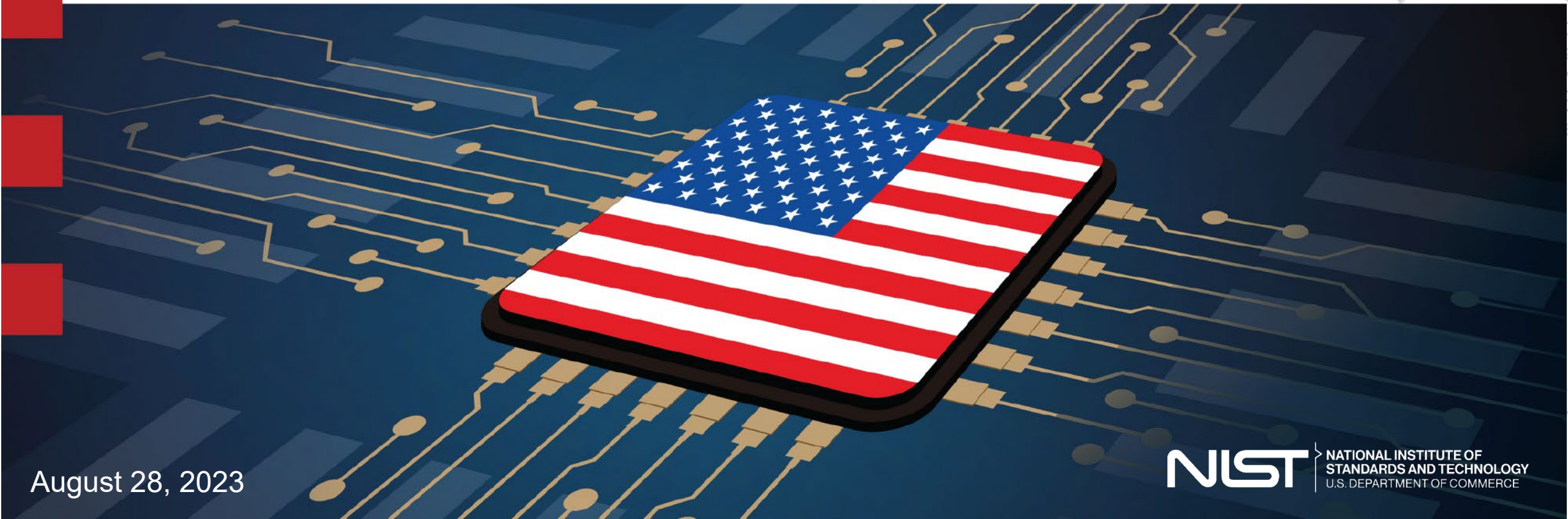
CHIPS for America

Brief Overview of National Pollution Discharge Elimination System (NPDES) Permitting for the Semiconductor Industry



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NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

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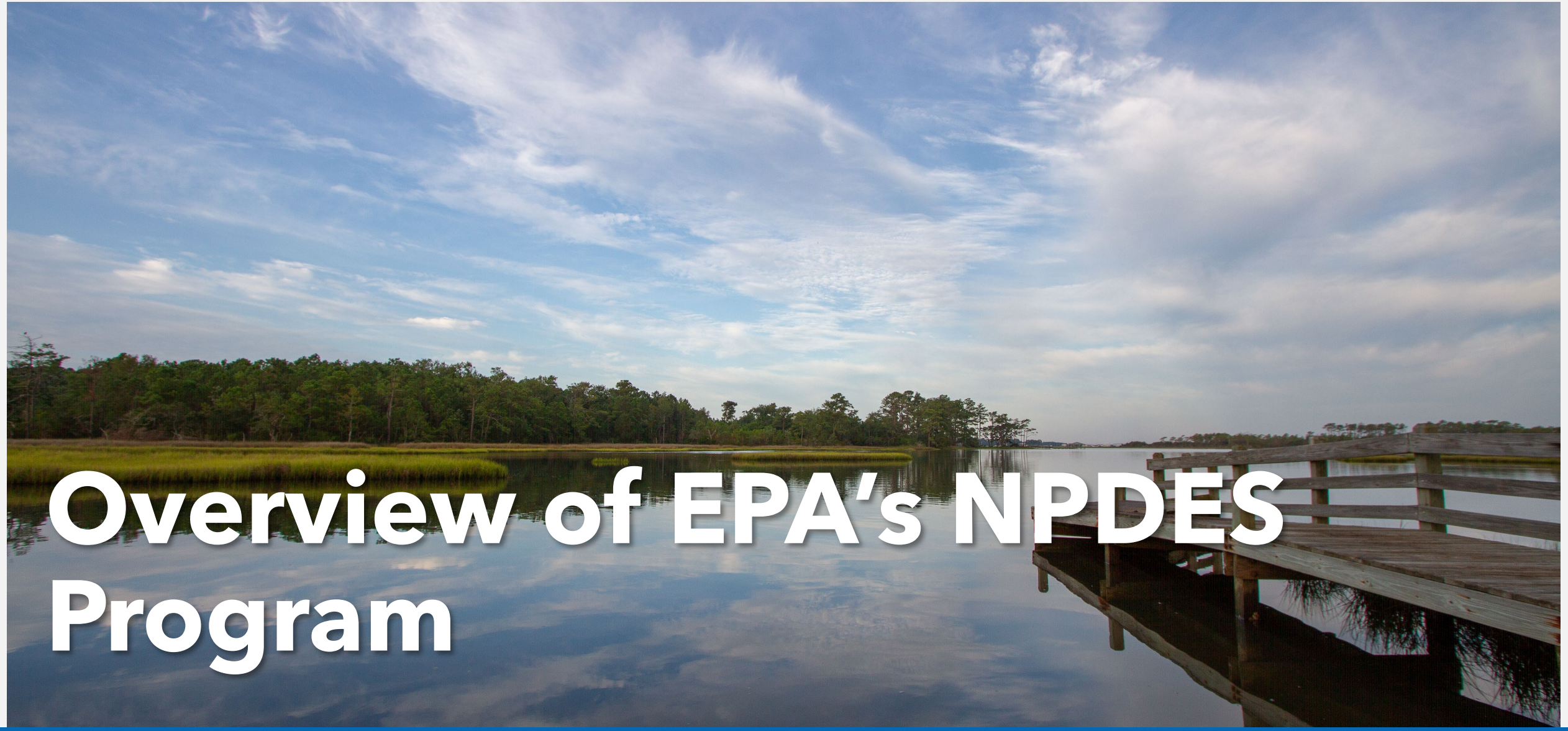

Overview of EPA's NPDES Program

8/28/2023

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This presentation does not:

- Impose any binding requirements
- Determine the obligations of the regulated community
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- Control in any case of conflict between this discussion and statute, regulation, policy or guidance

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An Overview of the Clean Water Act

Clean Water Act – Cuyahoga River

Federal Water Pollution Control Act Amendments – 1972

Clean Water Act Section 101(a)

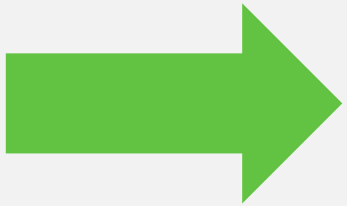
- Objective: Restore and maintain the chemical, physical, and biological integrity of the Nation's waters
- National Goals and Policies include:
  - Eliminate the discharge of pollutants to navigable waters by 1985
  - As an interim goal, achieve by July 1, 1983, wherever attainable, a level of water quality that provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water
  - Prohibit the discharge of toxic pollutants in toxic amounts

Clean Water Program (1972 – Present)

- Federal Water Pollution Control Act Amendments (1972)
  - Established NPDES and pretreatment programs
  - Provided for authorization of state NPDES permitting programs
  - Established technology- and water quality-based requirements
  - Established "permit as a shield"
  - Established significant penalties for permit violations
- Clean Water Act (1977)
  - Focused on priority pollutants and effluent guidelines
- Water Quality Act (1987)
  - Focused on water quality-based effluent limits and stormwater

NPDES Statutory and Regulatory Framework CWA section 301(a) and 40 CFR 122.1(b)

- All *point sources*
- Discharging *pollutants*
- Into *waters of the United States*



Must obtain an NPDES *permit* from EPA or an authorized state, territory, or tribe

- Permits are issued for a maximum of 5 years
- May be administratively continued if the permittee timely reapplies with a complete application

Point Source – 40 CFR 122.2

- Any discernible, confined, and discrete conveyance, including but not limited to:
  - Any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged
- *Does not include return flows from irrigated agriculture or agricultural storm water runoff*
- Direct dischargers are subject to the NPDES permit program, indirect dischargers (discharging into a sewage treatment plant or POTW) are subject to the national pretreatment program.

CWA Classes of Pollutants

- Pollutant – defined at 40 CFR 122.2
  - Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water
- Practical Definition – Anything that changes the physical, biological or chemical characteristics of the receiving water
- Does not include sewage from vessels or certain materials related to injection wells

Conventional Pollutants	BOD, TSS, pH, fecal coliform, and oil and grease
Toxic Pollutants	65 classes of compounds (126 priority pollutants that are heavy metals or organic compounds)
Nonconventional Pollutants	Everything else (e.g., chlorine, ammonia, nitrogen, phosphorus)

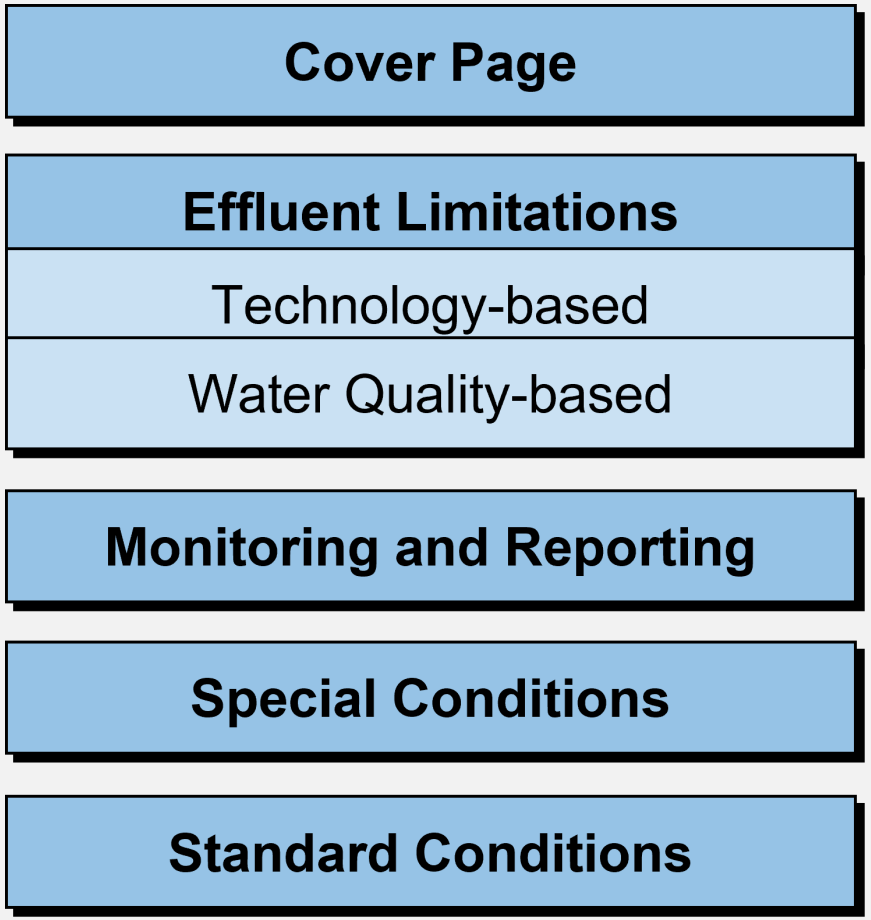
Waters of the U.S. - Supreme Court Rulings

- Interpretations of Supreme Court rulings led to confusion about which waters are protected under the CWA
  - SWANCC v. U.S. Army COE (2001)
  - Rapanos v. United States (2006)
- 2015 and 2020 Definition of WOTUS under CWA
  - Litigated and vacated/remanded
- EPA and U.S. Army Corps of Engineers signed and published a new proposed rule to clarify WOTUS on December 7, 2021
  - https://www.epa.gov/wotus/revising-definition-waters-united-states
- The Supreme Court issued the *Sackett v EPA* (2023) decision in May 2023 that provided new direction on what is a Waters of the US. EPA and the US ACE are considering next steps
  - https://www.supremecourt.gov/opinions/22pdf/21-454_4g15.pdf

Work with the state to understand status of receiving waterbody

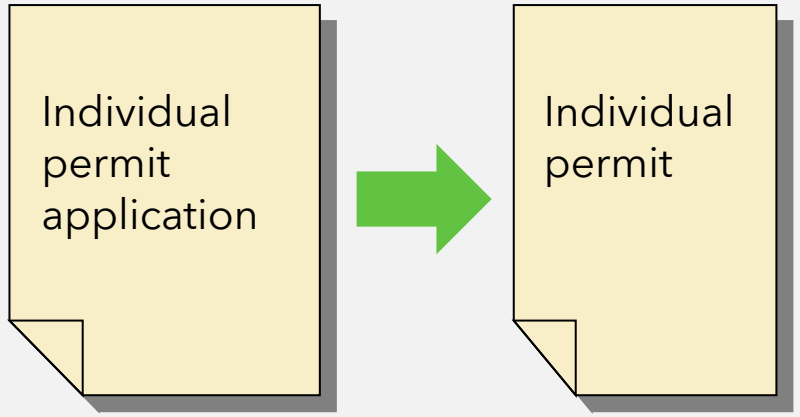
What is a Permit?

- A permit is a **license** that is
  - issued by the **government**
  - grants permission to do something that would be **illegal** in the absence of the permit (e.g., driver's license)
- There is **no right** to a permit, and it is **revocable** for cause (e.g., reckless driving)
- An ***NPDES permit*** is a license to discharge pollutants to a waters of the US, and limitations and requirements of a permit are enforceable.

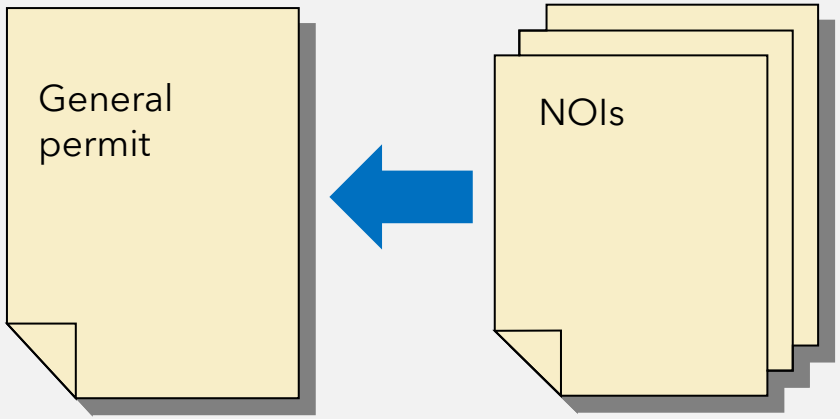


NPDES Permit Types

- Individual Permit
  - One application submitted for each permit issued
  - Appropriate where facility-specific permit conditions are needed
- General Permit [§ 122.28]
  - One permit issued and many Notices of Intent (NOIs) for coverage submitted
  - Appropriate where:
    - Multiple, similar sources within the same geographic area require permit coverage
    - Sources have similar discharges and would require the same or similar permit conditions



56,554 facilities (July 2023)

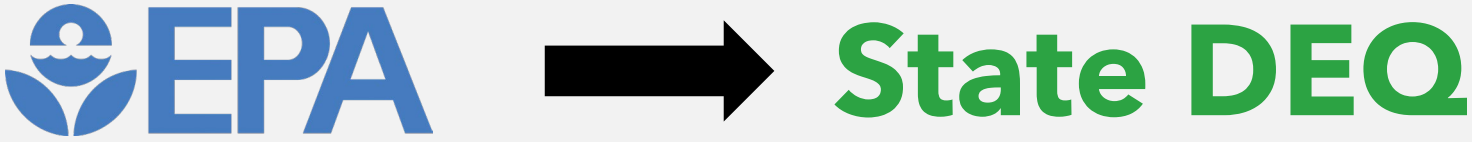


417,094 facilities (July 2023)

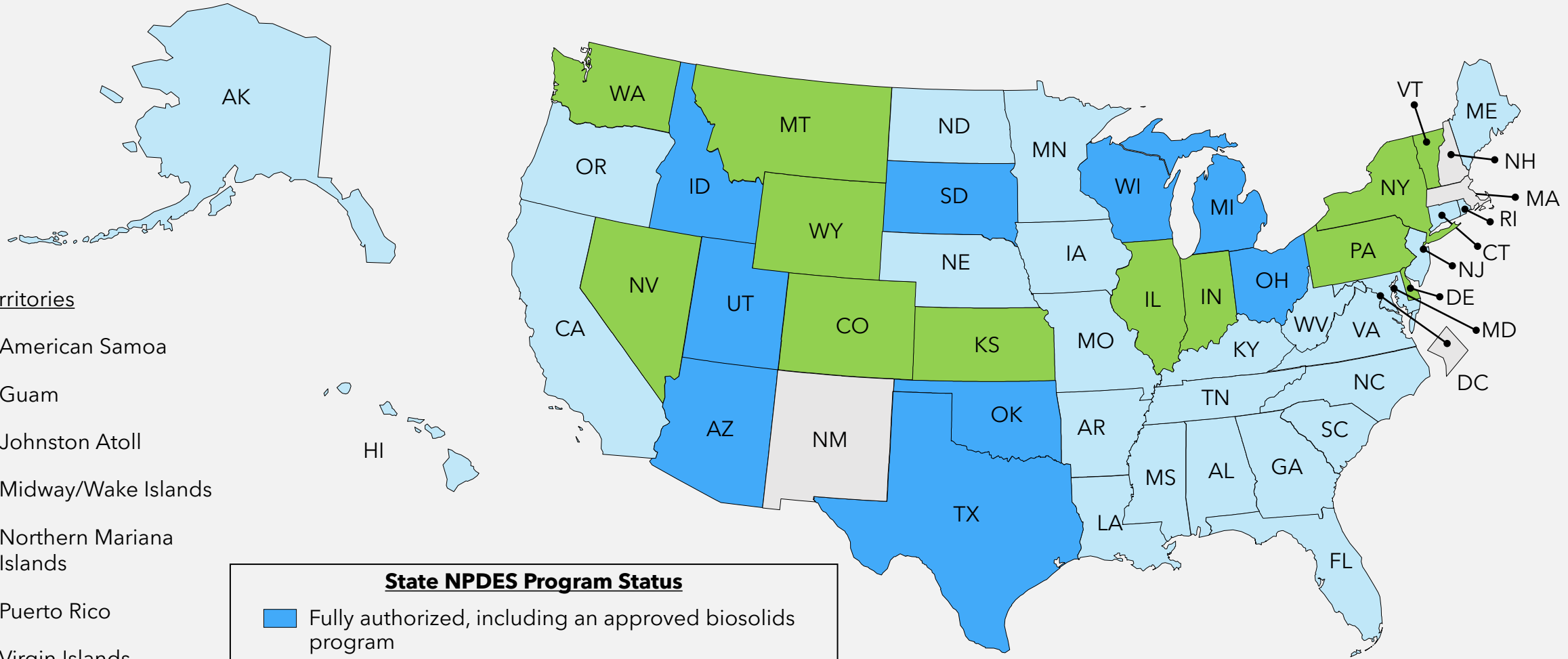
Who Administers the NPDES Program?

U.S. EPA administers the NPDES permit program unless a state, territory, or tribal government seeks and receives authorization:

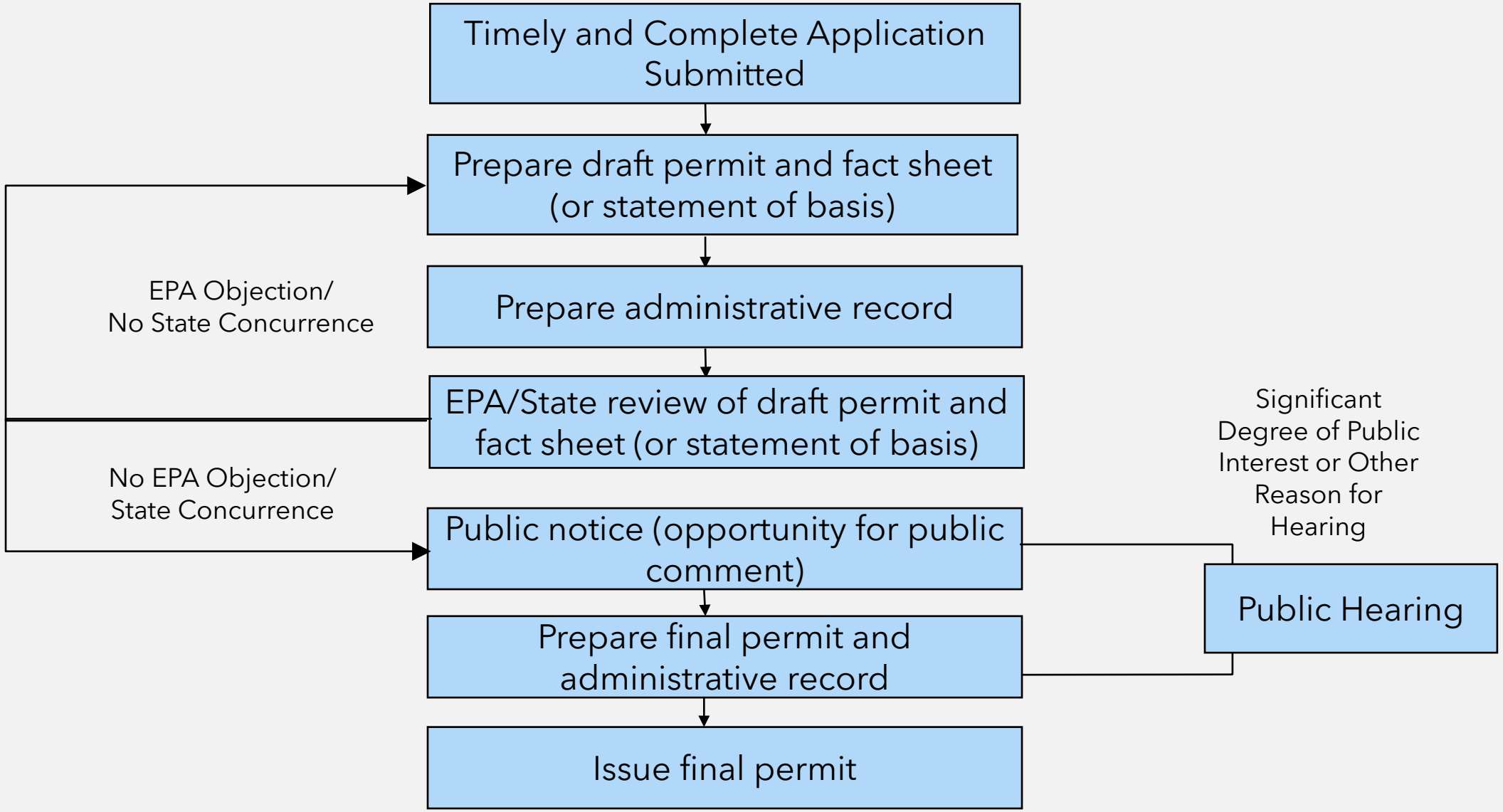
- **Request**: State/territory/tribe [hereafter "state"] must submit a detailed request to EPA for approval [40 CFR Part 123]
- **Content**: The request must include requisite legal authority, resource commitment, and implementation procedures
- **Authority**: Upon EPA approval of the state program, *exclusive authority* for permitting transfers to the state
- **Oversight**: EPA assumes oversight role and reviews and objects to permits as necessary to assure consistency with federal requirements.



NPDES Program Authorizations



NPDES Permitting Process

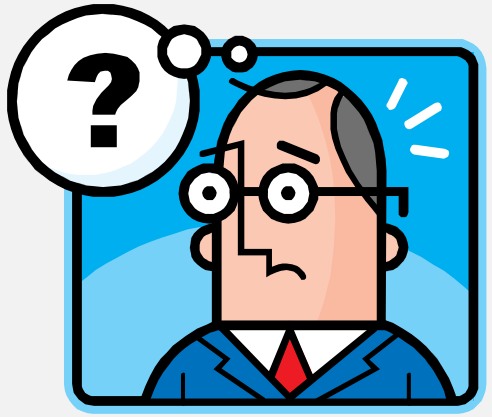


Permit Application and Limitation Development

Who Must Apply for an NPDES Permit?

Any person who discharges pollutants or proposes to discharge pollutants…who does not have an effective permit… [§ 122.21(a)]

- exclusions [§ 122.3] (e.g., nonpoint sources, sewage from vessels, dredged or fill material, indirect dischargers)
- owner vs. operator [§ 122.21(b)]



40 CFR 122.22 specifies who is authorized to sign the permit application and certify the information in the application is true, accurate and complete.

- Corporation – responsible corporate officer (president, vice president, secretary, treasurer, some facility managers)
- Partnership or sole proprietorship – general partner or the proprietor
- Municipality, state, federal or other public agency – principal executive officer or ranking elected official

How Does a Permittee Apply for an Individual Permit?

- Applicants must use approved EPA or state permit application form(s)
  - state's, territory's, or tribe's forms may differ but must contain minimum required information
  - additional forms often used to supplement EPA forms
- For Industrial facilities, the most typical form is EPA Form 2C or equivalent

Why is Application Completeness Important?

Permit processing [§ 124.3(a)(2)]	• Director shall not begin the processing of a permit until the applicant has fully complied with the application requirements for that permit
Permit issuance [§ 122.21(e)]	• Director shall not issue a permit without a complete application
Continuation of expiring permits [§ 122.6]	• EPA provides administrative continuance of expiring NPDES permit with receipt of a complete and timely permit application [§ 122.6] • Most states have continuance provisions similar to provisions for EPA-issued permits
Permit as a Shield CWA Section 402(k)	• "Compliance with a permit" is compliance with the CWA • Limited to pollutants that discharge information is provided for in the application

Technology- and Water Quality-based Effluent Limitations

	Technology-based Effluent Limitations (TBELs)	Water Quality-based Effluent Limitations (WQBELs)
Goal or Policy:	▪ Zero Discharge of Pollutants	▪ Fishable and Swimmable Waters ▪ No Toxics in Toxic Amounts
Standards:	▪ Technology	▪ Water Quality
NPDES Regulations:	▪ 40 CFR 122.44(a), (e) ▪ 40 CFR 125.3	▪ 40 CFR 122.44(d)

- Develop **TBELs** (derived from technology standards) for all applicable pollutants of concern. Minimum level of control required [125.3(a)]
- Develop **WQBELs** where TBELs are not adequate to meet water quality standards in the receiving water.

CWA Technology Requirements

- § 125.3(a) – technology-based treatment standards represent the minimum level of control that must be imposed in an NPDES permit.
  - for Publicly Owned Treatment Works (POTWs): Secondary Treatment
  - Industrial (non-POTWs): Best Practicable Technology
    Best Conventional Technology
    Best Available Technology
    New Source Performance Standards

- § 125.3(c) – methods of imposing technology-based requirements for non-POTWs:
  - application of EPA-promulgated effluent guidelines (ELGs) by industry category
  - where effluent guidelines are inapplicable, through a case-by-case approach using Best Professional Judgment
  - through a combination of these approaches

CWA Technology Requirements

- ELGs are developed for industry categories.
  - More than one ELG may apply to a facility if multiple processes are conducted.
  - Part 414 – Organic Chemicals, Plastics, and Synthetic Fibers
  - Part 469 – Electrical and Electronic Components Point Source Category

- When an ELG has not been developed or a pollutant was not addressed by an ELG, then case by case limitations must be considered.
  - Essentially a facility specific ELG analysis that can take time to complete so early engagement is important.
  - PFAS is not currently regulated under an ELG and is subject to case by case requirements.

Type of Direct Discharger – New Source

- New Source [§ 122.2]: Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:
  - After promulgation of applicable New Source Performance Standards in the effluent guidelines or
  - After proposal of applicable New Source Performance Standards in the effluent guidelines, but only if the standards are promulgated within 120 days of proposal

CWA Water Quality Requirements

- CWA Section 301(b)(1)(C) and 40 CFR 122.44(d)(1)(vii)
  - Limits must derive from and comply with all applicable WQ standards
  - Limits must be consistent with the assumptions and requirements of any available wasteload allocation in an EPA-approved TMDL

Water Quality Criteria

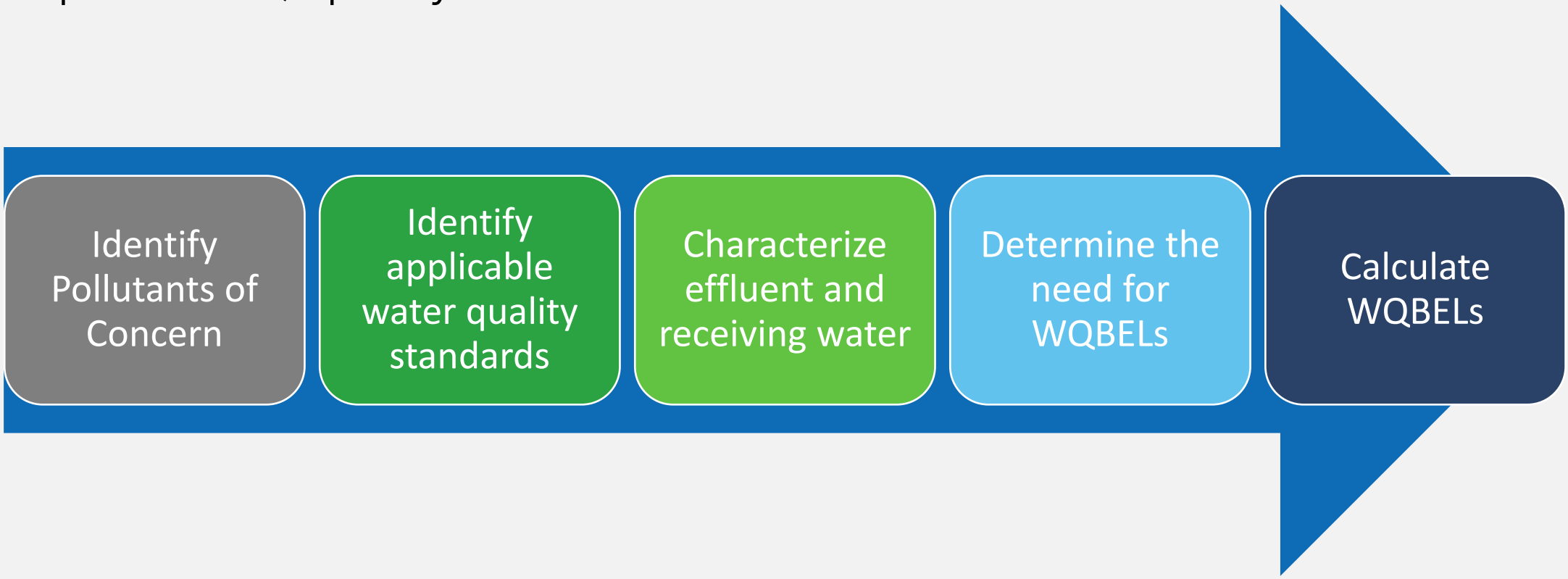
- Apply in the receiving water and could include:
  - **magnitude**
  - **duration**
  - **frequency**

Effluent Limitations

- Apply "end-of-pipe" and include:
  - **magnitude**
  - **averaging period**

Implementing Water Quality Requirements in NPDES Permits

- Water quality standards and implementing procedures (including NPDES requirements) specify how we:



Inputs to Calculating Limitations

- Identify Pollutants of Concern
  - Pollutants that have applicable ELGs, present in required monitoring, otherwise expected to be present.
  - If the pollutant is not identified and considered during permit development, then any discharge would be unauthorized.
- Applicable Water Quality Standards
  - Specific numeric criteria for pollutants
  - Narrative criteria such as “no toxics in toxic amounts” that are interpreted to numeric values when specific criteria have not yet been developed.
- Effluent and Receiving Water Characterization
  - Determine critical conditions to ensure that criteria are still met at worst case conditions (low flow and max facility production typically)
  - Water quality standards often specify metrics for critical conditions such as 7Q10 flow or design effluent flow.

Determining the Need for WQBELs

Water Quality-Based Effluent Limitations

40 CFR 122.44(d)(1)(ii)

When determining whether a discharge causes, **has the reasonable potential to cause**, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for:

- **existing controls** on point and nonpoint sources of pollution
- **the variability** of the pollutant or pollutant parameter in the effluent
- **the sensitivity** of the species to Whole Effluent Toxicity testing (when applicable)
- where appropriate, the **dilution of the effluent** in the receiving water

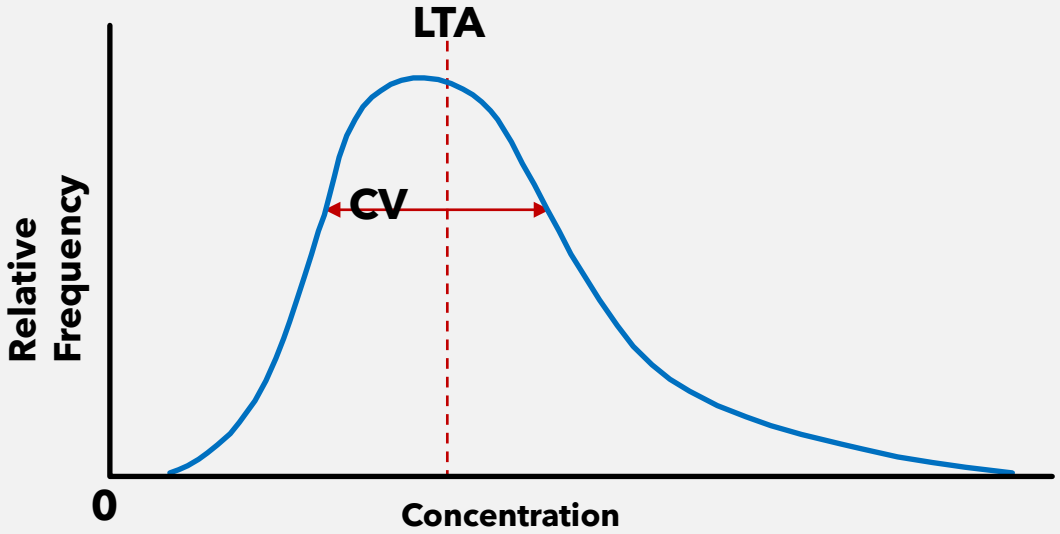
EPA has developed a process found in a Technical Support Document (**TSD**), but state procedures vary widely…must account for the factors above.

Reasonable Potential Analysis (RPA)

- We can conduct a "reasonable potential analysis" based on:
  - numeric criteria
  - narrative criteria
    - numeric interpretation
    - qualitative interpretation
- A reasonable potential analysis can be completed:
  - with effluent data
  - without effluent data
    - data from other sources or from similar discharges
    - qualitative information
- EPA's statistical process was developed for toxic chemical analysis, but may be used for other pollutants as appropriate. RPA must be competed for all pollutants using established federal or state procedures.

TSD Process

- The TSD has a statistical process that allows us to estimate or predict a value for the toxic chemical pollutants in the effluent that would represent critical conditions from even 1 data point.
  - Under the empirical process, to say with 99% confidence that we have "sampled" the 99% value for the distribution we would need 330 data points.
  - The statistical process allows us to estimate this with that 1 data point.
  - More data is better, rule of thumb is at least 30 data points reduces the uncertainty.



Considerations for Other Parameters

pH

- Non-conservative
- Instantaneous effects
- Limits often based directly on water quality criteria with no consideration of dilution
- Typically applied as a range that must be met at all times

Pathogens

- Non-conservative
- Bacteria, viruses
- Human health impacts (beaches)
- Indicator criteria
- Complex duration and frequency considerations

Nutrients

- Non-conservative
- Limits often derived from interpretation of narrative criterion and state policy implementation
- Relationships between causal and response variables (e.g., far-field effects and delayed impacts)
- Limit expression might include annual or seasonal averages or cumulative loading requirements

Temperature

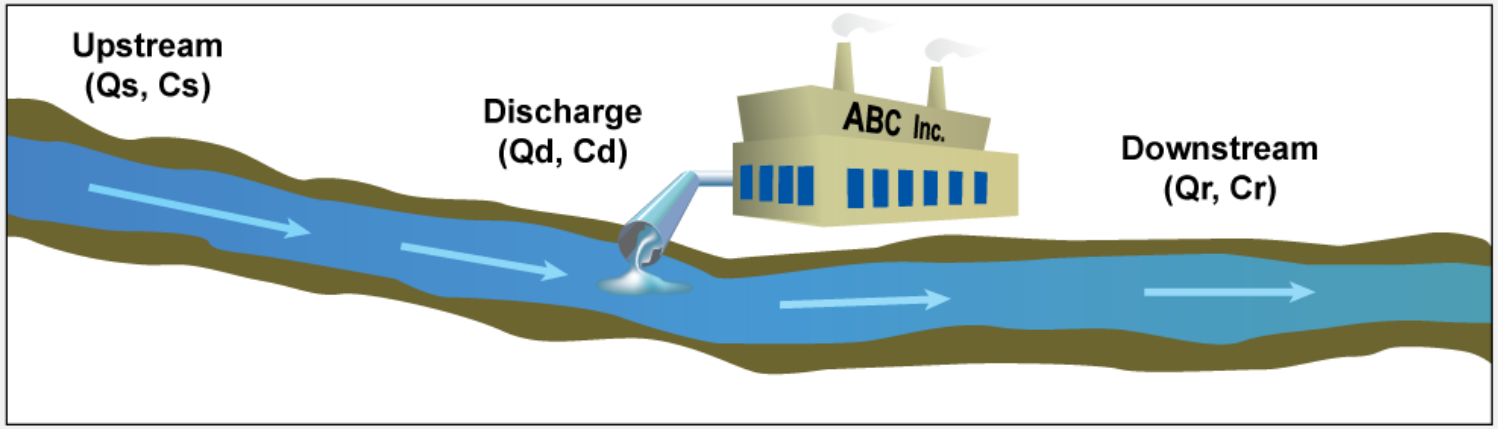
- Often applied as a delta
- Modeling is typically required
- CWA Section 316(a) may be applicable

Answer the Question: "Is There Reasonable Potential?"

- If the projected receiving water concentration exceeds the applicable water quality criterion, then there is reasonable potential and the permit writer must establish WQBELs.

- If the projected receiving water concentration is equal to or less than the applicable water quality criterion, then there is no reasonable potential and we have not demonstrated a need to establish WQBELs.

Calculate WQBELs



WLA = the maximum allowable pollutant concentration in the effluent from ABC Inc. that, after accounting for available dilution under critical conditions, will meet an applicable water quality criterion

*Permitting authorities use various terms for what is called a WLA here

WLAs are converted to Maximum Daily Limitations and Average Monthly Limitations to comply with 40 CFR 125.45(d) using statistical procedures if applicable.

Final Effluent Limitations

- Compare:
  1) TBELs *with*
  2) WQBELs based on WLAs for all applicable criteria *with*
  3) WQBELs based on a TMDL or other watershed-based requirements

- The most stringent limitations for each parameter are the new, calculated final effluent limitations.

- Final effluent limitations in the permit must meet ***anti-backsliding*** and ***antidegradation*** requirements.
  - Anti-backsliding – proposed limits cannot be less stringent than any previous limit imposed in an NPDES permit unless certain criteria are met.
  - Antidegradation – new or increased discharges must meet certain criteria to be allowed.

Other Permit Conditions

Monitoring

- Permits must specify the type, intervals, and frequency of monitoring sufficient to yield data representative of the monitored activity [§ 122.48(b)]
- Permit must include monitoring requirements to assure compliance with permit limitations [§ 122.44(i)(1)]
  - the mass or other measurement specified in the permit for each pollutant limited in the permit
  - the volume of effluent discharged from each outfall
  - other measurements as appropriate (e.g., internal waste streams and determination of compliance with narrative requirements)
- Self-Compliance Monitoring
  - Primary method of monitoring for NPDES program
  - Permittee performs sampling and analysis
  - Results determine compliance with permit limits and conditions
  - Requirements should be clear and precise

Reporting

- Permit establishes what must be reported
  - monitoring results as required in permit [§ 122.41(l)(4)]
  - data for pollutants monitored more frequently than required using approved methods [§ 122.41(l)(4)(ii)]
- Permit establishes when information will be reported
  - reporting requirements must be established on a case-by-case basis with the frequency dependent on the nature and effect of the discharge, but in no case less than once a year [§ 122.44(i)(2)]
- While not required, permit should document where records are located

Special Conditions

- Additional Monitoring and Special Studies
  - Used to supplement effluent limitations
  - May be used to collect data for future limitation development
- Best Management Practices
  - Incorporate preventive requirements
  - Are qualitative, not quantitative
- Compliance Schedules
  - Allow time for a facility to come into compliance with new permit requirements.

List of Standard Conditions – § 122.41

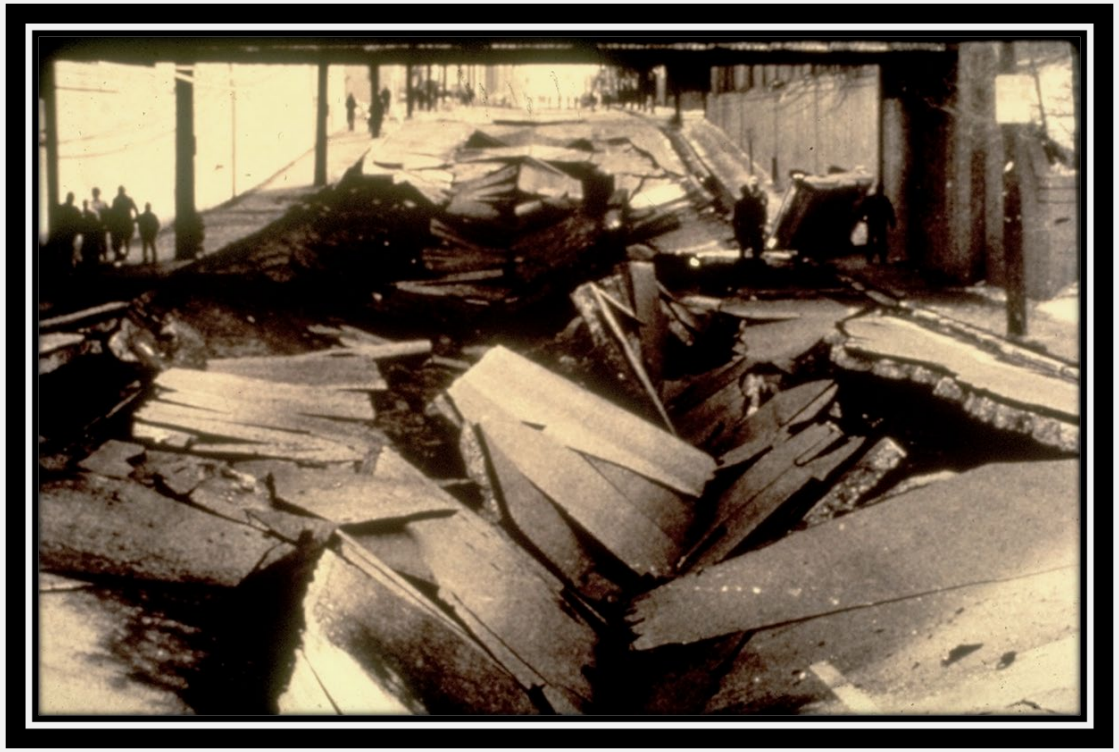
a. Duty to comply
b. Duty to reapply
c. Need to halt or reduce activity not a defense
d. Duty to mitigate
e. Proper O & M
f. Permit actions
g. Property rights
h. Duty to provide information
i. Inspection and entry
j. Monitoring and records
k. Signatory requirements
l. Reporting requirements
    1. Planned changes
    2. Anticipated noncompliance
    3. Transfers
    4. Monitoring reports
    5. Compliance schedules
    6. 24-hour reporting
    7. Other noncompliance
    8. Other information
    9. Identification of initial recipient
m. Bypass
n. Upset

Fact Sheets

- General facility information
  - Description of facility or activity
  - Sketch or description of location
  - Type and quantity of waste/pollutants discharged
- Summary rationale of permit conditions
  - Applicable statutory and regulatory citations
  - References to administrative records
- Detailed rationale of permit conditions
  - Explanation and calculation of effluent limitations and conditions
  - Explanation of how required sewage sludge land application elements addressed
  - Inappropriateness of requested variances
- Administrative requirements
  - Permit procedures
  - Permitting authority contact name and telephone number

National Pretreatment Program

- Major goal is controlling discharges in order to:
  - prevent interference with POTW processes
  - prevent pass through of pollutants
  - protect sludge management options
- Additional programmatic goals
  - encourage recycling and reclamation
  - ensure POTW personnel health and safety

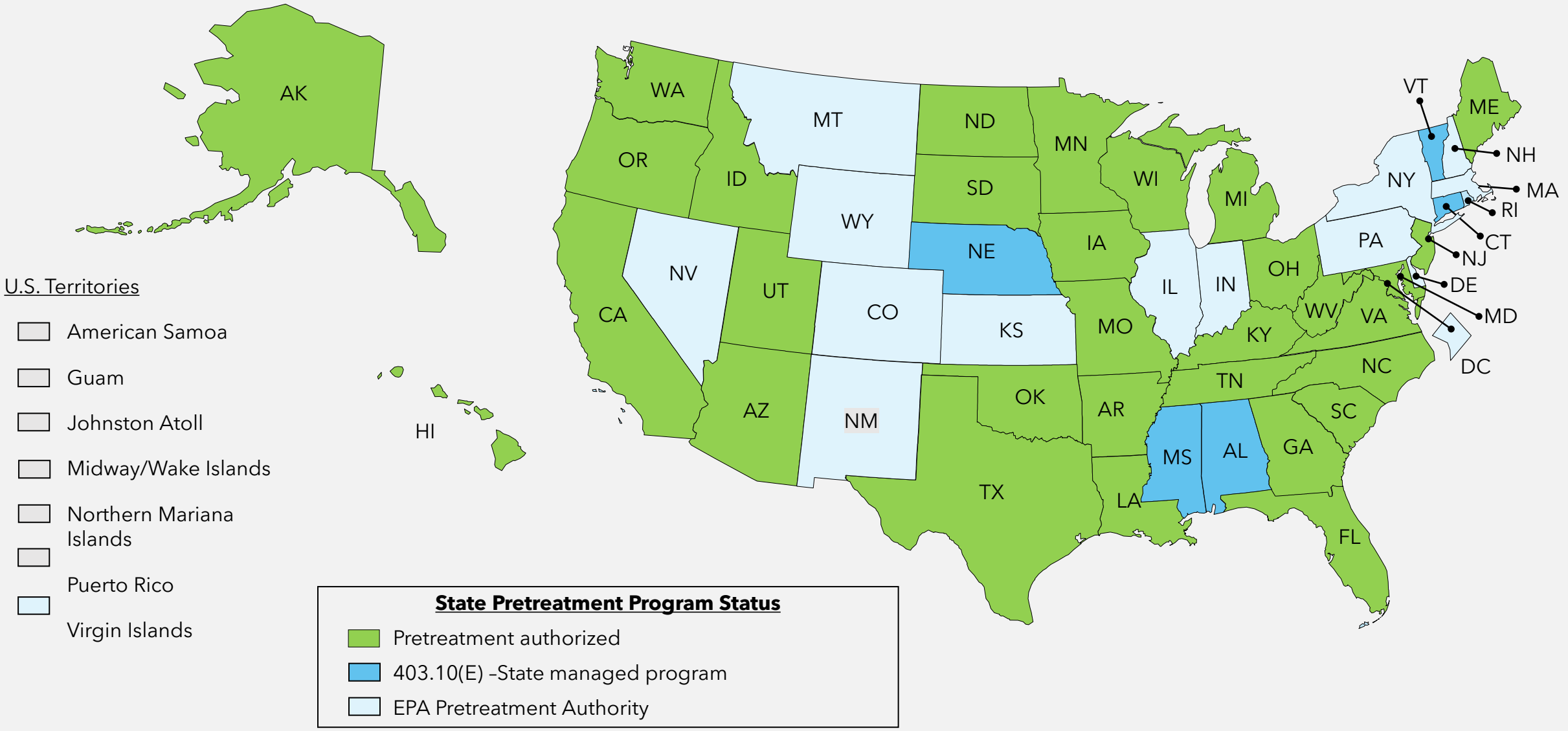


https://www.epa.gov/npdes/national-pretreatment-program

Pretreatment Regulatory Requirements

- General Pretreatment Regulations for Existing and New Sources of Pollution [40 CFR Part 403]
  - National Pretreatment Standards
    - Prohibited Discharges [§ 403.5]
    - Categorical Standards [§ 403.6]
  - Requirements for POTW and state, territorial, or tribal programs
  - Industrial and POTW monitoring and reporting requirements
- The Pretreatment Program is similar to the NPDES Program in that states must apply to EPA to obtain authority to implement the pretreatment program.
  - Program Approval Authority
    - Regulates and ensures POTW pretreatment programs comply with the regulations.
    - EPA or the State
  - Program Control Authority
    - Implements controls on Industrial Users discharging to the POTW to ensure pretreatment requirements are met.
    - POTW or State
    - https://www.epa.gov/npdes/national-pretreatment-program-implementation

Pretreatment Program Authorizations



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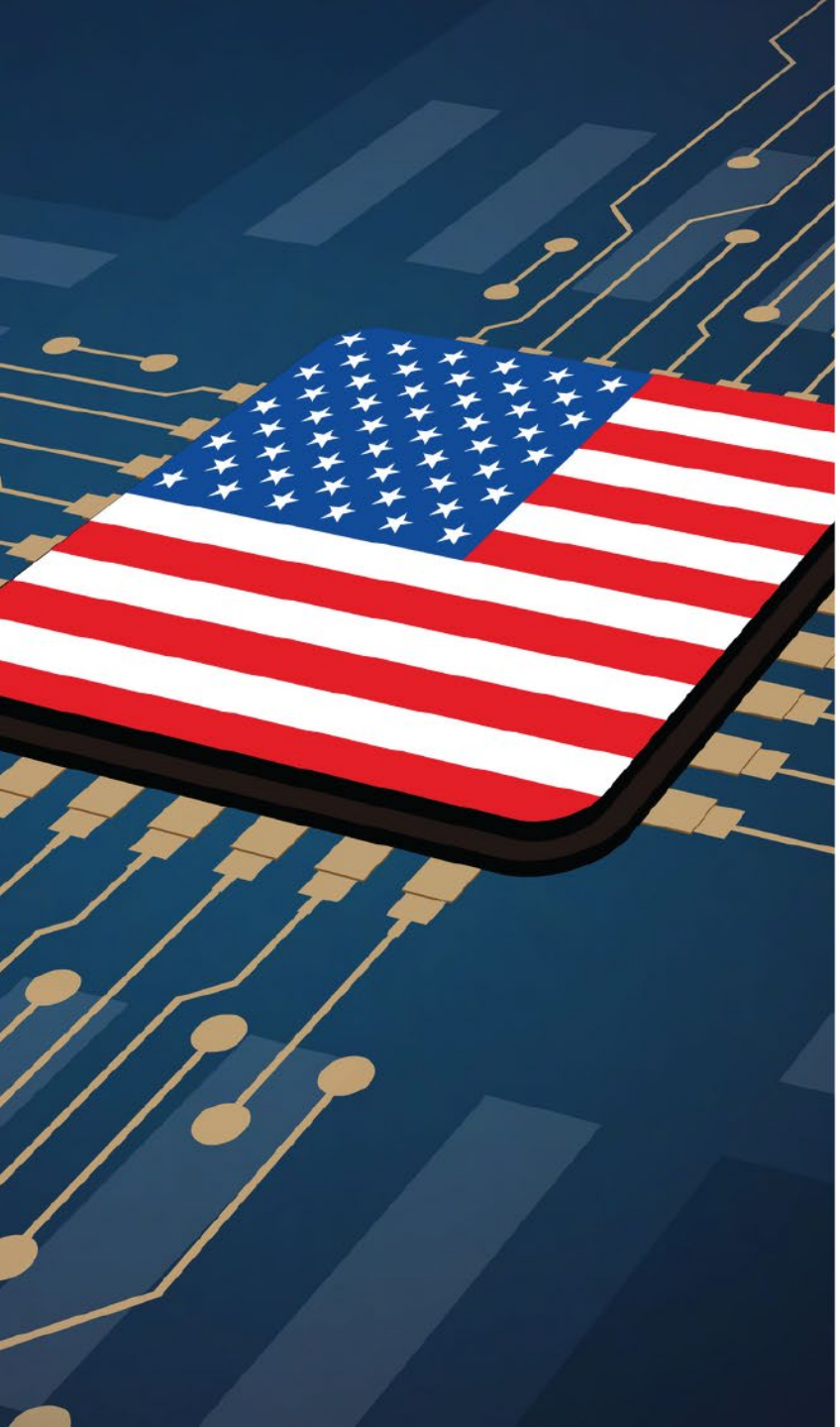

Next Steps

- Visit CHIPS.gov for resources, including:
  - Environmental Resources
  - Applicant guides and templates
  - FAQs and fact sheets
- Register for future webinars
- Join our mailing list
- Contact us
  - askchips@chips.gov – General inquiries
  - apply@chips.gov – Application-related inquiries

Questions

Thank you