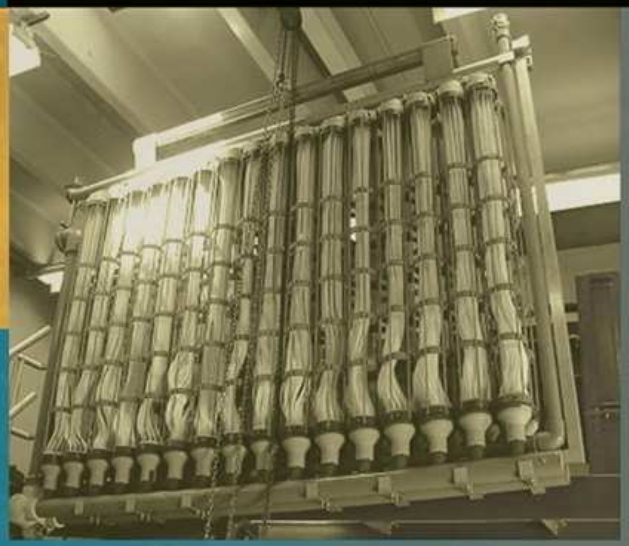
NACWA 2009 Summer Conference and 39th Annual Meeting

Public Enemy Number One: Nutrients



July 15, 2009

David L. Clark

HDR Engineering

dclark@hdrinc.com

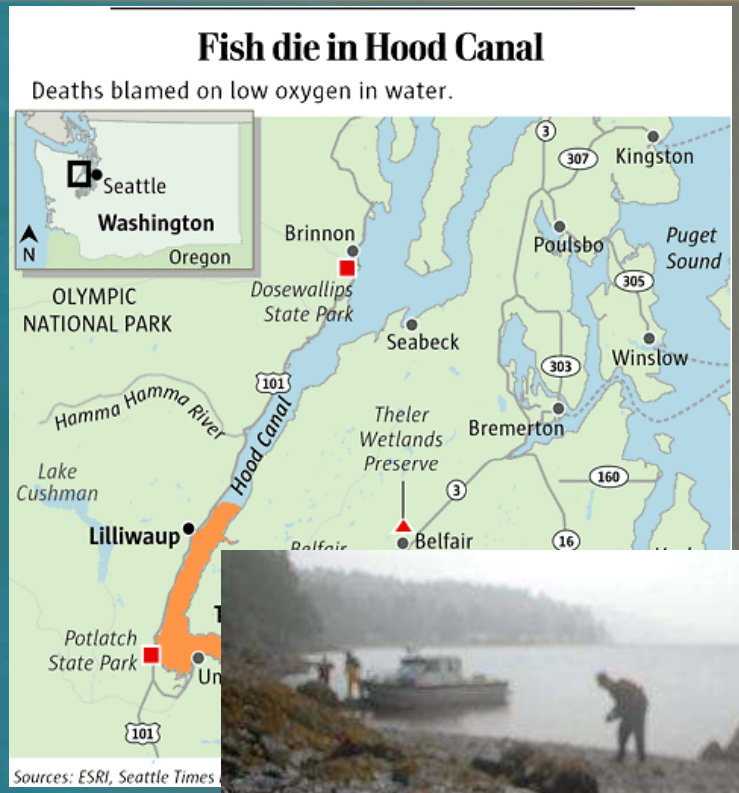
HDR

NACWA Nutrient Technical Issues Paper

- **Water Quality Issues**
- **Wastewater Treatment Technology**
- **Balance and Sustainability**

Water Quality Issues

Lake Spokane, WA
Washington Department of Ecology

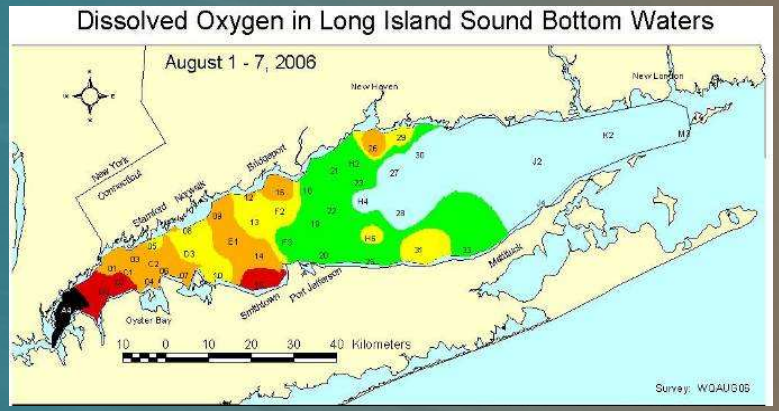


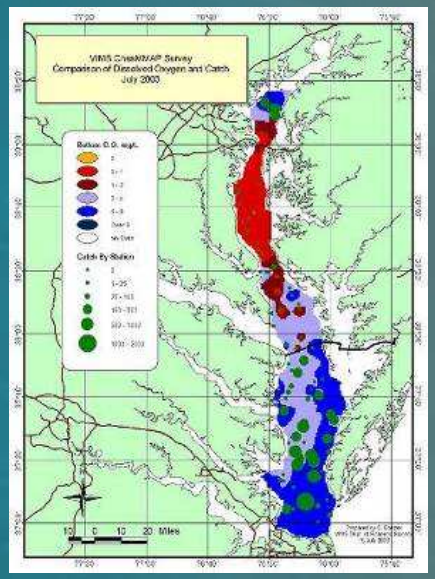
Puget Sound, WA
Seattle Times, 2006

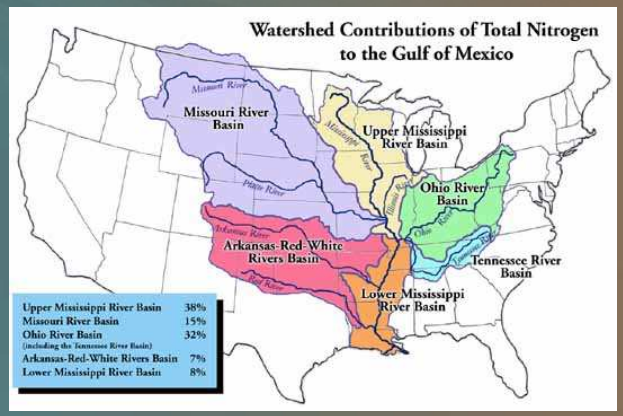
National Water Quality Priorities

Ben Grumbles, Former EPA Assistant Administrator for Water

- Chesapeake Bay
  - 150,000 New Residents per Year
- Gulf of Mexico
  - Large dead zone
  - Importance of Phosphorus
- Long Island Sound
  - Below DO in Half of Sound
  - Water quality trading program implemented
- Puget Sound
  - Priority No. 1: Better handle on nutrient and bacteria loadings from Septic Systems



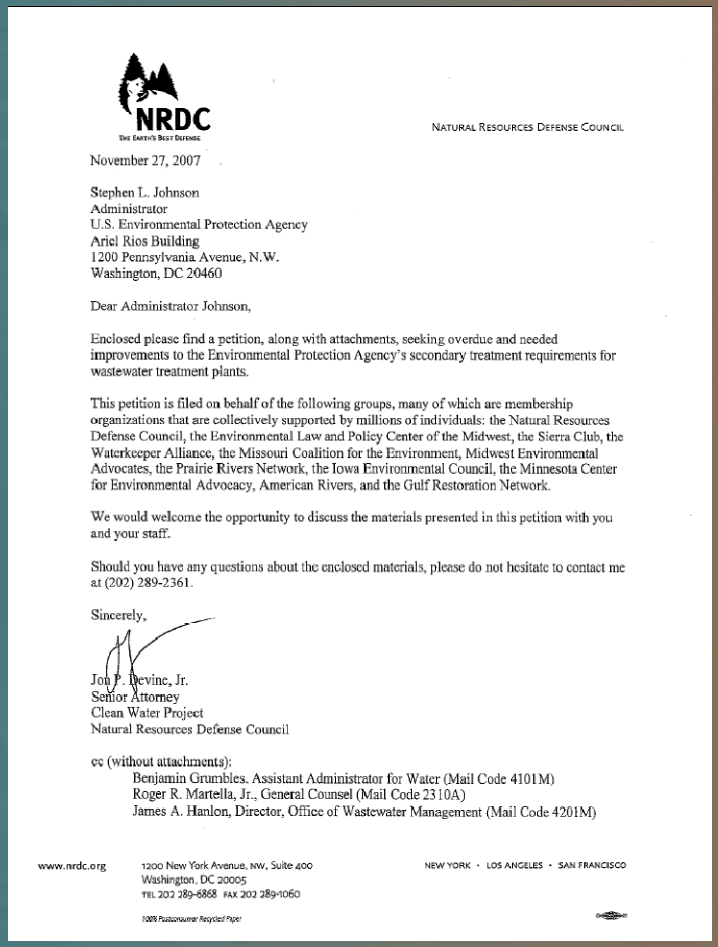




NRDC Petition on Secondary Treatment Standards

- 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,

John 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)

www.nrdc.org
1200 New York Avenue, NW, Suite 400
Washington, DC 20005
TEL 202 289-6868 FAX 202 289-1060
NEW YORK · LOS ANGELES · SAN FRANCISCO
100% Postconsumer Recycled Paper

Wastewater Treatment Technology

Healdsburg, CA Membrane Bioreactor

Yakima River, WA

Concrete, WA MBR Effluent

Secondary Treatment

- **Focused on BOD, Suspended Solids, pH**
  - **On Incidental Removal of Nitrogen and Phosphorus**

Title 40: Protection of Environment PART 133—SECONDARY TREATMENT REGULATION

All requirements for each parameter shall be achieved except as provided for in §§133.103 and 133.105.

(a) BOD_5.
(1) The 30-day average shall not exceed 30 mg/l.
(2) The 7-day average shall not exceed 45 mg/l.
(3) The 30-day average percent removal shall not be less than 85 percent.
(4) At the option of the NPDES permitting authority, in lieu of the parameter $BOD_5$and the levels of the effluent quality specified in paragraphs (a)(1), (a)(2) and (a)(3), the parameter $CBOD_5$may be substituted with the following levels of the $CBOD_5$effluent quality provided:
(i) The 30-day average shall not exceed 25 mg/l.
(ii) The 7-day average shall not exceed 40 mg/l.
(iii) The 30-day average percent removal shall not be less than 85 percent.

(b) SS.
(1) The 30-day average shall not exceed 30 mg/l.
(2) The 7-day average shall not exceed 45 mg/l.
(3) The 30-day average percent removal shall not be less than 85 percent.

(c) pH.
The effluent values for pH shall be maintained within the limits of 6.0 to 9.0 unless the publicly owned treatment works demonstrates that: (1) Inorganic chemicals are not added to the waste stream as part of the treatment process; and (2) contributions from industrial sources do not cause the pH of the effluent to be less than 6.0 or greater than 9.0.

Wastewater Treatment Performance

Parameter	Typical Municipal Raw Wastewater, mg/l	Secondary Effluent (No Nutrient Removal), mg/l	Typical Advanced Treatment Nutrient Removal (BNR), mg/l	Enhanced Nutrient Removal (ENR), mg/l	Limits of Treatment Technology, mg/l	*Typical In-Stream Nutrient Criteria, mg/l*
Total Phosphorus	4 to 8	4 to 6	1	0.25 to 0.50	0.05 to 0.07	*0.020 to 0.050*
Total Nitrogen	25 to 35	20 to 30	10	4 to 6	3 to 4	*0.3 to 0.600*

Las Vegas, NV (TP 0.170 mg/l)

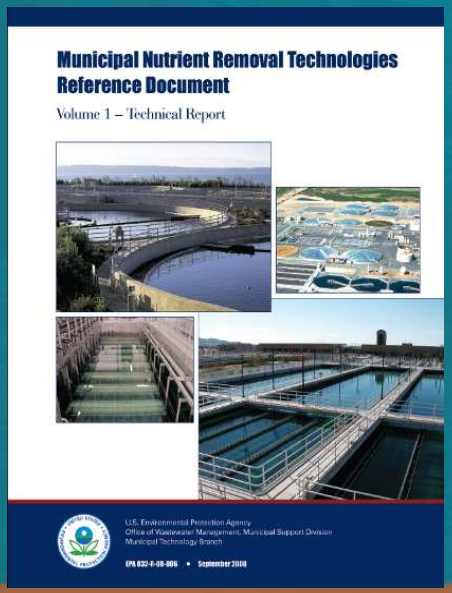
Clean Water Services, OR (TP 0.100 mg/l)

Lacy, Olympia, Tumwater Thurston Co (LOTT), WA (TIN 2 mg/l)

Coeur d'Alene, ID (TP 0.050 mg/l)

EPA's Municipal Nutrient Removal Technologies Reference Document

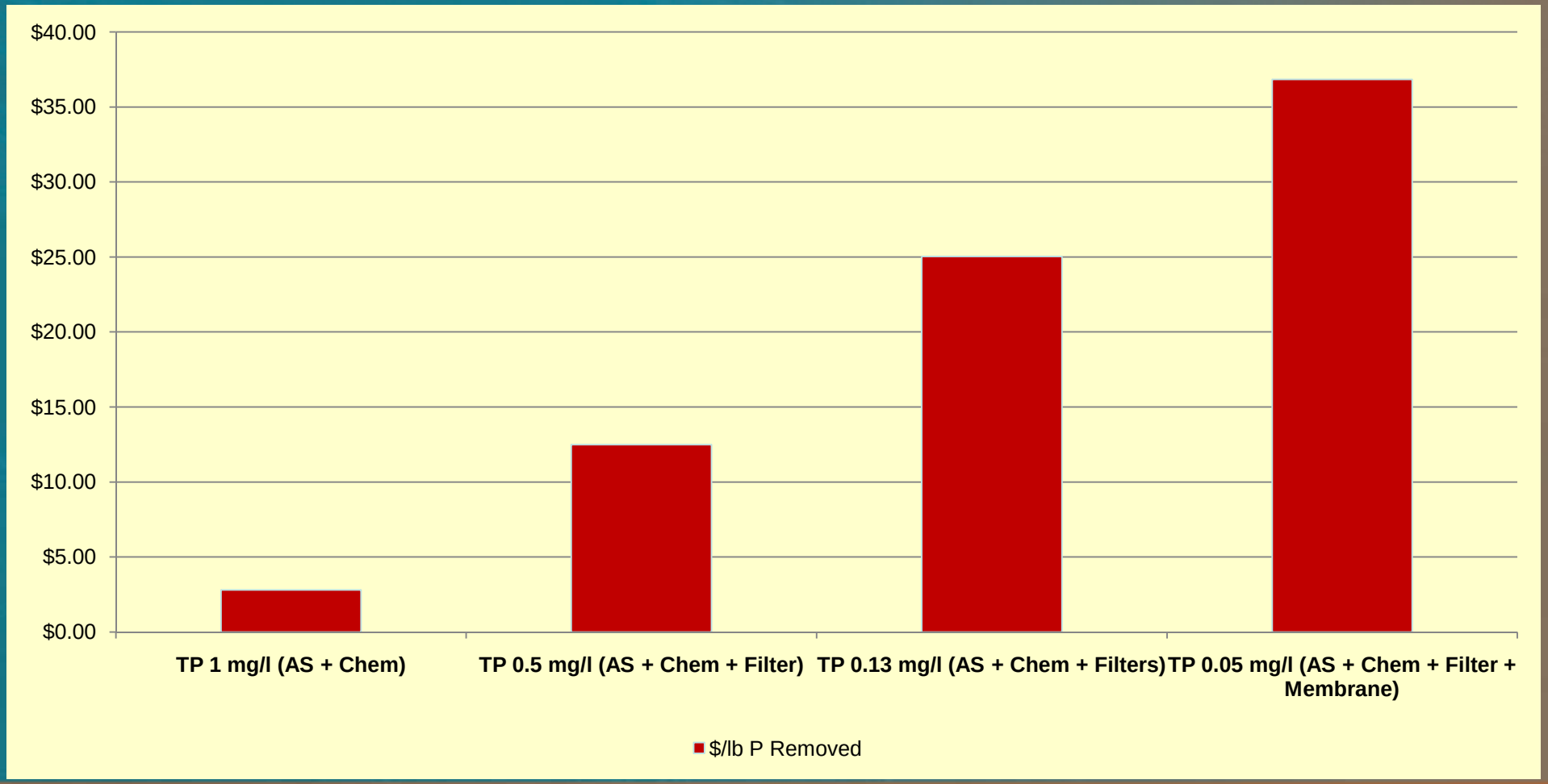
- **Technical and Cost Information**
  - 40 Process Trains for N and P Removal
  - Performance Data Analysis 30 Operating Facilities
  - In-depth Case Studies 9 Operating Facilities



Effluent Target	Capital $/gpd	O&M $/MG treated	Life-cycle $/MG treated
TN 5 mg/l TP 1 mg/l	$1.36 - $2.05	$299 - $436	$625 - $925
TN 5 mg/l TP 0.5 mg/l	$2.19 - $2.45	$452 - $456	$975 - $1,040
TN 5 mg/l TP 0.1 mg/l	$0.83 - $1.87	$259 - $387	$456 - $834
TN 3 mg/l TP 0.1 mg/l	$0.75 - $2.48	$448 - $477	$626 - $1,070

Treatment Costs Escalate Substantially as Approach Limit of Technology

- **Estimated Unit Costs for Phosphorus Removal from Base Nutrient Removal to Limit of Technology**



Estimated retrofit costs at 10 mgd capacity from Jiang, et al

Balance and Sustainability

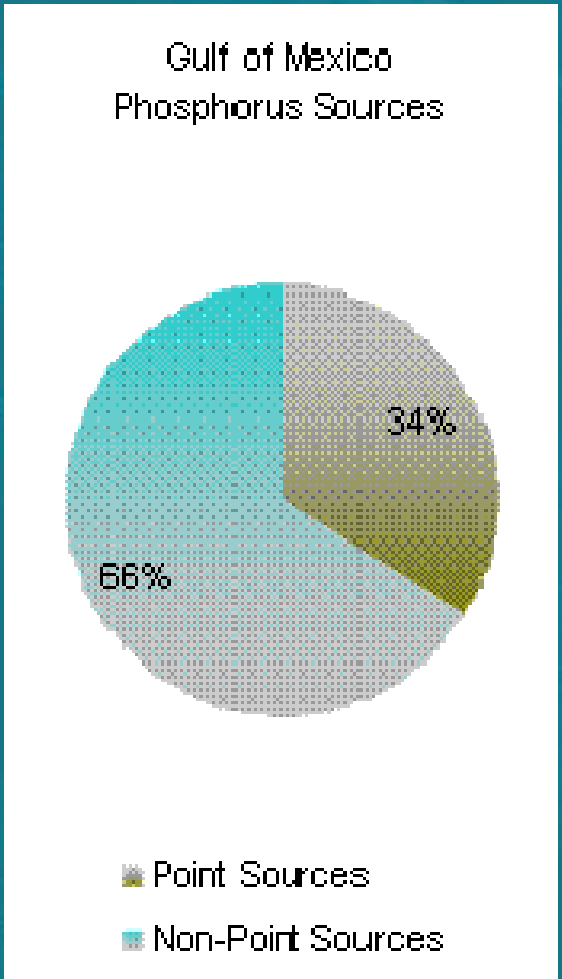
Yellowstone River, MT

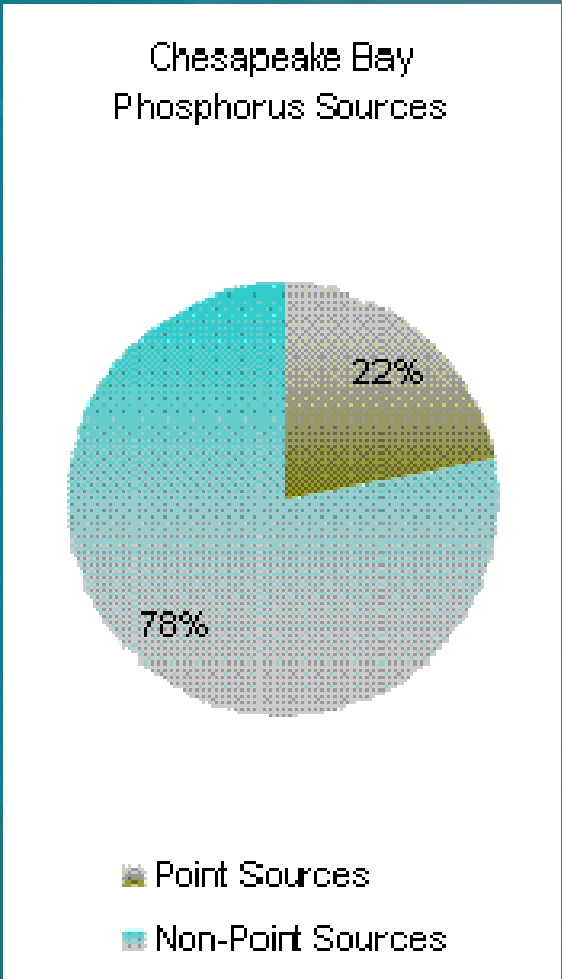
Billings, MT Treatment Plant

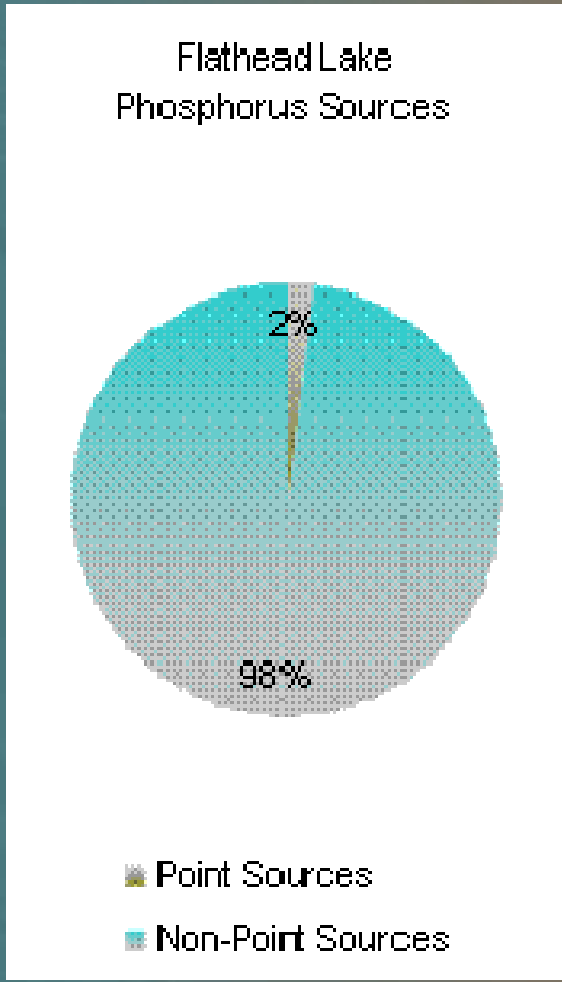
Balance and Sustainability to Protect Water Quality

- ***Advanced Treatment Increases:***
  - **Capital and Operating Costs**
  - **Energy Use**
  - **Chemical Use**
  - **Atmospheric Emissions**
- ***… and May Not Always Benefit Water Quality***
  - **Importance of Nitrogen and Phosphorus Varies with Watershed**
  - **NonPoint Sources Dominate Many Watersheds**

Nonpoint Sources Dominate Many Watersheds







Phosphorus Loading Summaries for Gulf of Mexico, Chesapeake Bay, and Flathead Lake

Comparison of Point and Nonpoint Source Nutrient Control Performance

Approach	Nutrient Removal Performance	Cost Effectiveness
Point Source	80% to 90%	$0.50 to $50+ $/lb
Advanced Treatment		
Nonpoint Source	15% to 80%	$0.50 to $300+ $/lb
Best Management Practices[1]		

[1]Conservation Tillage, Grass Buffers, Detention Basins, Wetlands

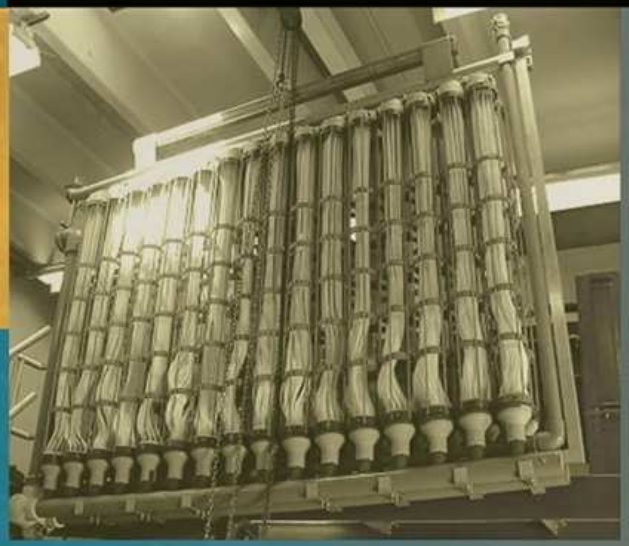
Sustainability Comparison of Point and Nonpoint Source Nutrient Controls

Approach	Electrical Power	Chemical Use	Greenhouse Gas	Additional Watershed Enhancements
Point Source Advanced Treatment	+50% to + 250% over Secondary Treatment	Alum, Ferric, Methanol, other carbon sources	+120% over Secondary Treatment	None
Nonpoint Source Best Management Practices[1]	None	None	Sequesters Carbon	Enhanced Habitat, Aesthetics, Sediment Reduction

[1]Conservation Tillage, Grass Buffers, Detention Basins, Wetlands

NACWA 2009 Summer Conference and 39th Annual Meeting

Public Enemy Number One: Nutrients



July 15, 2009

David L. Clark

HDR Engineering

dclark@hdrinc.com

HDR