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Leadership and Excellence in Environmental Engineering and Science

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Complying with the New EPA Multi-Sector General Industrial Stormwater Permit

A Range of Cost Alternatives

AAEES Webinar

March 29, 2023

Agenda

- Presentation team introductions
- Why stormwater matters
- What is the Multi-Sector General Permit?
- What can a facility do to prepare?
- Facility improvements to meet benchmarks

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Bill Carrig, P.M.P., Environmental Consultant

Tyler Marshall, P.E., ENV SP, Principal Environmental Engineer

Trent Humphrey, P.E., Environmental Engineer

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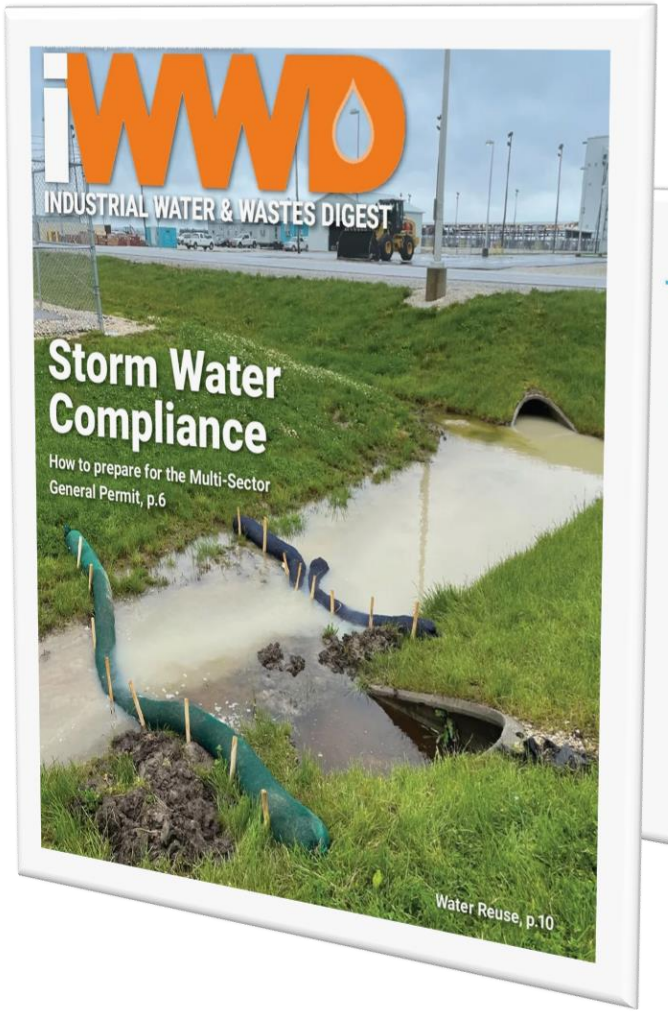
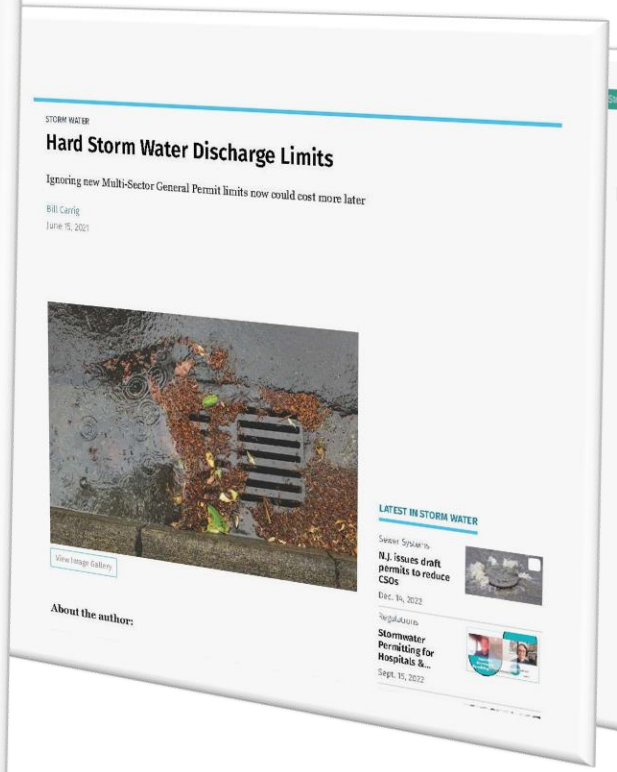




Bill Carrig
June 15, 2021

Trent Humphrey
Nov. 9, 2021

Tyler Marshall
Dec. 7, 2021

The Big Picture

- Stormwater is a primary mechanism of creation for problems on a global scale
  - Algae blooms
  - Dead zones
  - Garbage and microplastics
  - Emerging pollutants (PFAS, PFOA)

The Big Picture

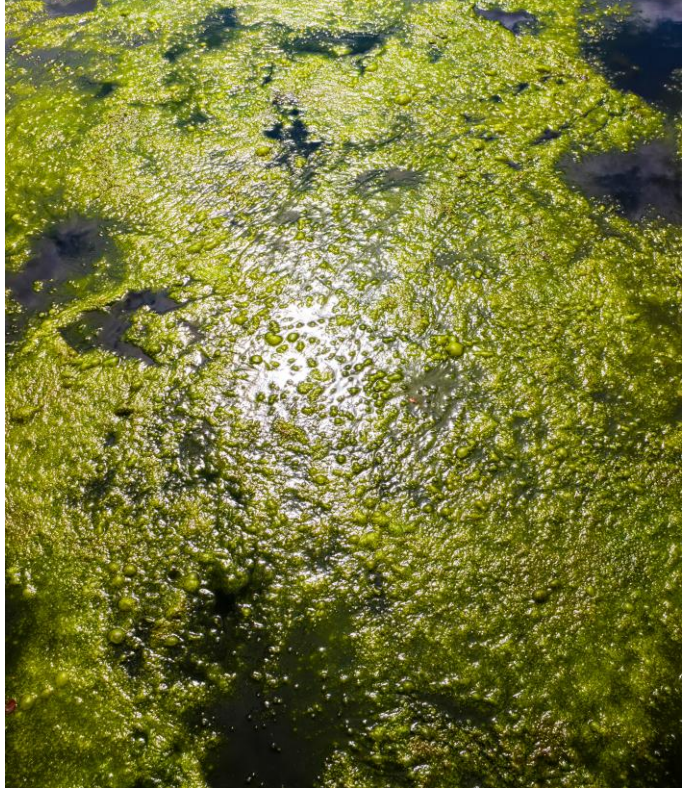
Stormwater pollutants can cause harmful algae blooms

Source: National Institute on Environmental Health Sciences

The Big Picture

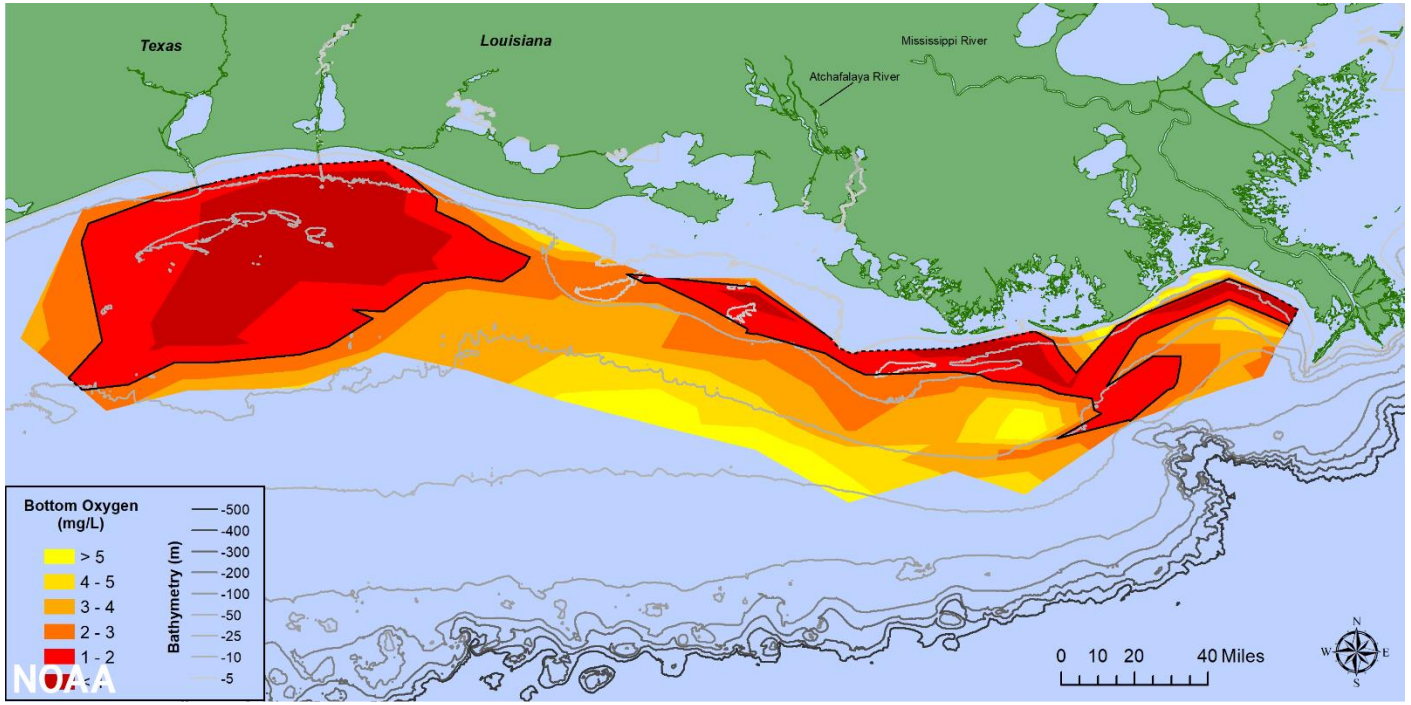
- Algae Blooms can be highly toxic, also removing oxygen

Source: Texas Parks and Wildlife Commission



The Big Picture

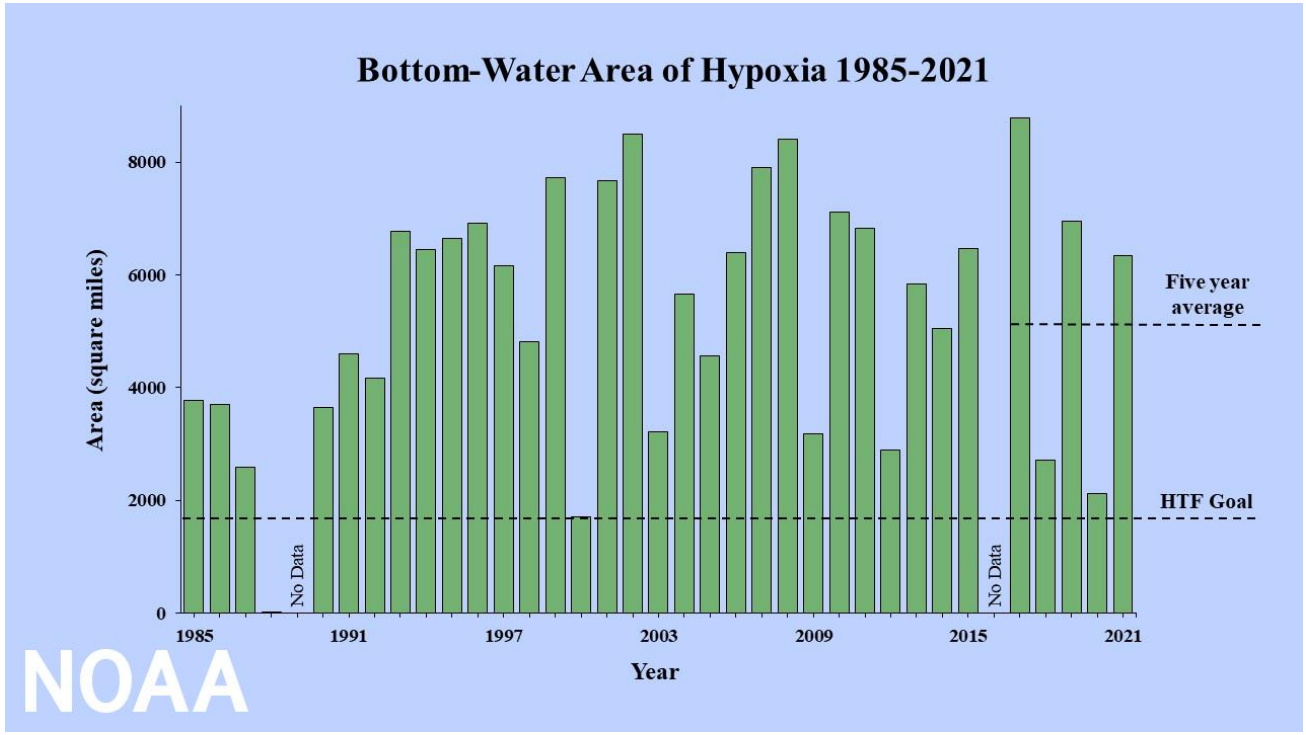
- Gulf of Mexico “Dead Zone” largely due to stormwater pollutants and eroded sediments



Source: NOAA

The Big Picture

- Even with increasing awareness, the dead zone is not going away soon



Source: NOAA

Increasing Community Concern About Stormwater

- Climate change impacts go beyond sea level rise
- Mechanism by which climate change is impacting inland communities
  - Increased peak flowrates
  - Aging infrastructure
  - Increasing urbanization
- Increasing regulation of stormwater quantity and quality

Stormwater is a Source of Environmental Toxics

		Annual Average Stormwater (urban land use types)			USEPA Chronic Water Quality Standard - Aquatic Life
Pollutant	Unit	Minneapolis, MN	Marquette, MI	Madison, WI	
Cadmium	(µg/L)		0.6	0.4	0.72
Copper	(µg/L)		22	16	9.34
Lead	(µg/L)	60	49	32	2.5
Zinc	(µg/L)		111	203	120

Source: Minnesota Pollution Control Agency

Stormwater Brings Nutrient Loading

		Annual Average – Urban Runoff		
Pollutant	Unit	Minneapolis, MN	Marquette, MI	Madison, WI
Biological Oxygen Demand	(mg/L)		15	
Chemical Oxygen Demand	(mg/L)	169	66	
Total Kjeldahl Nitrogen	(mg/L)	2.62	1.5	
Nitrate + Nitrite	(mg/L)	0.53	0.37	
Ammonia	(mg/L)		0.2	
Total Phosphorus	(mg/L)	0.58	0.29	0.66
Dissolved Phosphorus	(mg/L)	0.2	0.04	0.27
Total Suspended Solids	(mg/L)	184	159	262

Solutions to Global Problems Start with Local Actions

- Knowledge of stormwater impact is gradually shifting societal attitudes toward stormwater runoff
- Increasing pressure to change from grassroots and governmental levels

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Stormwater Management in the ESG Toolbox

- ESG driving facility management decisions
- Reducing pollutant loading is good for the **E**nvironment
- Many of the areas hit hardest by inadequate stormwater infrastructure are lower **S**ocial or economic status
- Because stormwater management is most efficient at the watershed scale, well-planned **G**overnance of improvements will allow for access to more funding and stacking of benefits

Changes in the Regulatory Environment

- Clean Water Act – 1972
- National Stormwater Permit Program – 1987
  - Origins of “industrial activity” and “MS4”
  - General Permits - most states develop their own stormwater permitting programs
- Phase II Rule – 1999
  - Expanded definitions and coverage
  - “Common Plan of Development”
  - Stormwater Pollution Prevention Plans

The Multi Sector General Permit

- Origins in the 1987 National Stormwater Program
- Federal regulations at 40 CFR 122.26(b)(14)(i)-(xi)
- Stormwater discharges associated with specific categories of industrial activity must have permit coverage

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“Stormwater Associated with Industrial Activity” - EPA

- If any of these operations generate precipitation runoff:
  - material handling equipment and activities
  - industrial machinery
  - raw materials
  - intermediate and final products
  - by-products
  - waste products

Sector Specific Requirements

- Industry sectors and benchmarks are applied based on facility Standard Industrial Classification (SIC) codes
- Individual outfalls may have separate sets of benchmarks if multiple SIC codes apply to a facility
- Sectors have benchmarks and specific pollution prevention

Recent Events Bring Significant Changes

- The 2021 MSGP replaces the 2015 version
- 2015 lawsuit challenged the provisions of the existing MSGP
- 2016 settlement agreement directed EPA to make the MSGP more robust in terms of monitoring and enforcement
- 2021 final language is less restrictive than the 2020 draft permit

So, What's the Big Deal?

- Historically, enforcement of stormwater has been mostly toothless
- Some states have narrative standards
  - Other states have benchmarks, but only tied to trying harder
- Few states had provisions where exceedances triggered enforcement, such as a violation of a water quality standard
- 2021 EPA MSGP adds Additional Implementation Measures for benchmark exceedances

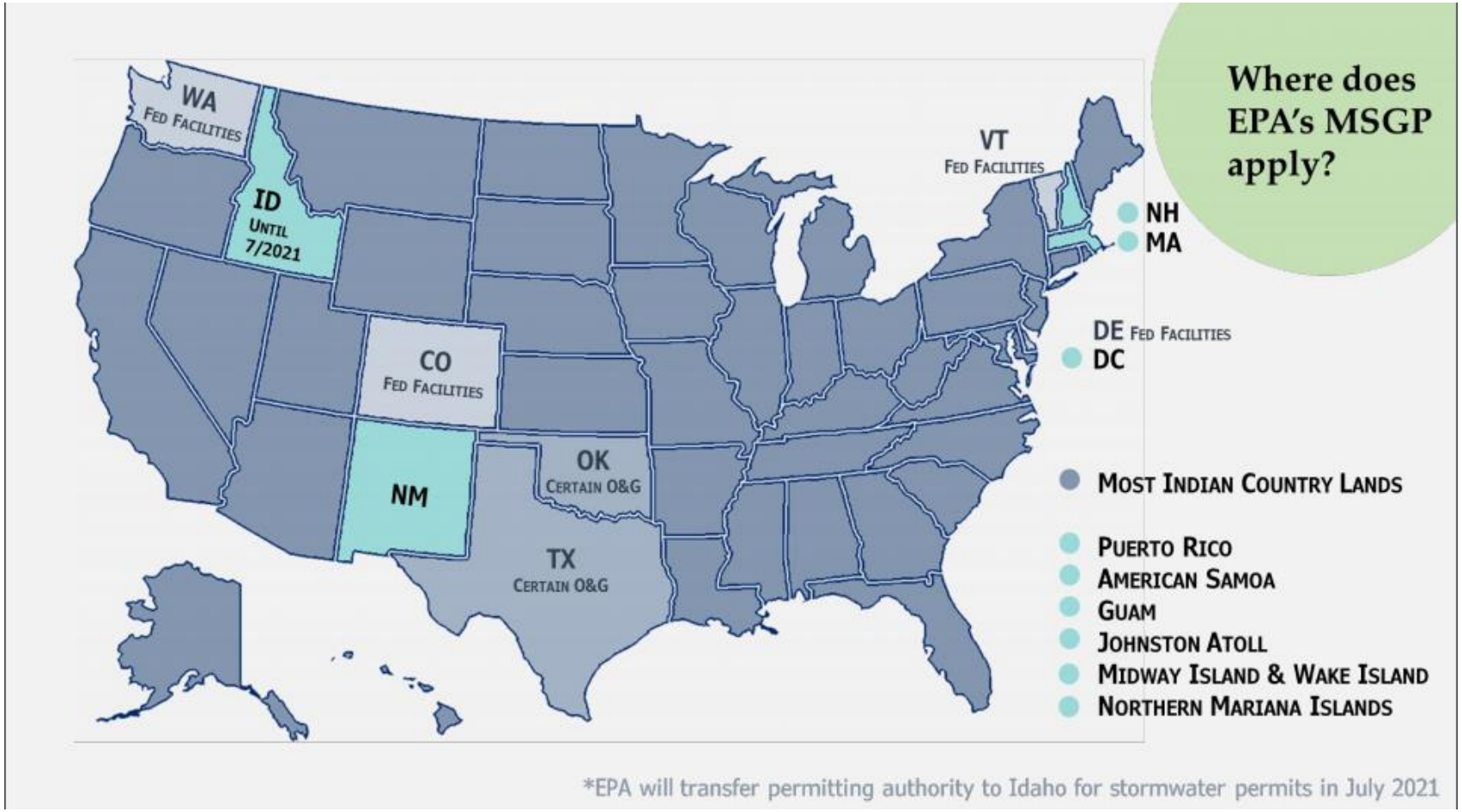
New MSGP Technical Requirements

- Changes to sampling and reporting frequency for indicators and benchmark pollutants
  - Many sectors will monitor quarterly for pH, TSS and COD at each outfall
- Monitoring required in at least first year of coverage and fourth year of coverage
- More monitoring if a facility discharges to an impaired waterway or does not meet benchmarks
- Tiered corrective actions

New MSGP Administrative Requirements

- Stormwater pollution plan to be sent with notice of intent
- Public notification of corrective actions if serious benchmark exceedances occur
- Site signage requirements to indicate permit and SWPP coverage for the facility

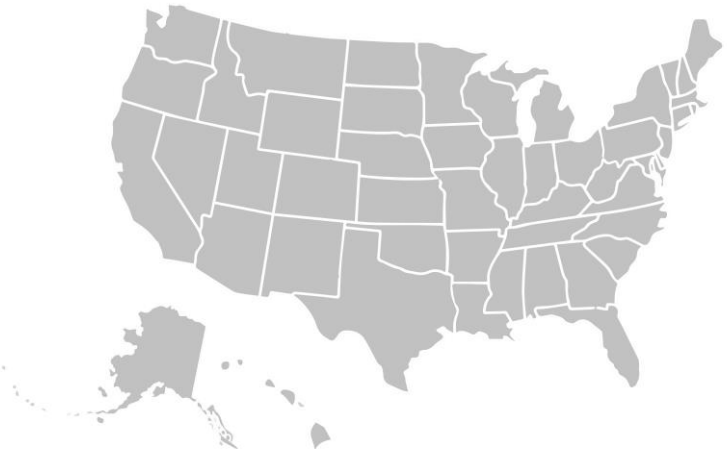
EPA – Administered Programs



Source: EPA 2021

Changes for Individual States

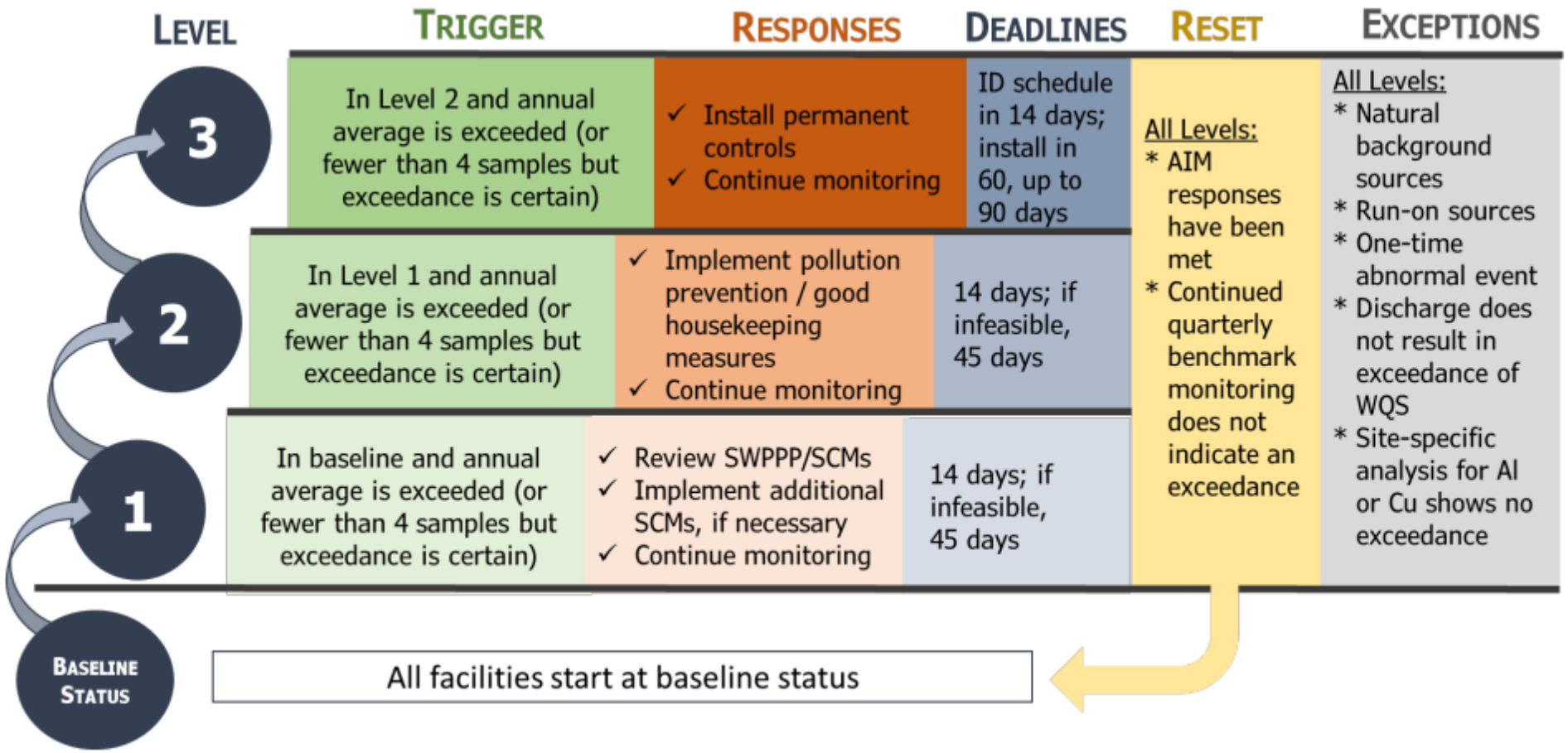
- Most states already have some form of benchmarks
- Many states will see benchmarks expand to additional sectors and industries, while others may only see the additional compliance requirements



What are Additional Implementation Measures?

- AIMs are tied to a three-tiered approach to compliance monitoring
- Benchmark sampling (if required) is compared to benchmarks
  - If the annual average is below the benchmark after year 1, sampling can be discontinued until year 4
- Benchmark exceedances trigger Additional Implementation Measures (AIMs) to try to correct the cause

AIM Level Progression



Example Benchmarks

8.U.7 Sector-Specific Benchmarks (See also Part 4.2.2)

Table 8.U-2 identifies benchmarks that apply to the specific subsectors of Sector U. These benchmarks apply to both your primary industrial activity and any co-located industrial activities.

Table 8.U-2.

Subsector (You may be subject to requirements for more than one Sector / Subsector)	Parameter	Benchmark Monitoring Concentration
Subsector U1. Grain Mill Products (SIC 2041-2048)	Total Suspended Solids (TSS)	100 mg/L
Subsector U2. Fats and Oils Products (SIC 2074-2079)	Biochemical Oxygen Demand (BOD_5)	30 mg/L
	Chemical Oxygen Demand (COD)	120 mg/L
	Nitrate plus Nitrite Nitrogen	0.68 mg/L
	Total Suspended Solids (TSS)	100 mg/L

Example Benchmarks

Table 8.AA-2		
Subsector (You may be subject to requirements for more than one sector/subsector)	**Parameter**	**Benchmark Monitoring Concentration**
Subsector AA1. Fabricated Metal Products, except Coating (SIC 3411-3499; 3911-3915)	Total Recoverable Aluminum	1,100 µg/L
	Total Recoverable Zinc (freshwater)[2] Total Recoverable Zinc (saltwater)[1]	Hardness Dependent 90 µg/L
	Nitrate plus Nitrite Nitrogen	0.68 mg/L
Subsector AA2. Fabricated Metal Coating and Engraving (SIC 3479)	Total Recoverable Zinc (freshwater)[2] Total Recoverable Zinc (saltwater)[1]	Hardness Dependent 90 µg/L
	Nitrate plus Nitrite Nitrogen	0.68 mg/L

What Should Industries do to Prepare?

- Look at the 2021 MSGP, even if your state has their own permit
- Look for your sector and the requirements associated with it
- Start working towards compliance now

How much time do facilities have to prepare?

- States without benchmarks or corrective actions will likely implement with the next stormwater general permit cycle
- This may seem long, but time flies
- Starting early can make potential capital expenditures easier to absorb

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First Steps

- Start looking at your stormwater quality now - begin sampling for benchmarks
- If you comply, keep up the good work
- If you are not in compliance, start looking for the source

Source Identification

- Look at your sampling procedure
  - Is your outfall accessible?
  - Are you stirring up sediment while collecting your sample?
  - Do you have off-site flows comingling with your stormwater?
  - Are you sampling the right type of storm event, and collecting your sample at the right time?
- Improving your outfall accessibility can quickly and cheaply enhance sample quality, as well as worker safety

Targeted Sampling to Find Sources of Pollutants

- Begin working upstream from your sample point
- Collect samples from manholes or swales within the major sub-basins of your facility
- Try to correlate significant activity locations with high pollutant loads
  - Stockpiles
  - Material handling
  - Roof vents, stacks
- Consider biological sources

Grab and Composite Samples at Internal Locations

- Grab samples are taken within the first 30 minutes of discharge
- Composite samples can be collected every 15 minutes generally for three hours
- These two types of sampling activities can show a picture of what is flowing in a site's stormwater
- Consider sampling multiple storm events to collect data

Consider Automated Samplers

I found my sources, what next?

- Look for ways to reduce your sources – generally quickest and cheapest answer

Source Reduction

- Improved housekeeping and inspections
- Check performance of air pollution control equipment
- Move loading and stockpile areas under roof or cover
- Summaries of sector specific requirements as well as suggestions for common best management practices (BMPs) are found at: https://www.epa.gov/npdes/industrial-stormwater-fact-sheet-series

What to do if you end up in AIM Level 3?

- Source reduction, housekeeping, training, and improved sampling will address many AIM 1 or AIM 2 situations
- Many industries will have difficulty complying with the benchmarks and will wind up in AIM Level 3
- By starting early, you can minimize the cost of facility improvements under AIM 3

Why is stormwater a challenge to treat?

- Municipalities struggle with stormwater treatment and treatment plant surges
- Industrial stormwater presents a unique challenge
- Many solutions developed for municipal and urban stormwater do not translate well

High Volume

- Precipitation events can generate a large amount of water in a short period of time
- The size of the watershed can cause even a small facility to have a very large amount of runoff
- Traditional physical or chemical treatment require a very large volume to get the flow velocity low enough to be effective.

Extreme Swings in Flow

- Storm runoff is very peaky
- From zero flow to maximum flow in the space of hours or even minutes
- Treatment facilities must be sized to handle peak flow rates without losing function
- Undersized units can have pollutants blown out during extreme events, if not designed correctly
- Must also be able to handle long periods of no flow

The Solution to Pollution…

- Stormwater is very dilute
- Conventional biological treatment is usually ineffective
- Lack of concentration of building blocks for bacterial growth means poor environment for the bacteria to grow

Source Volume Reduction

- Eliminate non-regulated stormwater
- Off-site flow contributions may be re-piped or re-graded
- Non-industrial stormwater can be sent to a separate outfall
- Move industrial activities contributing stormwater pollution to a smaller area
- If the volume is reduced sufficiently, consider re-piping high strength stormwater flows to existing treatment

Equalization

- Retention basins, ponds, or in-ground units can act as buffers to reduce peak flows
- Equalizing flows can drastically reduce the required size of treatment units in terms of peak flow capacity
- Prevents the issue of treatment unit blow out
- Reduced treatment size means reduced cost
- Equalization cost $$ <<< treatment cost $$

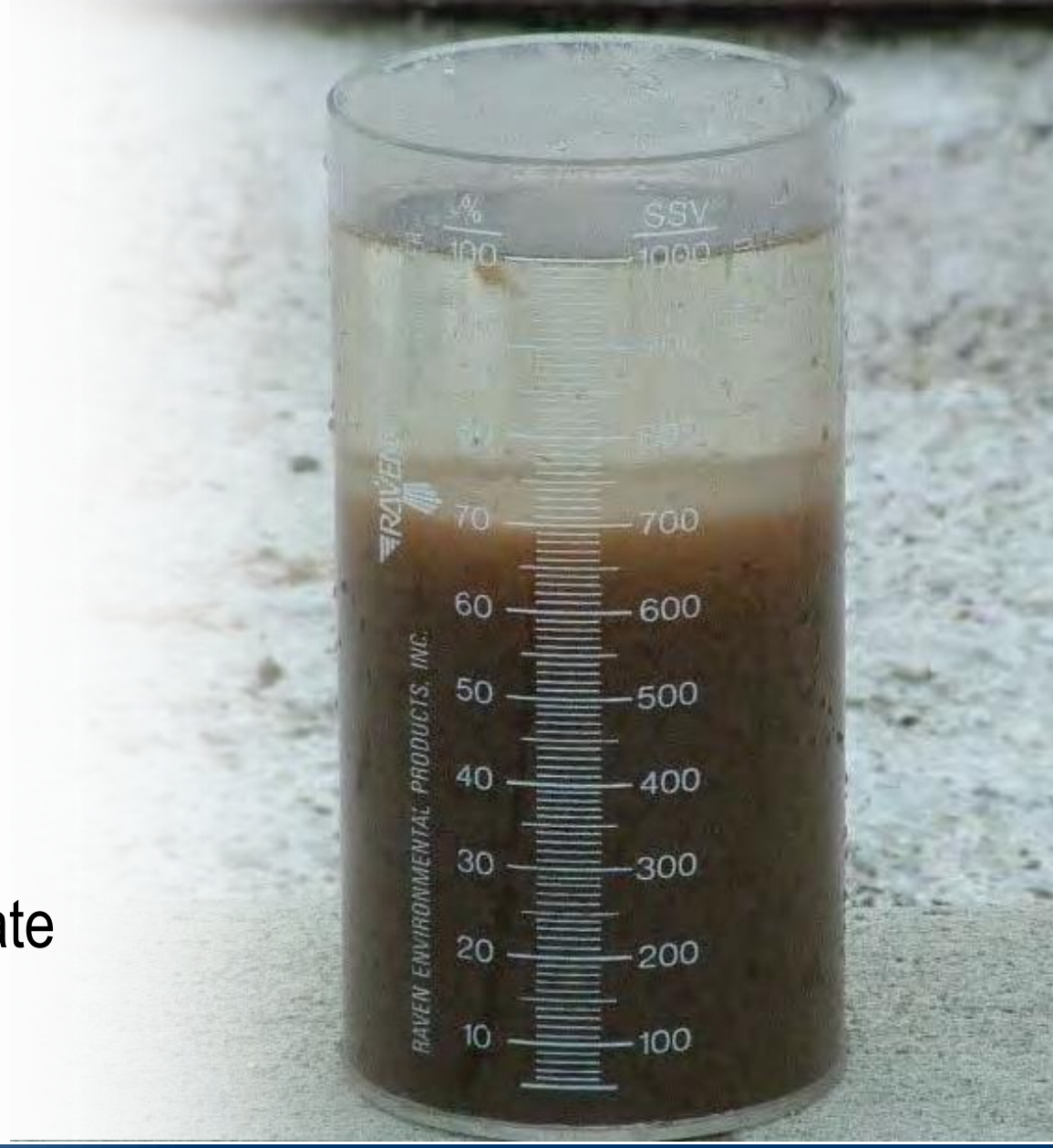
Select the right treatment systems

- Match treatment systems to your site
- Are your pollutants dissolved, or particulate?
- Are your pollutants organic or inorganic?
- The best treatment options combine aspects of equalization and treatment

Sedimentation / Settling

- Commonly in use for construction
- Provides some degree of equalization
- Serve as stormwater retention if required by local code
- Can provide oil spill or chemical spill containment if designed correctly
- Can be chemically enhanced
- Need to be sized correctly to provide adequate settling time for your pollutant profile

Source: Ohio EPA

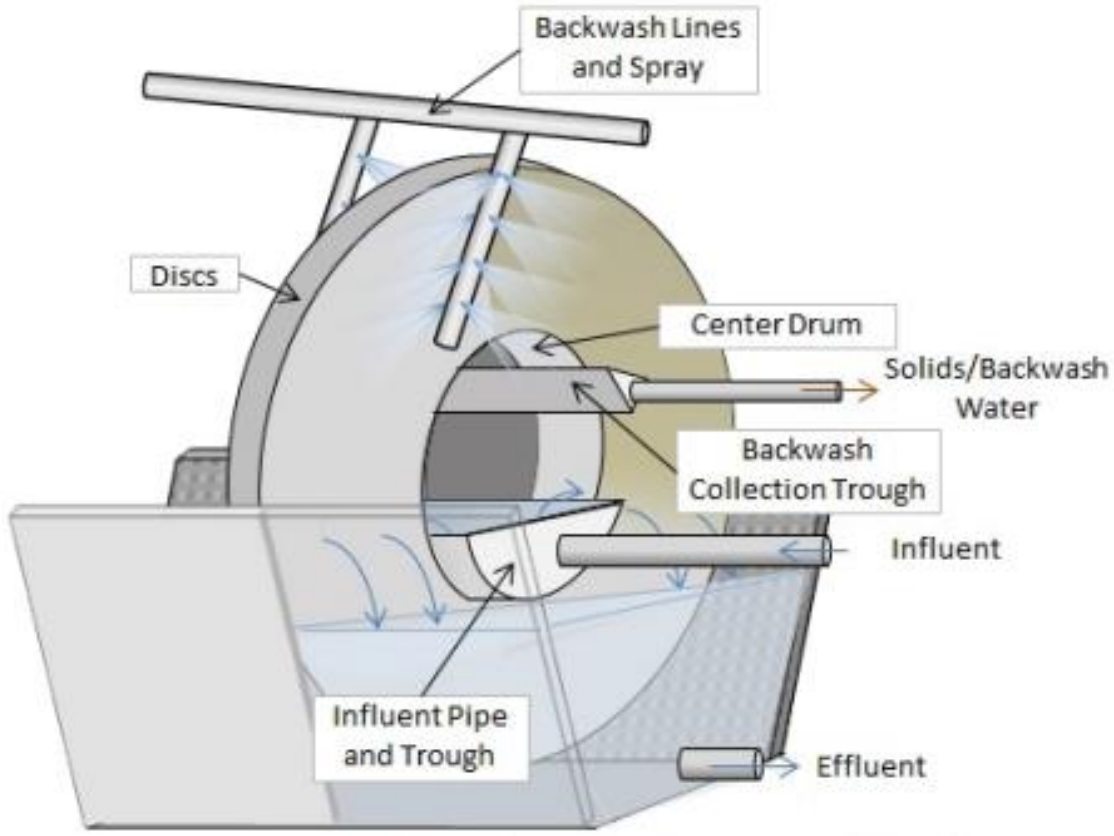


Engineered Wetlands

- Excel at treating stormwater
- Provides equalization as well as treatment
  - Solids and metals absorbed by plants and bound in place by plant roots
  - Both dissolved and particulate pollutants
  - Nutrients such as nitrogen and phosphorus are taken up by wetlands plants and bacteria
  - The drawback is the comparatively large footprint
  - Limitations on effectiveness in colder climates, but not as much of a problem for stormwater quality compliance

High Performance – High Rate (High Dollar)

- Traditional physical and chemical treatment can achieve very low pollutant levels
- High volume treatment typically requires large amounts of equalization or oversized treatment for peak flows
- Most technologies designed for solids separation can be adapted to stormwater



Picture source: Wisconsin DNR

The Problem of Space

- Many facilities do not have space for treatment
- Underground units can make parking areas do double duty but are more expensive

Photo source: Wilkipedia

Stormwater Funding

- Increasing opportunities for federal, state, and local funding
  - EPA announced $6.5 Billion for water infrastructure in 2022
  - Many state and local loans and grants are open to both public and private projects
- Multi-use projects (i.e. trails and habitat along with wetlands) increases funding opportunities

Get Creative!

- Many facilities are adjacent to vacant or abandoned lands such as floodplains or brownfield sites
- Consider public-private partnership to transform this land into engineered wetlands
- Stacking of many benefits: stormwater quality, public recreation trails, habitat enhancement, flood reduction
- Adding public entities as stakeholders also unlocks sources of funding: federal, state, local, including grants and loan programs
- Can provide valuable public relations for a facility

Stormwater as a Career

- Increasing awareness, funding, and regulation means more demand for stormwater professionals
- Science-focused
  - Meteorology, hydrology, environmental science
- Engineering-focused
  - Civil, environmental, mechanical, transportation
- Administrative or holistic
  - Sustainability, public administration

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Thank You!

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