired** Nutrient criteria attained.	**Box B. Indeterminate** Department conducts a study to determine attainment status and requirement of site-specific criteria.
One or more of the response indicators do not meet criteria in Table 3	**Box C. Impaired** Indeterminate cause requires weight-of-evidence analysis to determine cause of impairment.	**Box D. Impaired** Nutrient criteria not attained.

Table 2: Total phosphorus criteria

Table 3: Criteria for response indicators

- December 22, 2011 EPA Region 1 Letter to Maine DEP
  - *"EPA understands that the total phosphorus and response indicator values, together, comprise the nutrient criteria"*
  - *"…is consistent with the Clean Water Act and its implementing regulations."*

Maine – Phosphorus Criteria

Table 2: Total phosphorus criteria either measured as an average of water samples or computed by the Diatom Total Phosphorus Index (DTPI) (Maine DEP Nutrient Criteria for Surface Waters, Draft, 2011)

Statutory Class	Total Phosphorus Criterion (ppb)
AA and A	≤18.0
B	≤30.0
C	≤33.0
GPA	≤15.0

Maine – Criteria for Response Indicators

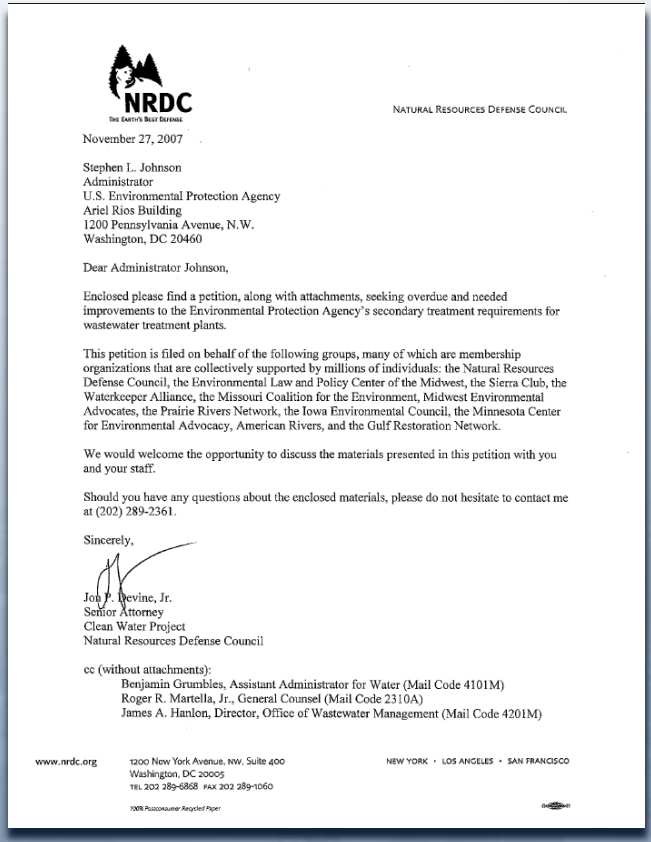
Table 3: Criteria for response indicators (Maine DEP Nutrient Criteria for Surface Waters, Draft, 2011)

Statutory Class	AA/A	B	C	Impounded A	Impounded B	Impounded C	GPA not colored	GPA colored
Secchi Disk Depth (meters)[a, b]	≥2.0	≥2.0	≥2.0	≥2.0	≥2.0	≥2.0	≥2.0	≥2.0 AND ≤8.0[a,e]
Water Column Chl *a* (μg/L, ppb)	≤3.5[a] (≤5.0[a,c])	≤8.0[a]	≤8.0[a]	≤5.0[a,d]	Spatial mean ≤8.0[d] and no value >10.0[d]	Spatial mean ≤8.0[d] and no value >10.0[d]	≤8.0[a,e]	
Percent of substrate covered by algal growth[a]	≤20.0	≤25.0	≤35.0	--	--	--	--	--
Patches of bacteria and fungi[a]	None obs.	None obs.	None obs.	None obs.	None obs.	None obs.	--	--
Dissloved Oxygen (mg/L, ppm)[a]	See 38 M.R.S.A. §465						--	--
pH[a]	6.0-8.5							
Aquatic life[a]	See 38 M.R.S.A. §465 and where applicable *Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams*						38 M.R.S.A. §465	

NRDC Petition on Secondary Treatment Standards

- November 27, 2007, NRDC petition for rulemaking
  - EPA has unreasonably delayed publishing information on secondary treatment to remove excess nutrients
  - Nutrient control is properly included within "secondary treatment"

- ***NRDC states:***
  - ***TP 0.3 mg/l and TN 3 mg/l currently attainable***
  - ***TP 1 mg/l and TN 8.0 mg/l attainable only using biological processes***
  - ***EPA must assess whether this constitutes "secondary treatment"***



NRDC
THE EARTH'S BEST DEFENSE

NATURAL RESOURCES DEFENSE COUNCIL

November 27, 2007

Stephen L. Johnson
Administrator
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Dear Administrator Johnson,

Enclosed please find a petition, along with attachments, seeking overdue and needed improvements to the Environmental Protection Agency's secondary treatment requirements for wastewater treatment plants.

This petition is filed on behalf of the following groups, many of which are membership organizations that are collectively supported by millions of individuals: the Natural Resources Defense Council, the Environmental Law and Policy Center of the Midwest, the Sierra Club, the Waterkeeper Alliance, the Missouri Coalition for the Environment, Midwest Environmental Advocates, the Prairie Rivers Network, the Iowa Environmental Council, the Minnesota Center for Environmental Advocacy, American Rivers, and the Gulf Restoration Network.

We would welcome the opportunity to discuss the materials presented in this petition with you and your staff.

Should you have any questions about the enclosed materials, please do not hesitate to contact me at (202) 289-2361.

Sincerely,

Jon P. Devine, Jr.
Senior Attorney
Clean Water Project
Natural Resources Defense Council

cc (without attachments):
Benjamin Grumbles, Assistant Administrator for Water (Mail Code 4101M)
Roger R. Martella, Jr., General Counsel (Mail Code 2310A)
James A. Hanlon, Director, Office of Wastewater Management (Mail Code 4201M)

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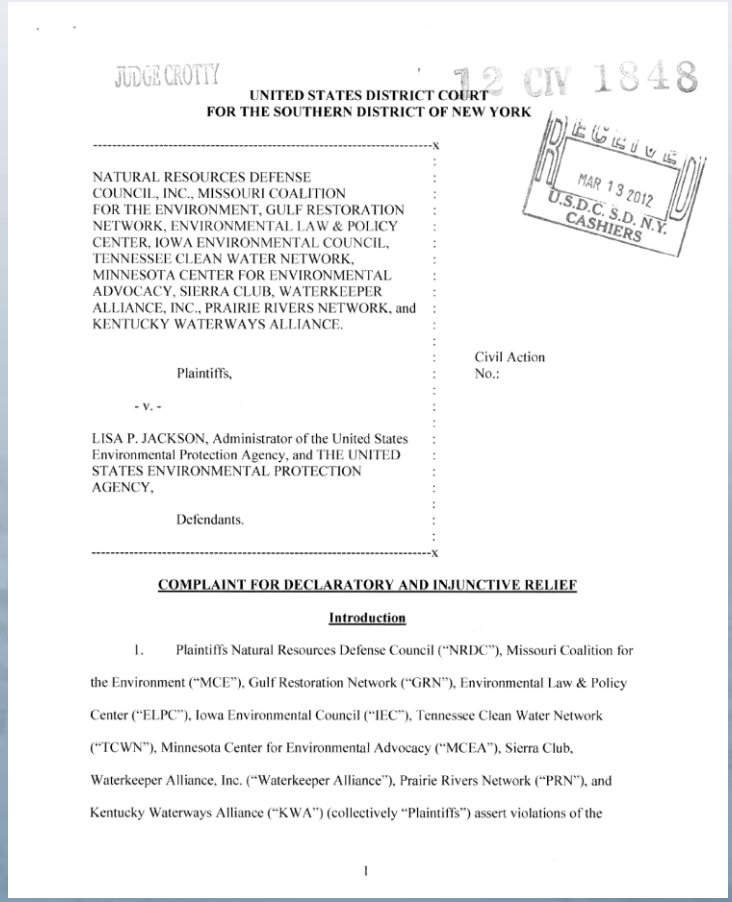
Update on NRDC Petition on Secondary Treatment Standards

- March 13, 2012 Complaint for Declaratory and Injunctive Relief
  - *"EPA has not responded to the Petition since it was filed in November 2007."*
    - *"… "Secondary treatment" technology in 1973 have improved over the years to the point where it is capable of a high degree of nutrient removal."*
      - *"…EPA last published information concerning secondary treatment capabilities in 1985."*



JUDGE CROTTY

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UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK

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NATURAL RESOURCES DEFENSE COUNCIL, INC., MISSOURI COALITION FOR THE ENVIRONMENT, GULF RESTORATION NETWORK, ENVIRONMENTAL LAW & POLICY CENTER, IOWA ENVIRONMENTAL COUNCIL, TENNESSEE CLEAN WATER NETWORK, MINNESOTA CENTER FOR ENVIRONMENTAL ADVOCACY, SIERRA CLUB, WATERKEEPER ALLIANCE, INC., PRAIRIE RIVERS NETWORK, and KENTUCKY WATERWAYS ALLIANCE.

Plaintiffs,

- v. -

LISA P. JACKSON, Administrator of the United States Environmental Protection Agency, and THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,

Defendants.

Civil Action No.:

COMPLAINT FOR DECLARATORY AND INJUNCTIVE RELIEF

Introduction

1. Plaintiffs Natural Resources Defense Council ("NRDC"), Missouri Coalition for the Environment ("MCE"), Gulf Restoration Network ("GRN"), Environmental Law & Policy Center ("ELPC"), Iowa Environmental Council ("IEC"), Tennessee Clean Water Network ("TCWN"), Minnesota Center for Environmental Advocacy ("MCEA"), Sierra Club, Waterkeeper Alliance, Inc. ("Waterkeeper Alliance"), Prairie Rivers Network ("PRN"), and Kentucky Waterways Alliance ("KWA") (collectively "Plaintiffs") assert violations of the

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