

Stormwater Regulatory Update

2019 National Academy of Sciences Report

Guest: Dr. Allen Davis



Dr. Allen Davis

Professor
Department of Civil and
Environmental Engineering at the
University of Maryland

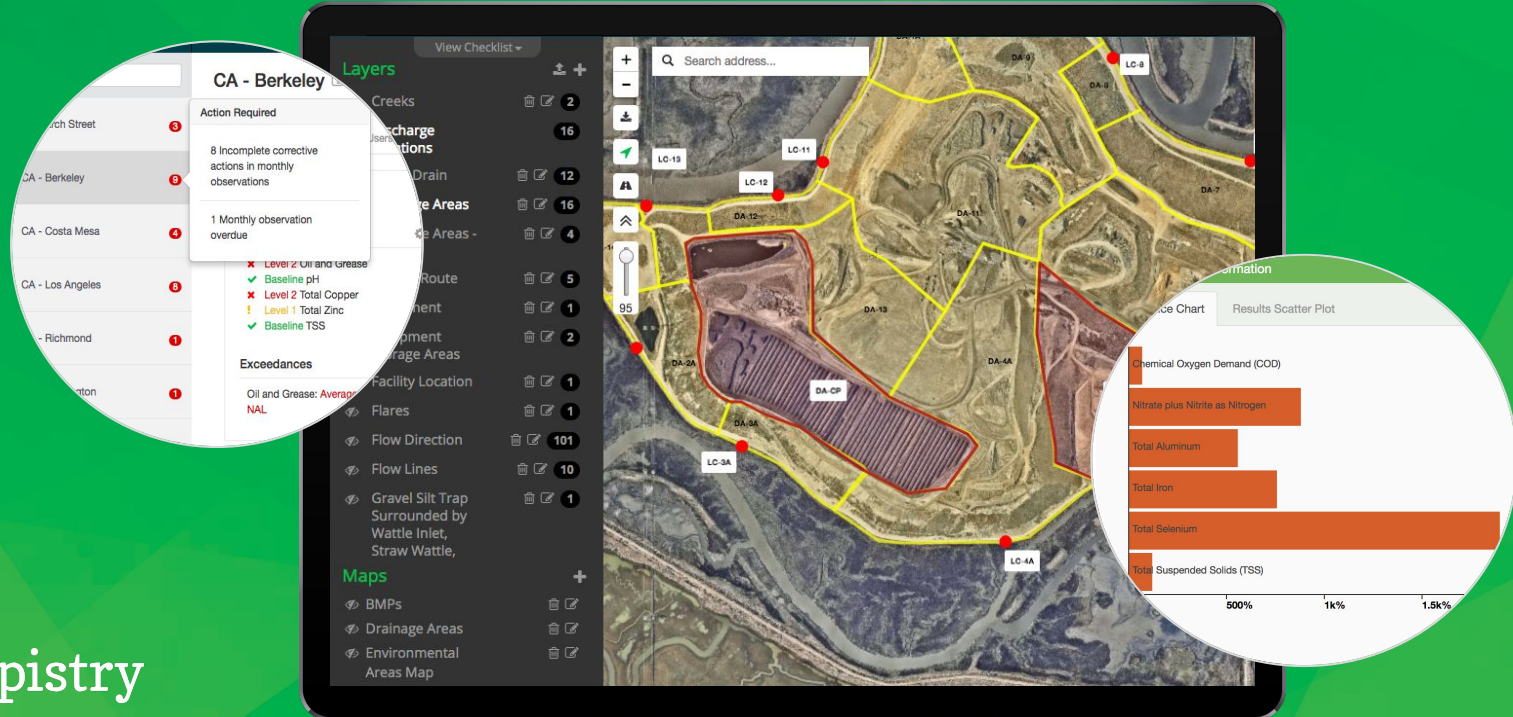


Ryan Janoch, PE

Mapistry
Co-founder & COO



Software for Ensuring Environmental Excellence

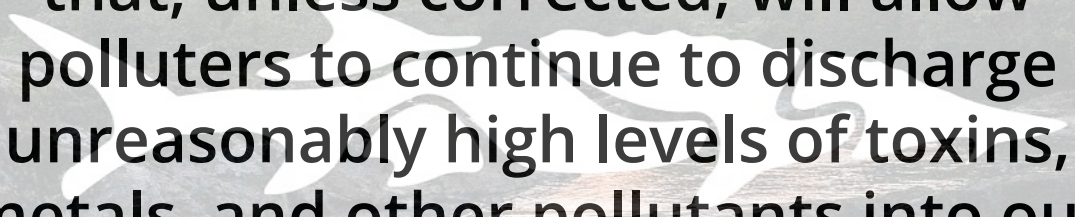


A person in a suit is holding a document titled "LAWSUIT" over a desk. The desk has a calculator and a notebook. The image is overlaid with a blue tint.

LAWSUIT

National Academy of Sciences Report

Waterkeeper Alliance v. United States EPA

The logo of the Waterkeeper Alliance, featuring a stylized white bird or fish shape with the words "WATERKEEPER ALLIANCE" written in a light, sans-serif font across its body.

“There are serious deficiencies in EPA’s industrial stormwater permit that, unless corrected, will allow polluters to continue to discharge unreasonably high levels of toxins, metals, and other pollutants into our waterways—and these deficiencies are illegal”.

Questions?

apdavis@umd.edu

ryan@mapistry.com

Committee's Overarching Statement

*"As electronic reporting of industrial stormwater monitoring data becomes **fully implemented and integrated for all states**, large amounts of valuable industrial **stormwater data will be available for analysis, evaluation**, and identifying areas for improvement."*

- National Academy of Sciences Report 2019

Waterkeeper Alliance v. United States EPA

“We are deeply disappointed with EPA’s failure to set numeric limits in this permit after spending so much time and effort to bring ‘Big Data’ to the world of water pollution.

[The] EPA worked with states to develop electronic water pollution records, then it linked those records together into a national system. Today, EPA can draw on hundreds of thousands of data points collected by polluters across the country, in every line of business, to set clear, achievable pollution limits for industrial stormwater. But EPA didn’t even consider trying to set clear, numeric limits.”

-Reed Super, Lawyer for Waterkeeper Alliance

The Evolving Challenge of Stormwater

Preparing for the Next-Generation MSGP Industrial Stormwater Permit

Allen P. Davis, PhD, PE

Charles A. Irish Sr. Chair in Civil Engineering

Department of Civil and Environmental Engineering

Department of Plant Science and Landscape Architecture

University of Maryland

College Park, MD 20742



Mapistry Webinar, April 24, 2019

A discussion of the *National Academies of
Sciences, Engineering, and Medicine*
Committee Report on
*Improving the EPA Multi-Sector General
Permit for Industrial Stormwater Discharges*



Statement of Task

1. Suggest improvements to the current MSGP benchmarking monitoring requirements.
2. Evaluate the feasibility of numeric retention standards.
3. Identify the highest priority industrial facilities/subsectors for consideration of additional discharge monitoring.

"highest priority" = subsectors for which the development of numeric effluent limitations would be most scientifically defensible (based upon sampling data quality, data gaps and the likelihood of filling them).



Committee

- ❑ **Allen P. Davis**, *Chair*, Univ. of Maryland, College Park
- ❑ **Roger T. Bannerman**, Wisconsin Dept. of Natural Resources (Retired)
- ❑ **Shirley E. Clark**, Penn State, Harrisburg
- ❑ **L. Donald Duke**, Florida Gulf Coast Univ.
- ❑ **Janet S. Kieler**, Denver International Airport
- ❑ **John D. Stark**, Washington State Univ.
- ❑ **Michael K. Stenstrom**, UCLA
- ❑ **Xavier Swamikannu**, UCLA; CA Water Board, LA Region (Retired)

NASEM staff: Stephanie E. Johnson and Carly Brody

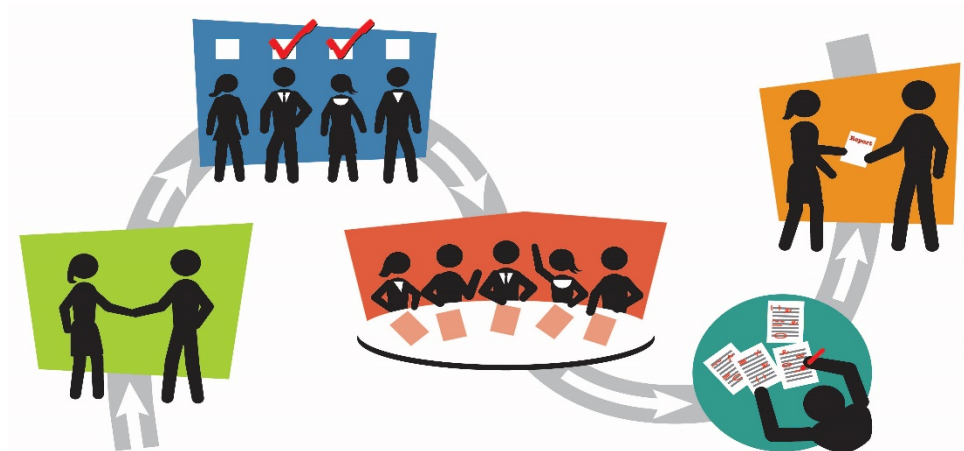


Study Process

5 in-person committee meetings (Nov. '17 to Sept. '18)

Other information-gathering sessions

Product: Peer-reviewed consensus report



Report

- **Feb 4** Delivered to EPA
- **Feb 12** EPA briefing
- **Feb 20** Public release
- **Feb 27** NASEM Webinar

PREPUBLICATION COPY

Improving the EPA Multi-Sector General
Permit for Industrial Stormwater Discharges

A Consensus Study Report of
The National Academies of
SCIENCES • ENGINEERING • MEDICINE

NOT FOR PUBLIC RELEASE BEFORE

February 20, 2019
At 11:00 a.m. ET

THE NATIONAL ACADEMIES PRESS
Washington, DC
www.nap.edu

Report Chapters

2. Pollutant monitoring requirements and benchmark thresholds
3. Stormwater sampling and data collection
4. Retention standards in the MSGP

16 Specific Recommendations

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Recommendations - 2

POLLUTANT MONITORING REQUIREMENTS AND BENCHMARK THRESHOLDS

1. EPA should update the MSGP industrial sector classifications so that requirements for monitoring extend to non-industrial facilities with activities similar to those currently covered under the MSGP.



Activity at a site is important when it comes to stormwater

SIC codes are not ideal for characterizing the industrial activities that occur at a site with the potential risk of stormwater pollution.

- Timber lots,
- Fuel storage and onsite fueling,
- Vehicle maintenance (e.g., school bus transportation facilities),
- Facilities with numerous parked diesel vehicles,
- Outdoor materials storage that pose stormwater contamination threats (e.g., liquid tanks with operational valves or in poor condition, solids such as salt or wood chips that are exposed to stormwater),
- Outdoor handling of materials (e.g., filling liquid tank trucks, conveyors handling solids in particulate form)

Recommendations - 2

2. EPA should require industry-wide monitoring under the MSGP for pH, total suspended solids (TSS), and chemical oxygen demand (COD) as basic indicators of the effectiveness of stormwater control measures (SCMs) employed on site.



Photo Credit: EPA

pH, TSS, & COD

EPA should require industry-wide monitoring for pH, TSS, and COD

Broad indicators of SCM effectiveness (or failure)

Baseline understanding across all sectors

Relatively low cost when added to visual monitoring



Photo Credit: EPA

Why COD?

- *Surrogate measure of organic contamination of stormwater*
 - *Petroleum products*
 - *PAH toxicity?*
- *TOC has several advantages over COD*
- *Recommend change to TOC once TOC benchmarks are established*



Photo Credit: EPA

Recommendations - 2

3. EPA should implement a process to periodically review and update sector-specific benchmark monitoring requirements that incorporates new scientific information.
4. Benchmarks should be based on the latest toxicity criteria
 - Develop acute aquatic life criteria for benchmarks where they do not currently exist, or develop equations to translate chronic criteria based on intermittent exposures.
 - Revisit the application of three benchmarks (iron, arsenic, and selenium).

Recommendations - 2

- Allow permittees with repeated benchmark exceedances to use the latest aquatic life criteria for selenium and copper to evaluate water quality risk on a site-specific basis and discontinue comparisons to national benchmarks, as appropriate.
- **Based on little evidence of adverse effects to aquatic organisms at common levels, suspend or remove the benchmarks for magnesium and iron; benchmarks for these metals can be reinstated if/when acute aquatic life criteria are established or benchmarks are developed based on chronic effects from intermittent exposure.**
- Express all benchmarks in the units from which they are derived

Episodic nature of stormwater

Wet weather exposure: Short-term event

For toxic pollutants, benchmarks should be based on acute toxicity criteria

For bioaccumulating pollutants, develop a translator concentration for use as benchmark



Photo Credit: EPA

Fe and Mg

Fe benchmark is based on chronic criterion (1000 $\mu\text{g/L}$). No acute aquatic toxicity criterion exists.

It is unclear why Mg is part of the MSGP
No acute aquatic toxicity criterion exists.

Suspend benchmarks for iron and magnesium. Develop acute aquatic life criterion (e.g., iron)



Recommendations - 2

5. Additional monitoring data collection on the capacity of SCMs to reduce industrial stormwater pollutants is recommended.

- Industries and industry groups should collect scientifically rigorous performance data for common SCMs under typical stormwater conditions to expand the knowledgebase and inform future decision making.
- EPA should encourage industries to collect these data and make them publicly available, such as uploading to the International Stormwater Best Management Practices (BMP) database.
- EPA should support maintenance of these data for industrial stormwater.

Recommendations - 2

6. Because of the paucity of rigorous industrial SCM performance data, the development of new numeric effluent limits (NELs) is not recommended for any specific sector based on existing data, data gaps, and the likelihood of filling them.

Recommendations - 3

STORMWATER SAMPLING AND DATA COLLECTION

1. EPA should update and strengthen industrial stormwater monitoring, sampling and analysis protocols and training to improve the quality of monitoring data.
 - Consider a training or certificate program in stormwater collection and monitoring to ensure that required sampling and data collection is representative of stormwater leaving the site to the greatest extent possible.
 - **Stay abreast of advancements in monitoring, sampling, and analysis technology that can provide more or better quality information for similar or reduced costs and consider these in future revisions of the MSGP.**

Sampling and Data Collection

Future use of sensors and technology in industrial stormwater monitoring

- UAV photography
- Mobile apps
- In-line, real-time sensors
 - *Rainfall*
 - *pH*
 - *Turbidity (instead of TSS)*
- Predictive weather capabilities



Washington Stormwater Sampling Manual

Recommendations - 3

2. EPA should allow and promote the use of composite sampling for benchmark monitoring for all pollutants except those affected by storage time.
3. **Quarterly stormwater event samples collected over one year are inadequate to characterize industrial stormwater discharge or describe industrial SCM performance over the permit term.**
4. National laboratory accreditation programs with a focus on the stormwater matrix and interlaboratory calibration efforts would improve data quality and reduce error.

Sample Frequency and Number

- *Quarterly grab sampling over 1 year inadequate to characterize stormwater and SCM performance*
 - *Large error with only 4 grab samples*
 - *EPA should determine minimum sample number for acceptable level of error, balanced with risk*

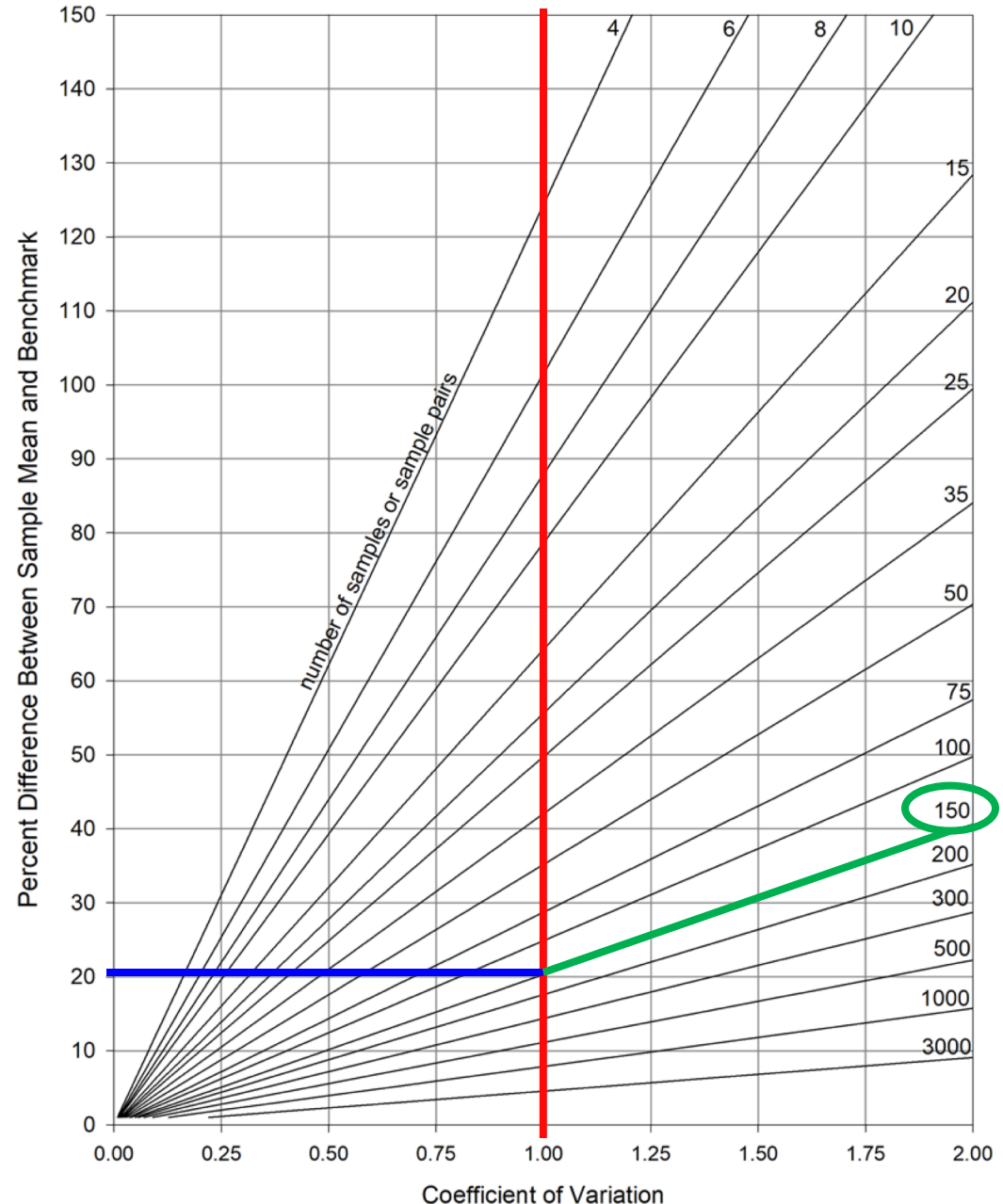


Photo Credit: RaleighNC.gov

Variability of Stormwater

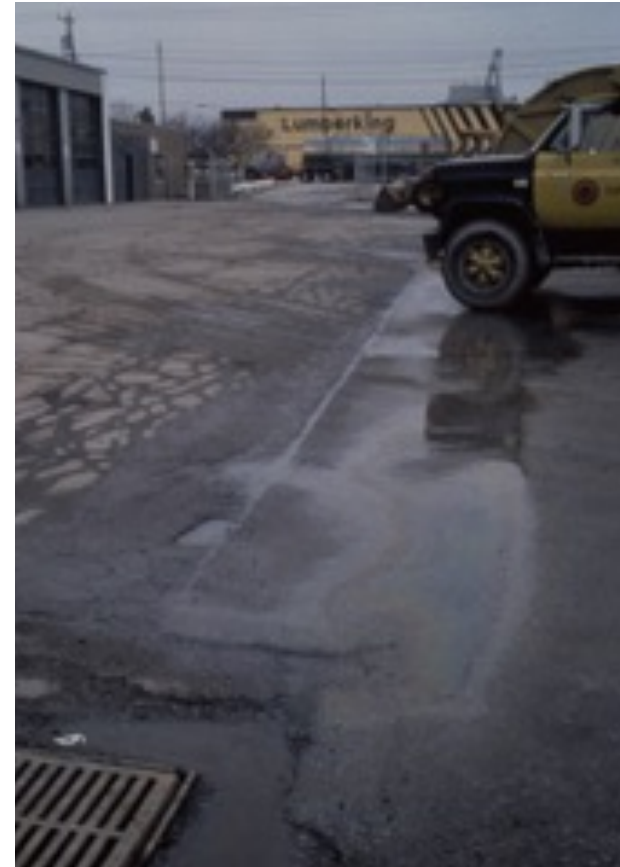
- Coefficient of Variation = 1.0 among samples
- 20% allowable difference between sample and benchmark
- 150 samples!

Number of Samples or Sample Pairs Needed
(Power = 80% Confidence = 95%)



Sample Frequency and Number

- *Recommend annual sampling at minimum*
 - *Current MSGP allows discontinuation of sampling if benchmarks met*
 - *Many changes possible at site throughout permit term*
 - *Rainfall variations*
 - *Product and Process*
 - *Personnel*



Recommendations - 3

5. EPA should expand its tiered approach to monitoring within the MSGP, based on facility risk, complexity, and past performance.

The committee proposes four categories:

1. Inspection only.
 2. Industry-wide monitoring only.
 3. Benchmark monitoring
 4. Enhanced monitoring
-
6. EPA should enhance electronic data reporting and develop data management and visualization tools.

Tiered Monitoring

1. Inspection Only

Low-risk facilities (small size of exposed activity)
Inspection in lieu of chemical monitoring

- *Certified inspector*
- *Review Permit & SWPPP*
- *Walk site*
 - *Verify SWPPP*
 - *Verify SCMs*
- *Identify problems/actions*
- *Education*
- *Report (public)*



Photo Credit: KingCounty.gov

Tiered Monitoring

"Low Risk"

Activity	Conditions that will attain "low risk"
Outdoor temporary storage of "factory floor wastes" such as lumber, containers, debris	<p>Intent: Low volume of water contacts surfaces where residuals may accumulate.</p> <p>Possible criteria: Containers covered. No process chemicals or hazardous substances. Residuals that may fall to surfaces removed, and surfaces cleaned, in at most 5 days, with verified operating procedure in place.</p>
Outdoor storage of waste, scrap, equipment believed potentially usable in future	<p>Intent: Should be routinely maintained, unusable items removed, and kept to minimal space, with no items stored long-term. Stored on impermeable hard surface.</p> <p>Possible criteria: Storage area no larger than 100 m². No materials that contain or have exposed patches of lubricants, fuels, or process liquids. Routinely inspected to remove wastes, with verified operating procedure.</p>
Outdoor materials handling or transport of packaged materials or drums of liquids or particles	<p>Intent: Handling infrequent, materials well-packaged, with detailed spill prevention and response procedures in place</p> <p>Possible criteria: Handling limited to one hour of operations daily (weekly average). Verified operating procedure includes inspection after each handling operation to identify, remove, or clean up spills, leaks, and debris.</p>

Tiered Monitoring

"Low Risk"

Activity	Conditions that will attain "low risk"
Vehicles or equipment used outdoors or in plant yard (small trucks, forklifts, hand trucks, etc)	<p>Intent: Vehicles well maintained so fuels and lubricants do not leak.</p> <p>Possible criteria: Vehicle maintenance, fueling, and cleaning conducted indoors. Vehicles used less than one hour per day, weekly average. Vehicles do not operate outdoors during precipitation, or else vehicles are routinely cleaned indoors to keep free of pollutants that may accumulate on vehicle surfaces.</p>
Material handling/loading areas, loading docks or doors	<p>Intent: Limited in number and in frequency of usage.</p> <p>Possible criteria: Materials handled in packaged, boxed, or drum form - no handling of materials in powder, liquid, or slurry form, and no hazardous or toxic materials. No more than 3 loading docks, with no more than 5 loadings/unloadings each per week. Verified operating procedures for inspection and cleaning.</p>
Vehicle maintenance	<p>Intent: Vehicle maintenance limited to non-polluting activities</p> <p>Possible criteria: No washing of vehicles with accumulated surface residuals except indoors or in areas with separate drains to process wastewater. Vehicle fueling prohibited in locations exposed to stormwater. Lubricant and liquids work only in small amounts (e.g. one oil change volume) with proper trays and spill avoidance/response procedures and on hard surface. Verified operating procedures include inspection and cleaning of these areas.</p>

Tiered Monitoring

2. Industry-wide monitoring (pH, TSS, COD):

*Those without benchmark monitoring, and
Do not qualify (or opt) for inspection only*

3. Benchmark monitoring:

*Similar to existing MSGP, except:
Includes pH, TSS, COD
Periodic updates*

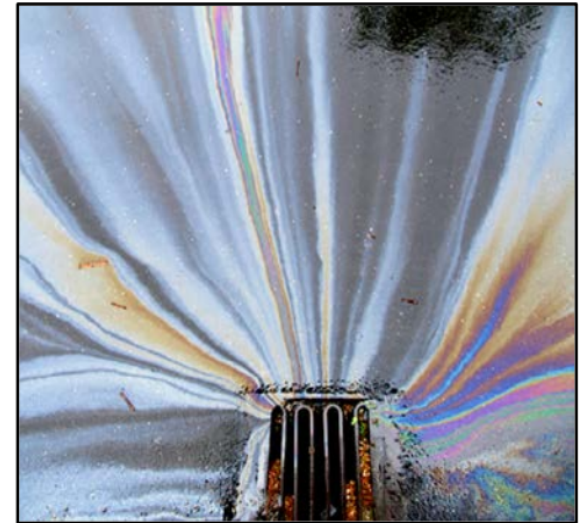
Tiered Monitoring

4. Enhanced Monitoring

For repeated exceedances or complex sites
Could include more rigorous monitoring and modeling:

- *Composite sampling*
- *Dissolved metals*
- *Wet-weather mixing*
- *Biotic ligand model*

*Sites that fall into proposed AIM
(Additional Implementation Measures)*



Washington Stormwater Sampling Manual

Additional Implementation Measures (AIM)

Part of settlement agreement (for public comment):

Tier 1: Annual average over threshold

Single sample 4x threshold

Review & Implement

Tier 2: Two consecutive annual ave over threshold

Two samples 4x threshold

Single sample 8x threshold

Implement

Tier 3: Three consecutive annual ave over threshold

Three samples 4x threshold

Two samples 8x threshold

Four samples over threshold & ave 2x

Install

Recommendations - 4

CONSIDERATION OF RETENTION STANDARDS IN THE MSGP

1. Rigorous permitting, (pre)treatment, and monitoring requirements are needed along with careful site characterization and designs to ensure groundwater protection in industrial stormwater infiltration systems
2. Site-specific factors and water quality based effluent limits render national retention standards for industrial stormwater infeasible within the existing regulatory framework of the MSGP.

Recommendations - 4

3. EPA should consider incentives to encourage industrial stormwater infiltration or capture and use where appropriate.
4. EPA should develop guidance for retention and infiltration of industrial stormwater for protection of groundwater.



Photo Credit: City of Columbia, MO

Summary

Tiered monitoring framework could improve quality of data while reducing burden to lowest-risk facilities

MSGP should incorporate the best available science with each permit revision


- *a structured review process that addresses scientific advances and data gaps*
- *continuously incorporate more sophisticated monitoring, training, and data analysis tools*

Questions?

Full report at <https://www.nap.edu/catalog/25355>

Also available on this page under “Resources” tab:

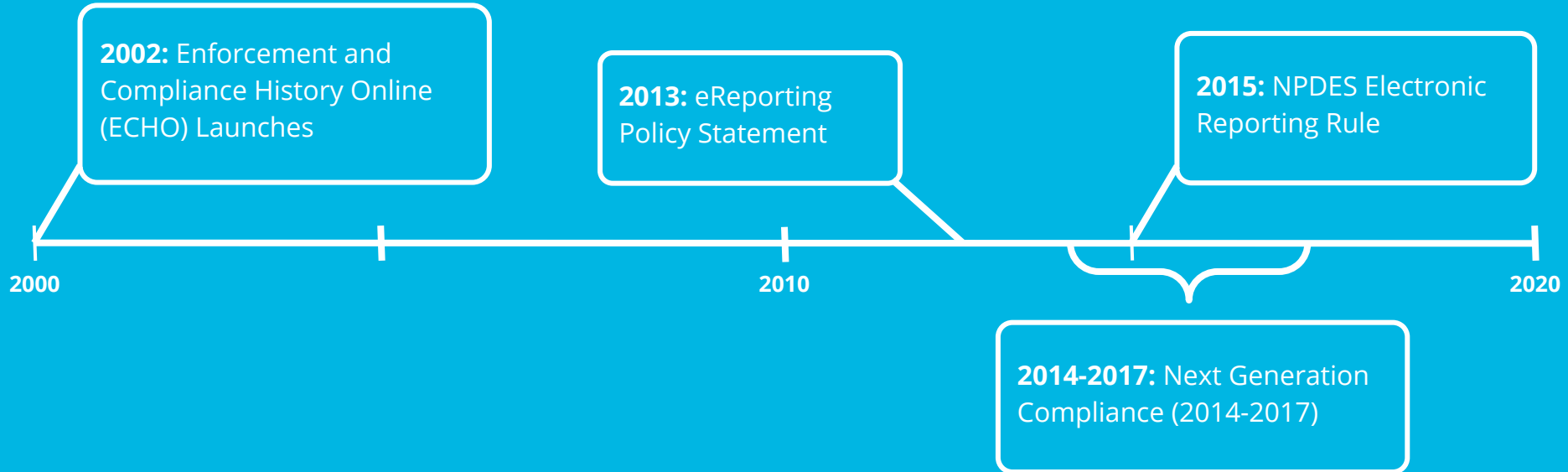
- *Press release*
- *4-page report-in-brief*
- *NASEM webinar recording*



Mandated online reporting
exposes your environmental
deficiencies to the world

A History of Electronic Reporting

Environmental Compliance at the EPA



States Have Their Own Systems Too

Some Examples

WA Water Quality
Permitting and
Reporting
Information System
(PARIS)

KY Department of
Environmental
Protection (DEP)
Online Search

CA Stormwater
Multiple Applications
and Report Tracking
System (SMARTS)

FL Department of
Environmental
Protection
Business Portal

TX Environmental
Electronic
Reporting System
(STEERS)

“

"...e-reporting will allow regulated entities, government agencies and the public to more quickly identify violations..."

-EPA Next Generation Compliance
Strategic Plan 2014-2017



A person wearing a hard hat and safety vest is using a tablet on a grassy field. The image is overlaid with a green tint.

Those who embrace technology,
automation, and real-time analytics
avoid violations.

A large industrial facility, possibly a steel mill or refinery, with multiple tall towers, complex piping, and structural steel frameworks. The image is overlaid with a semi-transparent blue filter. The text is centered over the image.

The **best companies excel** across
the board from production to
environmental

How do we build a **world-class** environmental program?

Analytics



Automation



Mobile



Training



Subject Experts



Thank you!