Geosyntec consultants

PREPARING FOR FUTURE POTW REQUIREMENTS

NUTRIENTS AND INDUSTRIAL PRETREATMENT PROGRAMS

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December 5, 2024

There is nothing permanent except change.

~Heraclitus

GEOSYNTEC – CENTRAL STATES WATER RESOURCES

OH: Cleveland, Columbus

MI: Ann Arbor, Detroit

IL: Chicago & Oak Brook

WI: Milwaukee

MO: St. Louis, Jeff City

KS: Overland Park

CO: Lakewood

Remote: OR & FL

OVERVIEW

NUTRIENTS

- Comment on Ohio's two nutrient rulemakings
- Assess your local receiving waters if you intend to apply for larger design average flows
- Consider phosphorus and nitrogen in capital planning

INDUSTRIAL PRETREATMENT

- Understand the POTW authority and responsibilities
- Understand the POTW capability and capacity
- Don’t give away what you don’t have

SURFACE WATER QUALITY CRITERIA 101

NARRATIVE

"Free from"

Example: "nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae."

NUMERIC

Total phosphorus (TP) = 0.4 milligrams per liter (mg/L)

Dissolved inorganic nitrogen (DIN) =

3.6 mg/L

6.7 mg/L

Nutrient Pollution

Nutrient pollution is one of America's most widespread, costly, and challenging environmental problems.

1995 – National Nutrient Assessment Workshop

2003 – USEPA issues nationally recommended numeric nutrient criteria (NNC)

2007 – NRDC petitions USEPA to include nutrients in definition of 2ndary treatment

2010 – USEPA attempts to promulgate NNC for Florida

2011 – Nancy Stoner's 8-step memo

2015 – USEPA initiates permit writer training using narrative criteria

Nutrient pollution is a major water quality problem in Ohio and throughout the nation.

1990 – Ohio adopts biological criteria (fish & bugs)

1999 – "Associations Report" & phosphorus total maximum daily loads (TMDLs)

2008- draft NNC for inland lakes

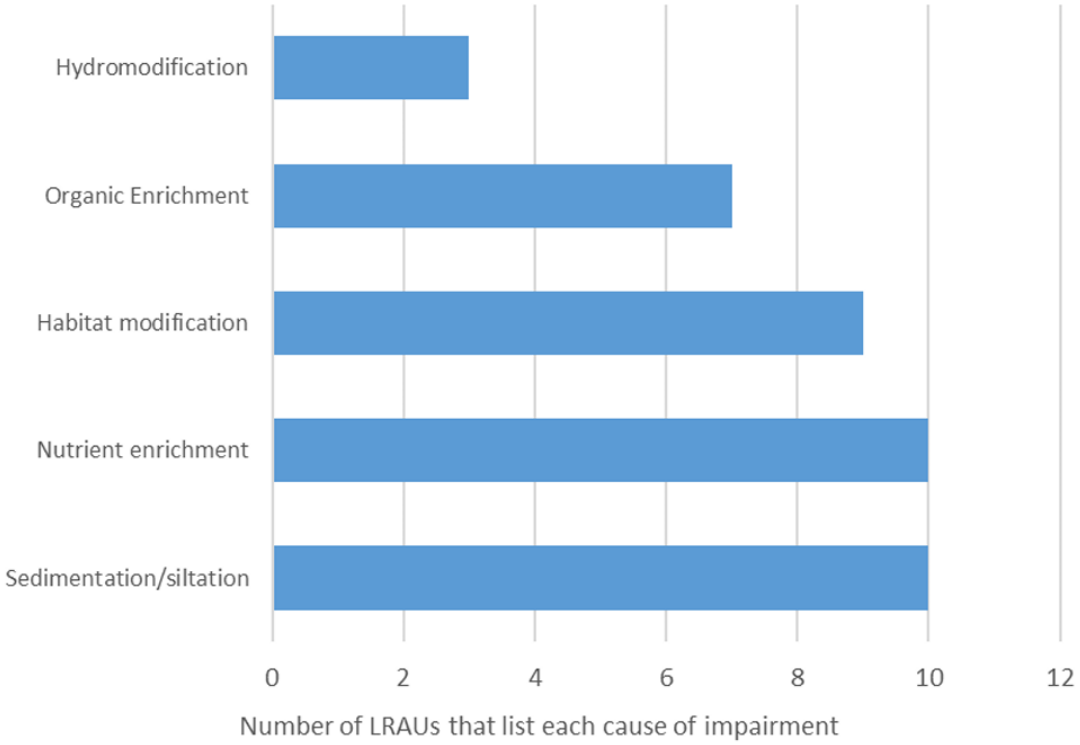
2013 to 2015 – Stream Nutrient Assessment Procedure (SNAP) drafting

2018 – Early Stakeholder Outreach (ESO) for large rivers NNC

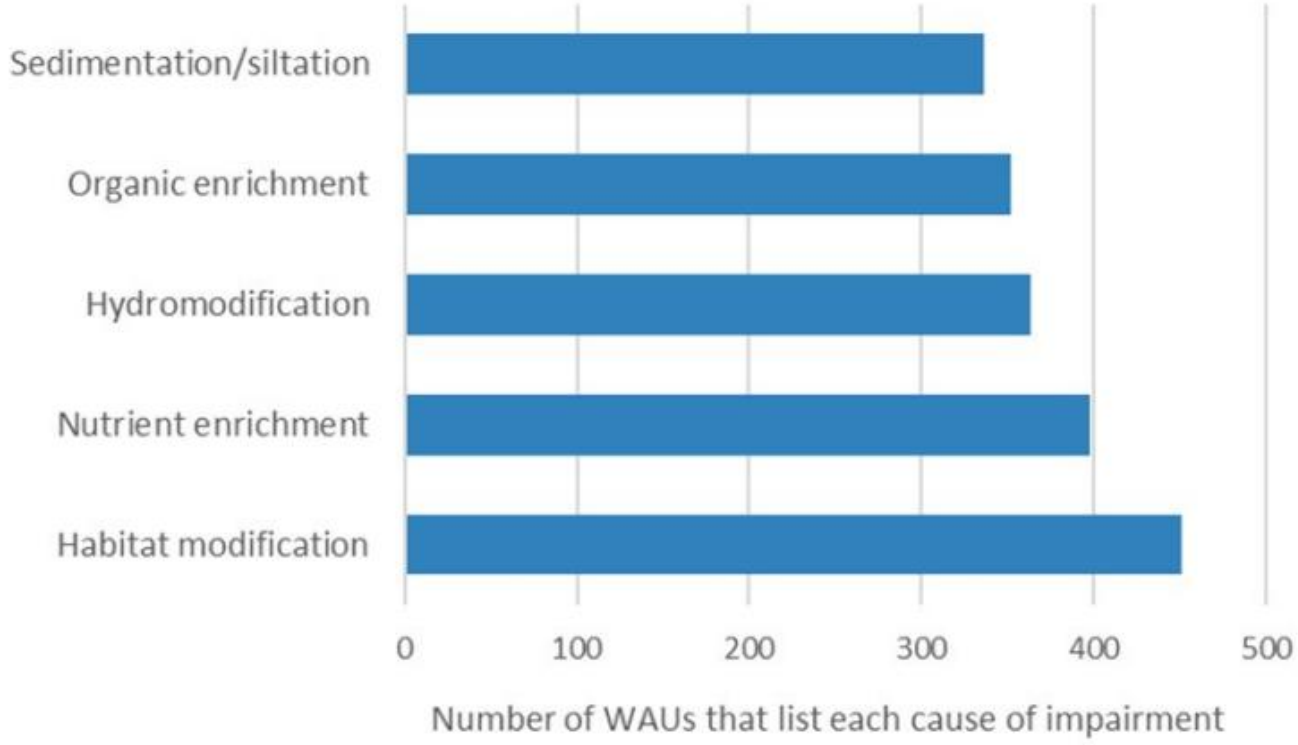
2024 to 2025 – ESO for OAC 3745-33 (NPDES permits) and OAC 3745-2 (water quality standards)

NUTRIENTS ARE IN THE TOP FIVE CAUSES OF IMPAIRMENT IN OHIO

LARGE RIVERS

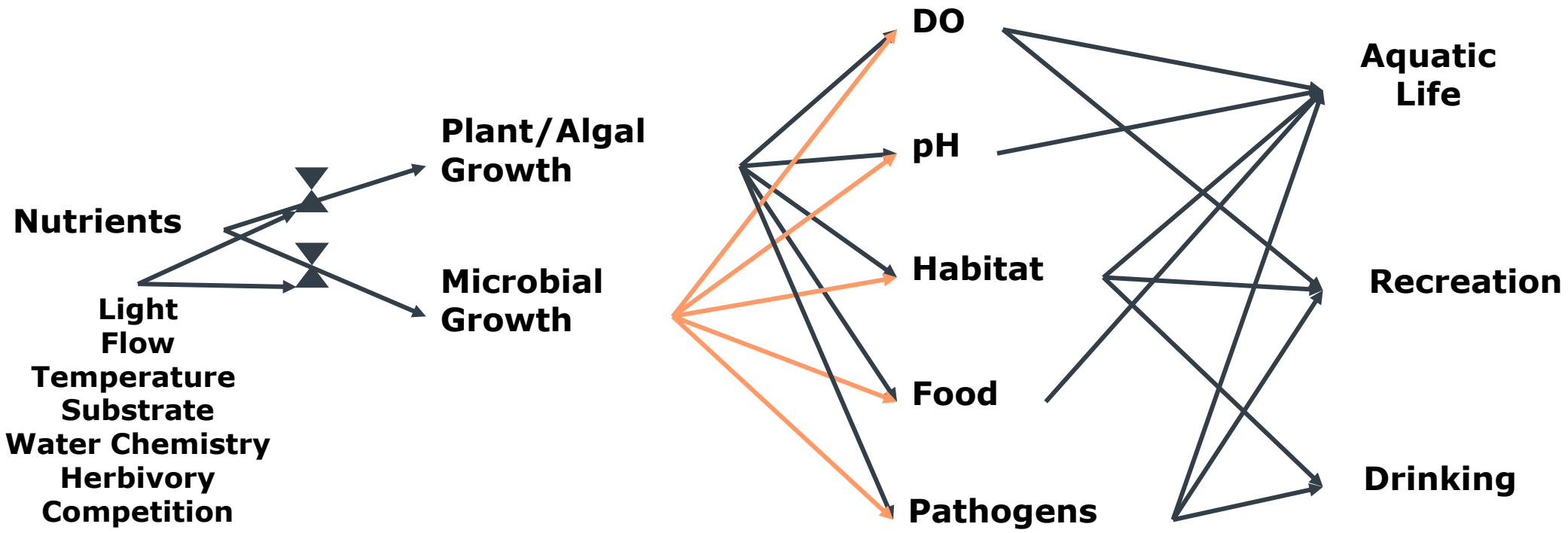


SMALLER WATERSHEDS



https://epa.ohio.gov/divisions-and-offices/surface-water/reports-data/ohio-integrated-water-quality-monitoring-and-assessment-report

Nutrient criteria must protect designated uses, but it is not a linear relationship

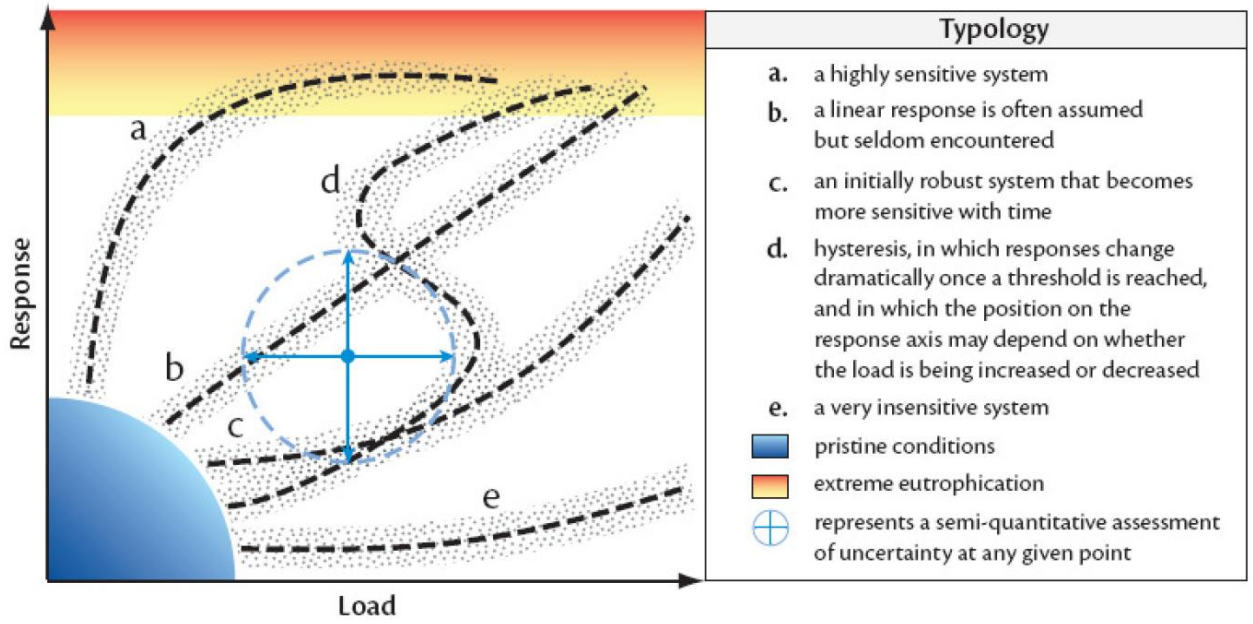


Source: WEFTEC 2010, Watershed Workshop. US EPA.

“States have found that nutrient levels that may cause impairments in one stream under one set of conditions will not have the same negative impact in a different stream.”

Source: Memorandum from Bob Gibbs, Subcommittee Chairman. Hearing on “Running Roughshod Over States and Stakeholders: EPA’s Nutrients Policies”. June 21, 2011.

https://entomology.umd.edu/news/title-a-tale-of-two-food-webs-algae-insects-and-shaded-streams



Conceptual model of a few possible eutrophication trajectories as a function of nutrient load (source: Bricker et al., 2007, p. 144).

NUTRIENTS – NOT JUST A NONPOINT SOURCE PROBLEM

State of Ohio Nutrient Mass Balance Study *December 23, 2022*

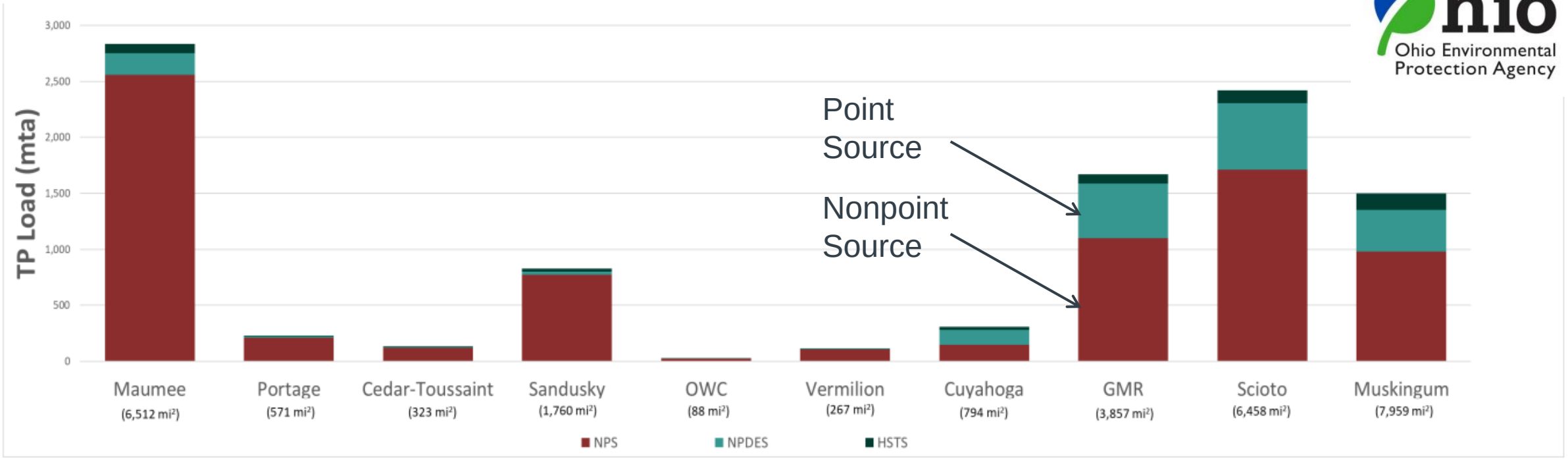


Figure 2 — Total phosphorus loading using nutrient balance methods as the average of the loads calculated from water year 2017 - 2021. "GMR" denotes Great Miami River and "OWC" Old Woman Creek.

EARLY STAKEHOLDER OUTREACH – 3745-2

Ohio EPA is considering adding a new rule that explains how to determine if streams and rivers are impaired for aquatic life use due to excessive nutrients

- Tool to interpret the existing narrative standards

The new rule will:

- Outline minimum data requirements to conduct an assessment
- Include target ranges for nutrient enrichment indicators like dissolved oxygen swings and chlorophyll a concentrations
- Include decision-making flow charts for verification of nutrient enrichment as a cause or threat of aquatic life impairment

Stream Nutrient Assessment Procedure (SNAP)

STEP 1	*STEP 2*	*STEP 3*	*STEP 4*	
Biological Criteria	**DO Swing** [2]	**Benthic Chlorophyll** [3]	**Preliminary Assessment: Nutrient Enrichment Status of Evaluated Segment or Waterbody**	
All indices attaining or in non-significant departure[1]	Normal or low swings (≤6.5 mg/l)	Low to moderate (≤320 mg/m^2)	Attaining aquatic life use / Not threatened	
		High (>320 mg/m^2)	Attaining aquatic life use, but may be threatened	*See Flow Chart A*
	Wide swings (>6.5 mg/l)	Low (≤182 mg/m^2)		
		Moderate to high (>182 mg/m^2)		
Non-attaining (one or more indices below non-significant departure)	Normal or low swings (≤6.5 mg/l)	Low to moderate (≤320 mg/m^2)	Impaired, but cause(s) other than nutrients	*See Flow Chart B*
		High (>320 mg/m^2)	Impaired, nutrient enrichment is a likely cause	*See Flow Chart C*
	Wide swings (>6.5 mg/l)	Low (≤182 mg/m^2)		
		Moderate to high (>182 mg/m^2)	Impaired, nutrient enrichment is a material cause	

EARLY STAKEHOLDER OUTREACH – 3745-33

Ohio EPA is considering adding information regarding processes related to the Nutrients Assessment Protocol (NAP)

- Determine what NPDES permit conditions are appropriate when Ohio EPA determines a receiving stream is impaired or threatened for aquatic life use due to excessive nutrients

Comments due Dec. 6!

This rule will:

- Define when NAP implementation applies
- Include separate requirements for streams that are impaired versus streams that are threatened

TRANSLATING NARRATIVE CRITERIA TO PERMIT LIMITS

Rule 3745-1-04 | Criteria applicable to all waters

"(E) Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae."

OAC 3745-1-05(C)(1) | Antidegradation

"Existing uses, which are determined using the use designations defined in rule 3745-1-07 of the Administrative Code, and the level of water quality necessary to protect existing uses, shall be maintained and protected. There may be no degradation of water quality that results in **either a violation of the applicable water quality criteria** for the designated uses, unless authorized by a water quality standard variance issued in accordance with rule 3745-1-38 of the Administrative Code, **or the elimination or substantial impairment** of existing uses. The director shall, pursuant to paragraph (C) of rule 3745-1-07 of the Administrative Code, **prohibit increased concentrations of specific regulated pollutants that are incompatible with the attainment or restoration of the designated use**."

ONE RECENT PERMIT

Given eutrophication observed in downstream waters, POTW should keep its monthly average TP load below the target value of 300 kg/d during the months of May through October and attempt to identify means to further reduce its phosphorus loading

- This is in a fact sheet
- There are no effluent limitations (yet)

ANOTHER RECENT PERMIT

While no impairment was observed in the recent biological study of the creek, the survey found elevated concentrations of TP at monitoring sites in the vicinity of the POTW, as well as occasionally high levels of nitrate or total Kjeldahl nitrogen at some sites.

This high nutrient loading likely has not resulted in an impairment because other measurements, such as chlorophyll-a and diel dissolved oxygen swings, are still within acceptable ranges, which may be attributable to the good quality habitat in the area, which is “comparatively wide and tree-lined” upstream of and near the facility outfall.

- Year-round limits imposed on TP and DIN
- Established using the design average flow (DAF) in the permit application, background levels in the creek, and the SNAP targets for creek

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ANOTHER RECENT PERMIT (CONT.)

Creek Upstream of POTW
Flow: 0.7 MGD
TP: 0.14 mg/L

POTW
DAF: 3 MGD
Average Monthly Limit (AML): 0.7 mg/L
Long-term Average (LTA): 0.5 mg/L
LTA TP Load: 5.8 kg/d

Creek Downstream of POTW
TP: 0.4 mg/L

POTW
DAF: 6 MGD
Average Monthly Limit (AML): 0.4 mg/L
Long-term Average (LTA): 0.26 mg/L
LTA TP Load: 5.8 kg/d

Creek Downstream of POTW
TP: 0.2 mg/L

ISSUES RAISED

If biological criteria are being met with existing nutrient loads, are more stringent permit limits necessary?

- Are there other limitations to help ensure protection that would be more effective and cost-efficient?

Since capital improvement plans can be long-term (20 years), should future anticipated DAFs be the basis of nutrient load limits?

- Can we find a way to recognize that loads can be increased and still not have detrimental impacts on receiving waters?

Can upgrading the POTW for nutrients wait until major capital improvements are required for other reasons?

How should Ohio consider the negative consequences associated with higher levels of nutrient control?

- Energy and greenhouse gas emissions, increased chemical use, increased sludge generation, etc.

NUTRIENTS – WHAT CAN YOU DO?

01

Comment on Ohio's two nutrient rulemakings

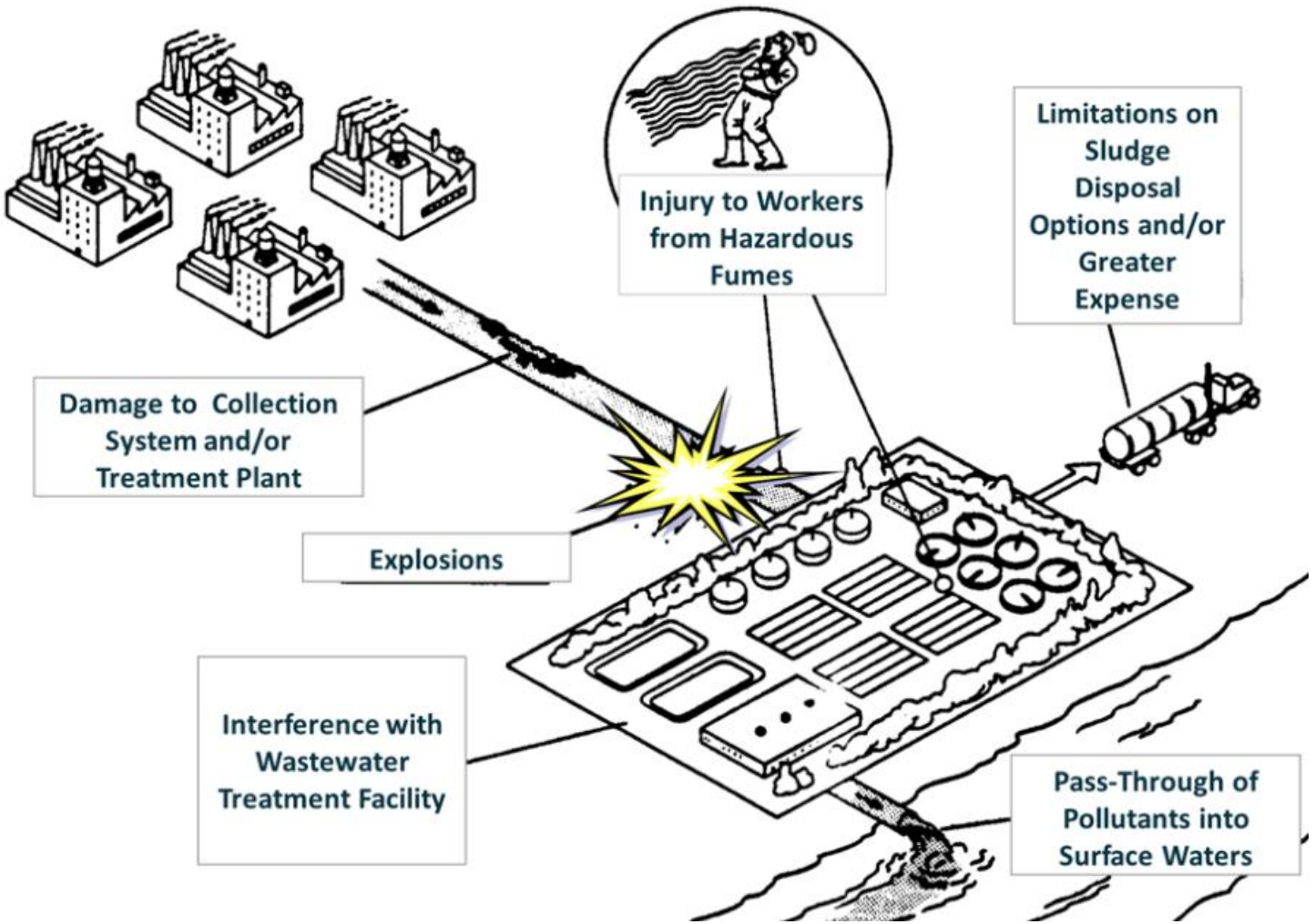
02

Assess your local receiving waters if you intend to apply for larger design average flows

03

Consider phosphorus and nitrogen in capital planning

INDUSTRIAL PRETREATMENT PROGRAMS (IPPs)



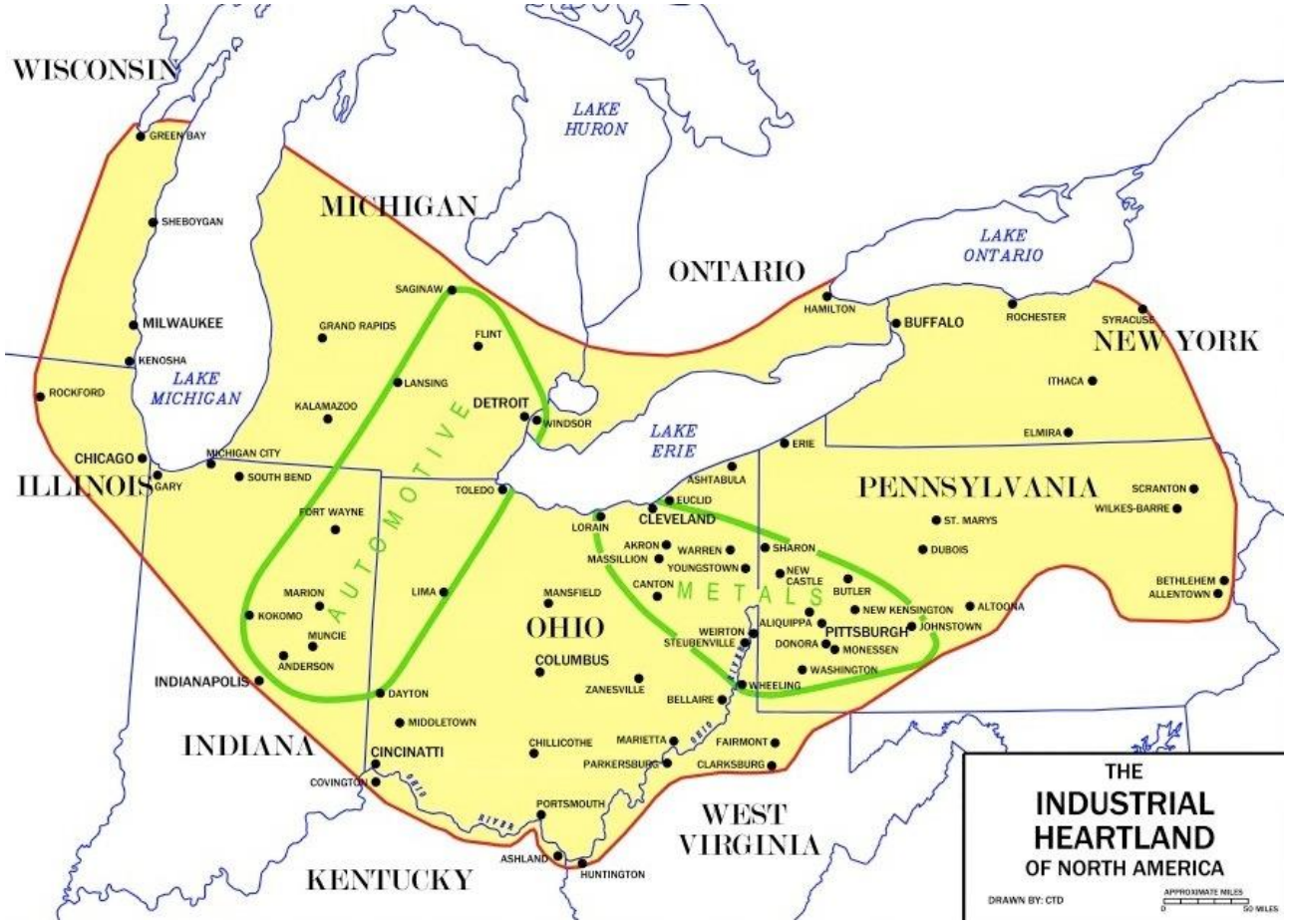
WHAT IS AN IPP?

Component of the NPDES Program designed to:

1. Protect the POTW
   - Includes collection system
2. Prevent the introduction of pollutants into a POTW that will interfere with its operation
   - Includes interfering with use or disposal of biosolids
3. Prevent the introduction of pollutants into a POTW that will pass through the treatment works
   - Or be in some way incompatible
4. Improve opportunities to recycle and reclaim municipal and industrial wastewaters and sludges

THE RUST BELT (AKA THE STEEL BELT)

- Availability of transportation infrastructure (rail and barge)
- Availability of Water!
- Heavy Industrial and Consumer Products
- Automobile Industries



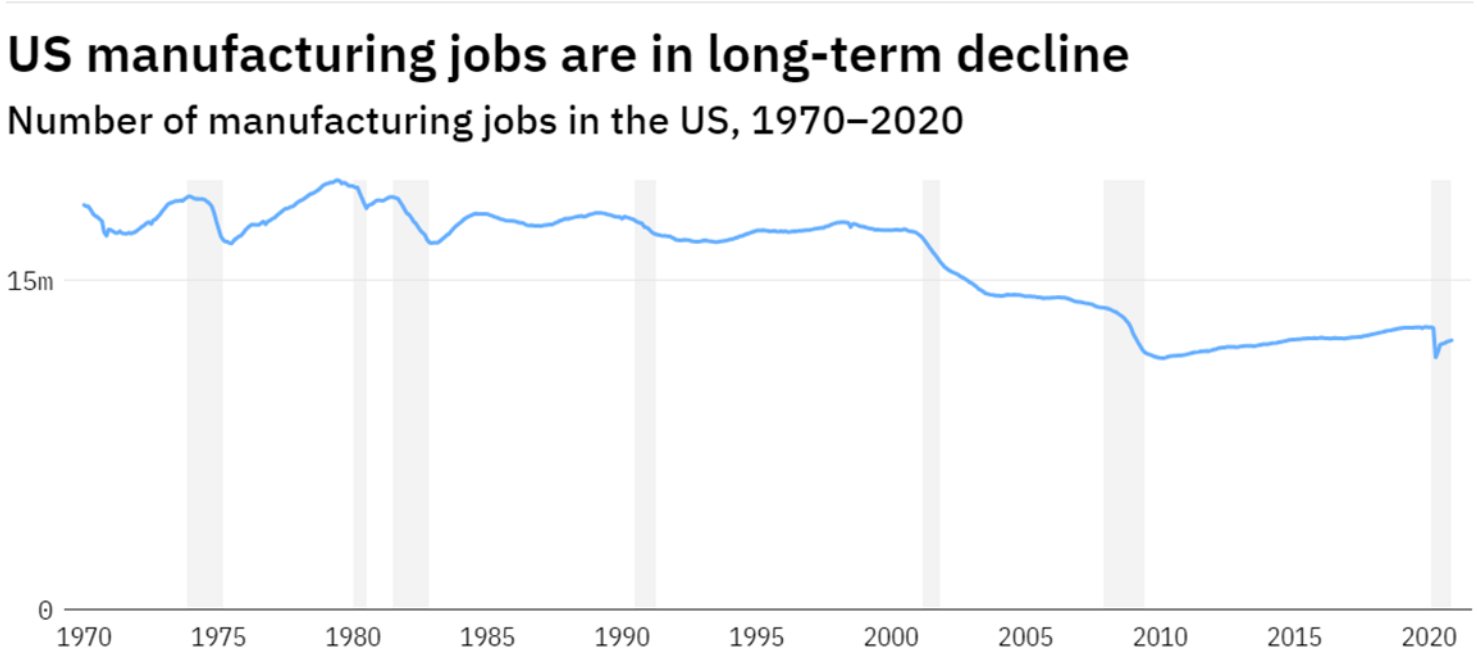
https://senicessm.live/product_details/59501543.html

50 YEARS OF CHANGE

1945, more steel was produced in the state of Pennsylvania alone than in Germany and Japan combined.

Between 1969 and the present day, nearly every aspect of the country's workforce has changed.

Between 2000 and 2010, the US lost one-third of its manufacturing jobs (6 million jobs)

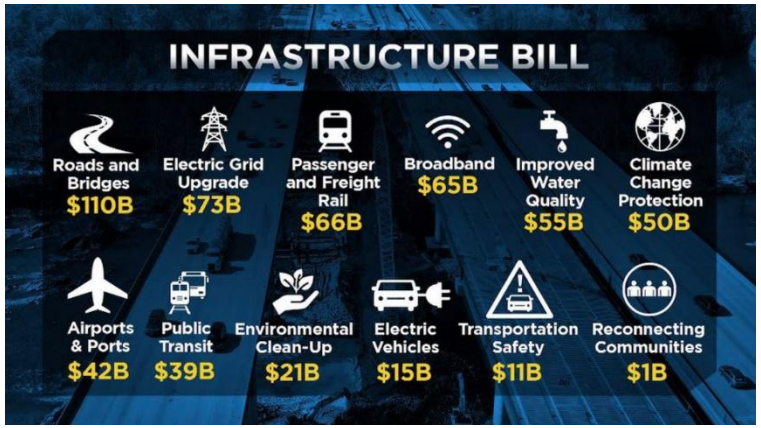


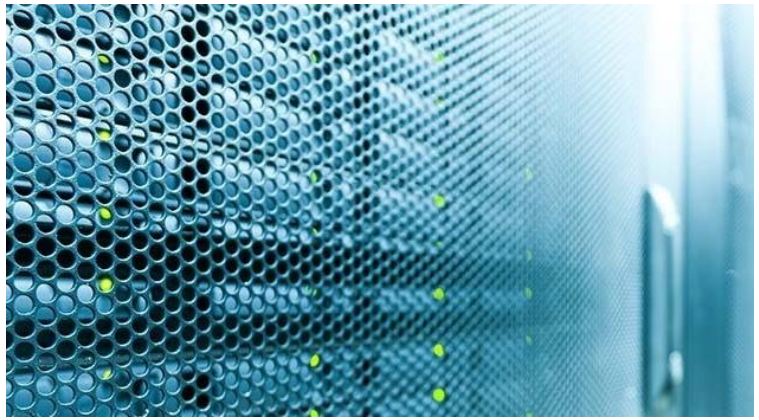
Source: https://www.investmentmonitor.ai/manufacturing/who-killed-us-manufacturing/

50 YEARS OF CHANGE

- Industries like computer programming and alternative energy sectors were all but unimaginable half a century ago
- Computer and electronics manufacturing grew by **2,607%** between 1987 and 2017
- Most industries have rapidly adopted new technologies over the past 10 years
- Wider range of industries means more specialized training
- The rise in adoption of digital technologies will be a driver for transformation for industry
- More jobs require specialized training in computers, coding, or fluency in social media

TODAY'S BIG INDUSTRIAL DRIVERS





MAY 09, 2022

Using Additive Manufacturing to Improve Supply Chain Resilience and Bolster Small and Mid-Size Firms

WHAT DOES THIS MEAN FOR WASTEWATER UTILITIES?

Increased Residential and Commercial Wastewater

Increased Industrial Wastewater Volume and Strength

Industrial Pretreatment Programs

IPP Logistics

What is it?

- Program that regulates industrial users' (IUs) discharge to POTWs

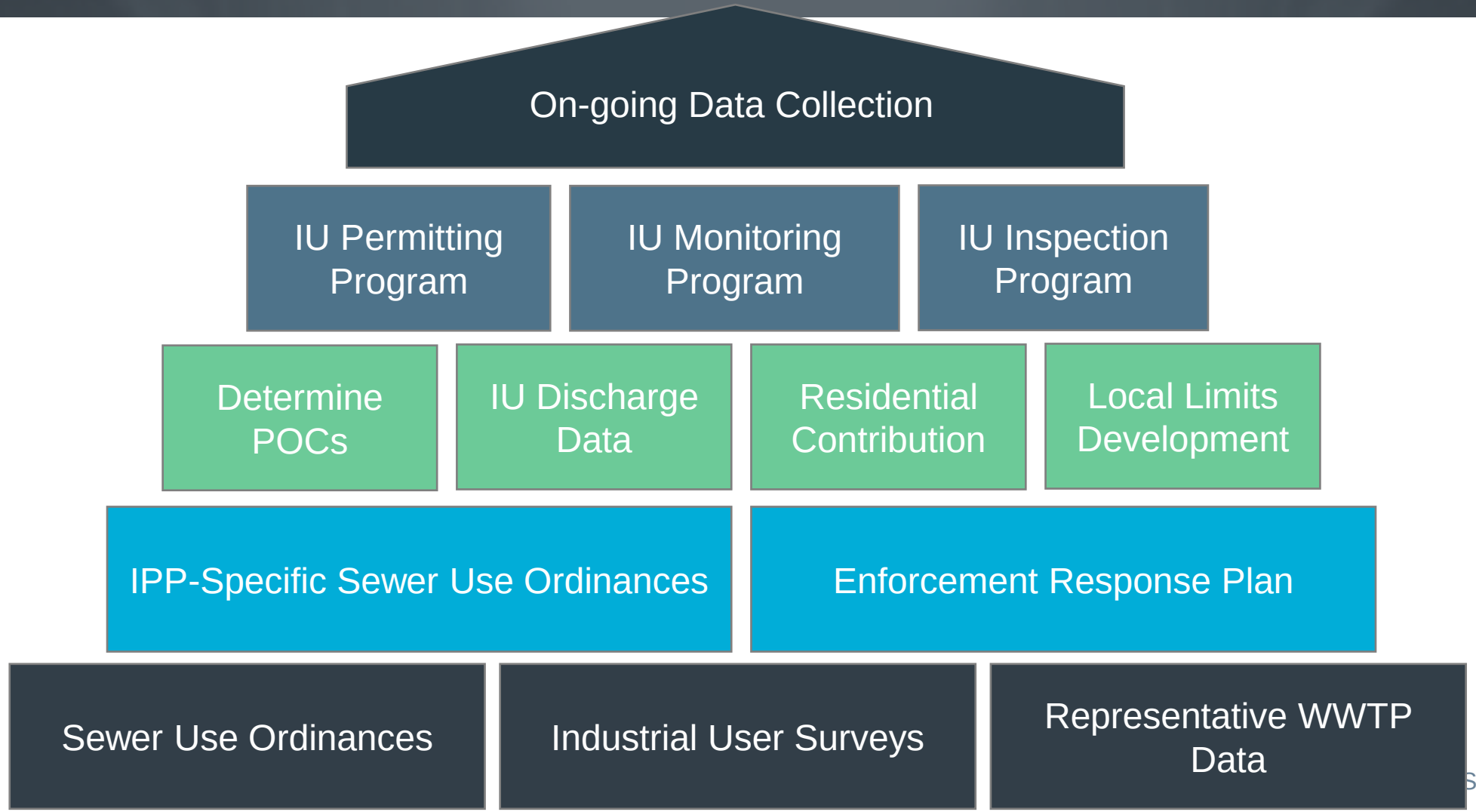
Why do we need it?

- Ensures POTWs can properly treat their wastewater and maintain workers' safety

Where is it required?

- POTWs with a design flow ≥5 MGD, or
- Smaller POTWs with qualifying characteristics (e.g. the nature of industrial pollutants)

The IPP Pyramid



THINGS TO CONSIDER

OAC 3745-3: Pretreatment Rules

Rule 3745-3-01 | Definitions.

Rule 3745-3-02 | Purpose and applicability.

Rule 3745-3-03 | POTW pretreatment programs.

Rule 3745-3-04 | Prohibited discharges.

Rule 3745-3-05 | Notification of potential problems, including slug loading.

Rule 3745-3-06 | Reporting requirements for industrial users.

Rule 3745-3-07 | Trade secrets; request for confidentiality.

Rule 3745-3-09 | General requirements governing application of pretreatment standards.

WHO'S IN CHARGE?

POTW

Ohio EPA

OAC 3745-3-01 (C)(3)

(3) “Control authority” means one of the following:

(a) The POTW, if it is administering an approved pretreatment program

(b) Ohio EPA, if the POTW is not administering an approved pretreatment program

DO YOU HAVE AN IPP?

Codified Ordinance... > CHAPTER 915 Municipal Wastewa

915.18 Accidental discharges.
915.19 Notification of changes in indirect discharge.
915.20 Industrial user discharge permit.
915.21 Wastewater discharge permit conditions.
915.22 Compliance reports.
915.23 Compliance schedules.
915.24 Confidential information.
915.25 Records retention.
915.26 Charges and fees.
915.27 Notification of violation.
915.28 Show cause hearing.
915.29 Compliance orders.
915.30 Emergency suspension of service and discharge permits.
915.31 Revocation of permit.
915.32 Right of appeal.
915.33 Inspecting and sampling.
915.34 Judicial proceedings.
915.35 Recovery of costs incurred by the City.
915.99 Penalty.

DO YOU HAVE AN IPP?

915.16 LIMITATIONS ON WASTEWATER STRENGTH.

(a) Federal Requirements. National categorical pretreatment standards as promulgated by the USEPA pursuant to the Act shall be met by all industrial users which are subject to such standards.

(b) State Requirements. State requirements and limitations on discharges to the WEPF shall be met by all industrial users which are subject to those standards in any instance in which they are more stringent than Federal requirements and limitations or those in this chapter or any other applicable ordinance.

(c) Local Requirements. No industrial user shall discharge or cause or allow to be discharged into the sewerage system any pollutant in concentrations above those specifically permitted in a wastewater discharge permit issued by the City. Discharge permits shall impose maximum discharge concentration limits or mass-based limits where appropriate. In the absence of such specific wastewater discharge permit conditions, no person shall discharge any of the following pollutants, except as such pollutants may occur, and only in the concentrations such pollutants may occur, in the potable water supplied to the premises. Discharge of any pollutants allowed by permit shall not exceed the following limitations:

Pollutant	Concentration (mg/l)
Ammonia (as N)	15.0
Arsenic	0.05
Cadmium	0.01
Chromium (total)	0.50
Chromium (hexavalent)	0.01
Copper	0.50
Cyanide (total)	0.02
Lead	0.05
Mercury	.0005

DO YOU HAVE AN IPP?

pretreatment 1/1

local limits 0/0

J. POTWs that accept hazardous wastes by truck, rail, or dedicated pipeline are considered to be hazardous waste treatment, storage, and disposal facilities (TSDFs) and are subject to regulation under the Resource Conservation and Recovery Act (RCRA). Under the "permit-by-rule" regulation found at 40 CFR 270.60(c), a POTW must

1) comply with all conditions of its NPDES permit,

2) obtain a RCRA ID number and comply with certain manifest and reporting

requirements under RCRA,

3) satisfy corrective action requirements, and

4) meet all federal, state, and local pretreatment requirements.

DO YOU HAVE AN IPP?

pretreatment 2/23

local limits 1/14

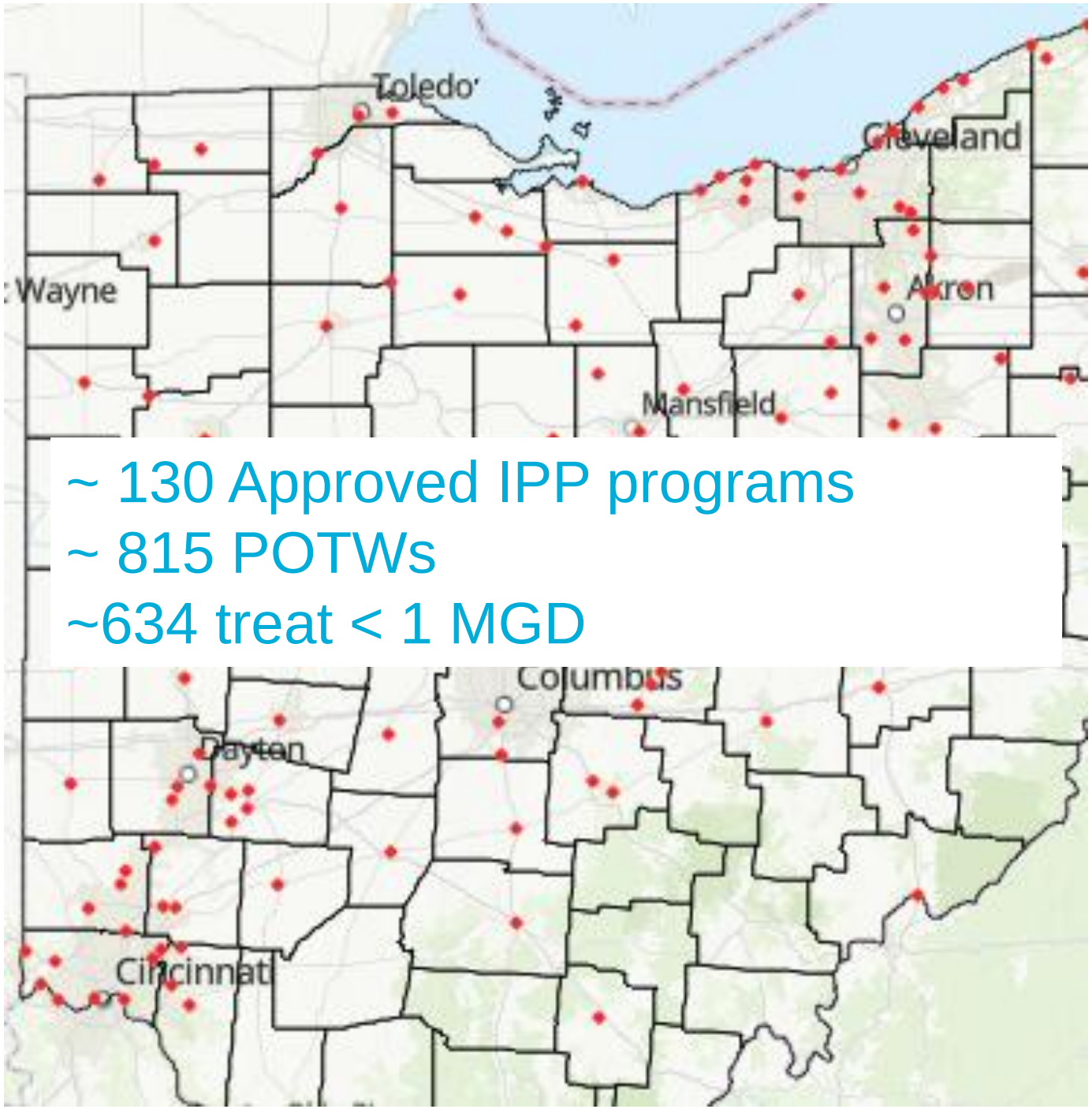
B. Municipal Pretreatment Schedule

1. The permittee shall evaluate the adequacy of local industrial user limitations to prevent the introduction of pollutants into the POTW which will interfere with the operation of the POTW, pass through the POTW in amounts that exceed water quality standard-based limits, be incompatible with the POTW, or limit wastewater or sludge use options. Technical justification for revising local industrial user limitations to attain compliance with final table limits, along with a pretreatment program modification request, or technical justification for retaining existing local industrial user limitations shall be submitted for acceptance to Ohio EPA, Central Office Pretreatment Unit and to Ohio EPA, Northeast District Office, as soon as possible, but no later than 24 months after the permit effective date (Event Code 52599)

Technical justification is required for arsenic, cadmium, total chromium, dissolved hexavalent chromium, copper, free cyanide, lead, mercury, molybdenum, nickel, selenium, silver, total filterable residue, and zinc unless screening of wastewater and sludge indicate these pollutants are not present in significant amounts. Technical justification is also required for any other pollutants where a local limit may be necessary to protect against pass through, interference or sludge disposal.

To demonstrate technical justification for new local industrial user limits or justification for retaining existing limits, a local limits technical justification report shall be submitted to Ohio EPA. The report shall be consistent with the guidance, procedures and methodologies found in Ohio EPA's and USEPA's local limits guidance documents available at:
https://epa.ohio.gov/divisions-and-offices/surface-water/permitting/pretreatment-program

OHIO'S IPPS



~ 130 Approved IPP programs
~ 815 POTWs
~634 treat < 1 MGD

I’m not saying don’t follow the rules, I’m saying make sure you are looking at **ALL** the rules!!!

WHO'S IN CHARGE?

POTW is Control Authority

- POTW has developed permitting processes
- Permitting process usually included in Sewer Use Ordinances
- Contact the Pretreatment Coordinator for Industrial Discharge Permit Application

Ohio EPA is Control Authority

- Obtain written permission from the POTW to discharge industrial wastewater
- Apply for an Indirect Discharge Permit via STREAMS

Existing Regulations

The table below lists the Effluent Guidelines promulgated by the EPA, organized by industry category.

- For some of the regulations, the links in the 'Category Overview' column provide a summary of the regulation and available EPA publications for the category.
- The links under '40 CFR' go directly to the **Code of Federal Regulations** (CFR). 'Initial' indicates the year of the first rulemaking for the category, and 'Last' indicates the most recent substantive revision.

Category Overview	40 CFR	Initial	Last
Airport Deicing	449	2012	2012
Aluminum Forming	467	1983	1988
Asbestos Manufacturing	427	1974	1975
Battery Manufacturing	461	1984	1986
Canned and Preserved Fruits and Vegetable Processing	407	1974	1976
Canned and Preserved Seafood (Seafood Processing)	408	1974	1975
Carbon Black Manufacturing	458	1976	1978
Cement Manufacturing	411	1974	1974
Centralized Waste Treatment	437	2000	2003
Coal Mining	434	1975	2002
Coil Coating	465	1982	1983
Concentrated Animal Feeding Operations (CAFO)	412	1974	2008
Concentrated Aquatic Animal Production (Aquaculture)	451	2004	2004

CAN THE POTW ACCEPT THE DISCHARGE?

How much of a pollutant can be in the WWTP influent?

While meeting the WWTP effluent limits and downstream water quality standards

While meeting the biosolids/503 requirements

Without causing pass-through or interference to the treatment process

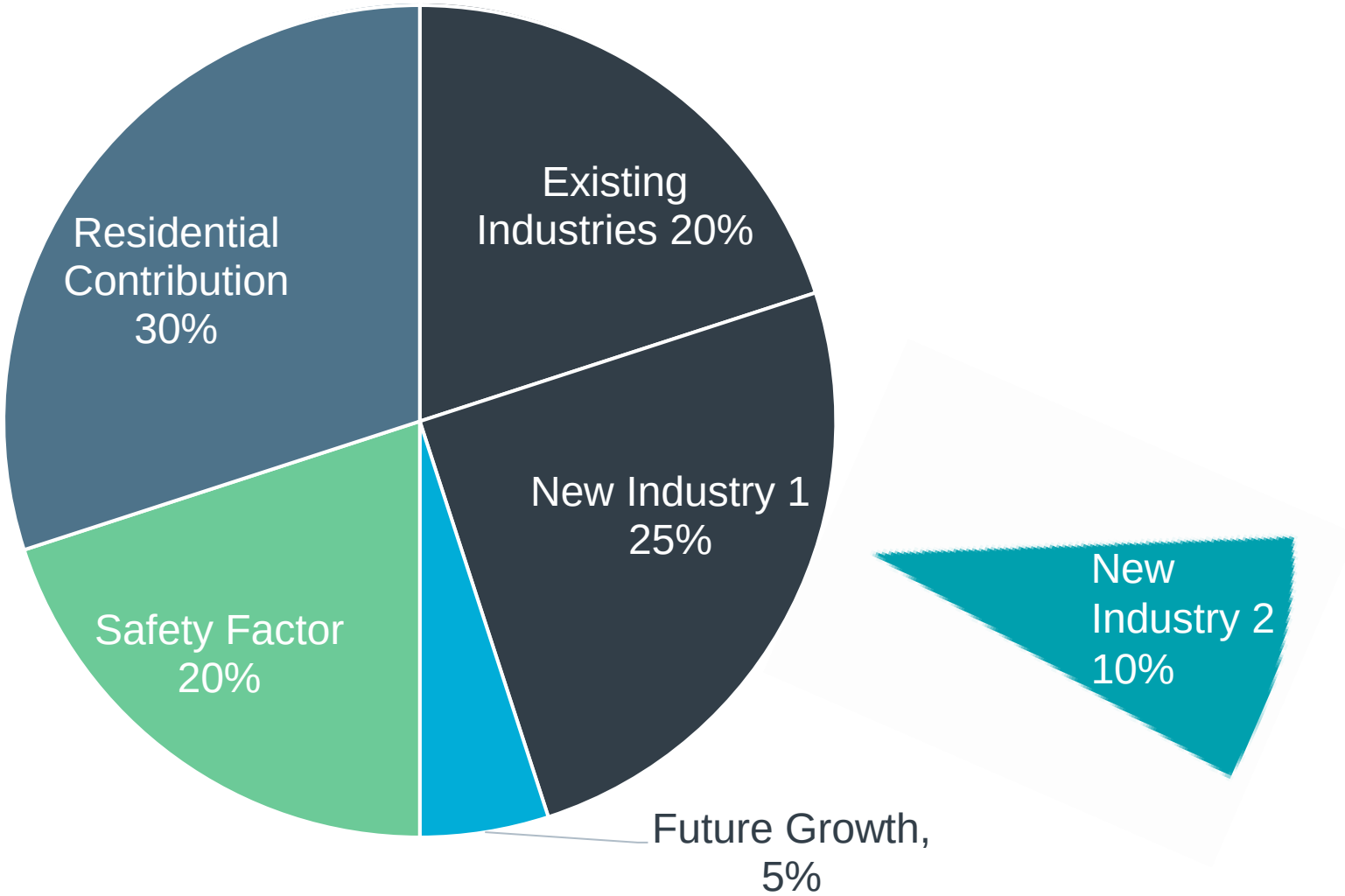
and allowing for water reuse?

MAXIMUM ALLOWABLE HEADWORKS LOAD (MAHL)

MAHL − **Safety Factor** − **Future Growth** − **Residential Contribution** =

Maximum Allowable Industrial Load

MAXIMUM ALLOWABLE HEADWORKS LOAD (MAHL)



PRETREATMENT WHAT CAN YOU DO

01

Understand the POTW authority and responsibilities

02

Understand the POTW capability and capacity

03

Don’t give away what you don’t have

One of life's most painful moments comes when we must admit that we didn't do our homework, that we are not prepared.
~Merlin Olsen

Prepare and prevent, not repair and repent.
~Anonymous

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EXTRA SLIDES

"SNAP" MINIMUM DATA REQUIREMENTS

Table I-1. Suggested Minimum Data Requirements for Performing SNAP

SNAP Assessment Steps	Data Type	Minimum Suggested Requirement for SNAP	
		Number of Samples per Site*	Temporal Considerations**
Preliminary Assessment	Biological	• At least one fish and/or macroinvertebrate community sample	• Collect during or no later than 3 weeks after benthic chlorophyll sampling • During periods with comparable baseflows to those measured during benthic chlorophyll sampling, provided the communities have not been affected by extreme flow events (flooding, desiccation, etc.) in the interim
	Dissolved Oxygen	• 48 hours of continuous data, or • At least five days of discrete maximum and minimum data	• Collect during or within 2 weeks of benthic chlorophyll sampling during comparable baseflow conditions provided the stream has not been affected by extreme flow events in the interim
	Benthic Chlorophyll	• 10 – 20 benthic scrapings, reported as a geometric mean	• Collect following at least 3 weeks of stable, baseflow conditions
Flow Charts A & B	Nutrients	• At least 3 samples per location, reported as a geometric mean	• Collect during stable, baseflow conditions
	Biological	• Same as above	• Same as above
	Qualitative Habitat Evaluation Index (QHEI)	1	• Collect during or no later than 3 weeks of biological sampling
Flow Chart C	Other Stressors	• Narrative observations and data commensurate with assessing the impact of the relevant stressor(s)	

* Number of sites per segment is based on best professional judgment.

TABLE 2 – Concentrations of total phosphorus (TP) and dissolved inorganic nitrogen (DIN) arrayed by narrative levels of ecological risk.

Table 2 presents narrative descriptions of various levels of ecological condition and potential risk, arrayed with ranges of nutrient concentrations commonly observed at the respective ecological condition levels. This information may be useful reference for nutrient assessment using Charts A or C. **Chart A**: Attenuation from a defined source may be inferred by nutrient concentrations measured at successive stations within an evaluated segment decreasing from a higher risk level to a lower risk level. **Chart C**: Table 2 may be used as a general reference in assessing impairment risk. Actual risks and the potential benefits of abatement are site-specific determinations.

		← *DECREASING RISK*				
	TP Conc. (mg/l)	**DIN Concentration** (mg/l)				
		<0.44	0.44 < 1.10	1.10 < 3.60	3.60 < 6.70	≥6.70
DECREASING RISK →	<0.040	background levels typical of least disturbed conditions	levels typical of developed lands; little or no risk to beneficial uses	levels typical of modestly enriched condition in phosphorus limited systems; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition in phosphorus limited systems; moderate risk to beneficial use if allied responses are elevated	characteristic of tile-drained lands; otherwise atypical condition with moderate risk to beneficial use if allied responses are elevated (1.1% of observations)
	0.040-<0.080	levels typical of developed lands; little or no risk to beneficial uses	levels typical of developed lands; little or no risk to beneficial uses	levels typical of working landscapes; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition in phosphorus limited systems; moderate risk to beneficial use if allied responses are elevated	characteristic of tile-drained lands; moderate risk to beneficial use if allied responses are elevated (1.1% of observations)
	0.080-<0.131	levels typical of modestly enriched condition in nitrogen limited systems; low risk to beneficial use if allied responses are within normal ranges	levels typical of working landscapes; low risk to beneficial use if allied responses are within normal ranges	levels typical of working landscapes; low risk to beneficial use if allied responses are within normal ranges	characteristic of tile-drained lands; moderate risk to beneficial use if allied responses are elevated; increased risk with poor habitat	characteristic of tile-drained lands; moderate risk to beneficial use if allied responses are elevated (1.0% of observations)
	0.131-<0.400	levels typical of modestly enriched condition in nitrogen limited systems; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition; low risk to beneficial use if allied responses are within normal ranges; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors
	≥0.400	atypical condition (1.3% of observations)	atypical condition (1% of observations);	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors ; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors

"allied responses" = allied response indicators (24-hour DO swing, benthic chlorophyll)