



# Nutrient TMDLs and NPDES Permits

Mississippi Department of Environmental  
Quality

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# Nutrient TMDLs in Mississippi

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# History of Nutrient TMDLs in Mississippi

## Mississippi was a “Consent Decree State”

- Required to complete TMDLs for all 303(d) listed waterbodies on the 1998 303(d) List in 10 years

## How many nutrient TMDLs?

- 261 individual pollutant – waterbody combinations
- Over 100 TMDL reports – most TMDL reports were for both Total Nitrogen (TN) and Total Phosphorous

# Historical Nutrient TMDL Methodology

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- Mass Balance TMDLs
  - Did not account for fate, transport, uptake, etc.
  - Steady state
  - $\text{Flow} \times \text{Concentration} = \text{Load}$
- Preliminary instream targets for TN and TP
  - No numeric nutrient criteria
  - Targets based on statistical analysis of nutrient levels in biologically healthy streams
- Nonpoint Source Loading estimated based on landuse type

# NPDES Permits in Nutrient TMDLs

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- Historically very little information of nutrient levels in effluent
  - Assume nutrient concentrations based on treatment type for domestic ww
  - EPA Technical Guidance Manual for Developing TMDLs – Book 2: Streams and Rivers – Part 1 Biochemical Oxygen Demand / Dissolved Oxygen and Nutrients / Eutrophication, Pg. A-13, EPA 823-B-97-002, March 1997
- Lagoon
  - TP: 5.2 mg/l
  - TN: 11.5 mg/l
- Activated Sludge
  - TP: 5.8 mg/l
  - TN: 13.6 mg/l

# Establishing the WLA in Nutrient TMDLs

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- Municipal Facilities
  - Design Flow
  - Concentration based on treatment type
  - Load expressed in pounds per day
- All other industrial facilities believed to discharge nutrients
  - Average reported flow
  - Concentration based on treatment type
  - Load expressed in pounds per day
- Reductions necessary? Depends on WLA % of TMDL

# Moving Forward with Nutrient TMDLs

Push from regulated community to determine permit limitations prior to capital expenditures

In depth monitoring / modeling approach

Models are more complex – simulating algal growth, different weather patterns, photosynthesis, respiration, etc.

Using modeling to help set Site Specific Nutrient Criteria in conjunction with the TMDL

Better information on nutrient levels in effluent

Currently working on 2 large river systems in Mississippi

# Pearl River Nutrient TMDL

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- First Nutrient TMDL in Mississippi using a more complex hydrodynamic and water quality model – EFDC and WASP
- Set chlorophyll-A level as the endpoint of the TMDL and determined TN and TP loading
- 2015 EPA approval required further instream monitoring
- Still pending Site Specific Nutrient Criteria



# Implementing Nutrient Limitations into Permits

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# Nutrient Permit Implementation

## When implemented into permits?

- TMDLs (Total Maximum Daily Loads)
- ELGs (Effluent Limit Guidelines)

## How many permits?

- 93 permits with limitations, 193 permits with monitoring
- 64 Major Municipals
  - 63 Monitor Effluent
  - 19 Contain Limitations
  - Currently implementing influent monitoring

## What parameters are we monitoring/ limiting?

- Total Nitrogen (TN)
- Total Phosphorus (TP)

# Typical Permit Implementation

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- TMDL establishes nutrient limit in Pounds per Day (#/day)
- Nutrient limitation is phased into permit
- First phase is report only, Second phase contains the limitation
- Schedule of compliance included in permit

## Typical Permit Implementation

#/day TN limit is applied to permit  
as a 30 day average

$1.5 * (30 \text{ day average}) = \text{\#/day daily max or weekly average}$

Concentrations remain report only  
unless concentration required by  
ELG

# Typical Permit Implementation

<i>Nitrogen (Total) Effluent [Phase I]</i>	Report Monthly Average	Report Maximum Weekly Average	pounds per day	*****	Report Monthly Average	Report Maximum Weekly Average	mg/L	Monthly	24-hr Composite	Jan-Dec
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<i>Nitrogen (Total) Effluent [Phase II]</i>	192 Monthly Average	288 Maximum Weekly Average	pounds per day	*****	Report Monthly Average	Report Maximum Weekly Average	mg/L	Monthly	24-hr Composite	Jan-Dec
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The permittee shall achieve compliance with the effluent limitations specified for discharge in accordance with the following schedule:

Upon issuance of this permit, the permittee shall achieve compliance with the effluent limitations specified for the parameters noted as Phase I; Phase II limitations shall not apply at this time. Beginning upon completion and start-up of the improvements needed to comply with Phase II limitations, but no later than the anticipated date of completion presented in the implementation scheduled required in Permit Condition No. S-1, the permittee shall achieve compliance with the effluent limitations specified for the parameters noted as Phase II; Phase I limitations shall not apply at this time. Phase II limitations will become enforceable conditions of the permit no later than the expiration date of the permit. The permittee shall notify our office orally at least 24 hours prior to start-up and in writing no later than 48 hours after start-up of improvements. [WPC-1 Chapter One Section IV.A(9)]

# Special Cases

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- Case 1:
  - Two permitted facilities require nutrient limits due to TMDL
  - Both facilities discharge into the same watershed cell of the TMDL
  - Both facilities are owned by the same entity
  - One facility newer, and more adapt to treat for nutrients

# Special Cases

- Result:
  - Combined the two permits into one permit.
  - Made each treatment system a separate outfall in the one permit

<i>Phosphorus (Total) Effluent</i>	Report Monthly Total	*****	pounds per month	*****	Report Monthly Average	*****	mg/L	Daily	24-hr Composite	Jan-Dec
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<i>Phosphorus (Total) Effluent</i>	Report Monthly Total	*****	pounds per month	*****	Report Monthly Average	*****	mg/L	5 Times per Week	24-hr Composite	Jan-Dec
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<i>Phosphorus (Total) Effluent</i>	1431 Maximum Monthly Average	*****	pounds per day	*****	*****	*****	*****	Monthly	Calculations	Nov-Apr
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# Special Cases

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- Case 2:
  - Three permitted facilities require nutrient limits due to a TMDL
  - All three facilities are owned by the same entity
  - TMDL allows the loads to be distributed as needed among the three facilities



# Special Cases

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- Result:
  - Continued with three separate permits
  - Required nutrient monitoring in each permit
  - Established combined nutrient limitation in one permit

# Special Cases

- Permit 1

<i>Phosphorus (Total) Effluent</i>	Report Maximum Monthly Average	Report Weekly Maximum	pounds per day	*****	Report Maximum Monthly Average	Report Weekly Maximum	mg/L	Weekly	24-hr Composite	Jan-Dec
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- Permit 2

<i>Phosphorus (Total) Effluent</i>	Report Monthly Average	Report Maximum Weekly Average	pounds per day	*****	Report Monthly Average	Report Maximum Weekly Average	mg/L	3 Times per Week	24-hr Composite	Jan-Dec
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- Permit 3

<i>Phosphorus (Total) Effluent</i>	*****	*****	*****	*****	Report Maximum Monthly Average	Report Maximum Weekly Average	mg/L	Daily	24-hr Composite	Jan-Dec
<i>Phosphorus (Total) Effluent (Net Value)</i>	1297 Maximum Monthly Average	1945.5 Maximum Weekly Average	pounds per day	*****	*****	*****	*****	Monthly	Calculations	Jan-Dec

Questions?

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