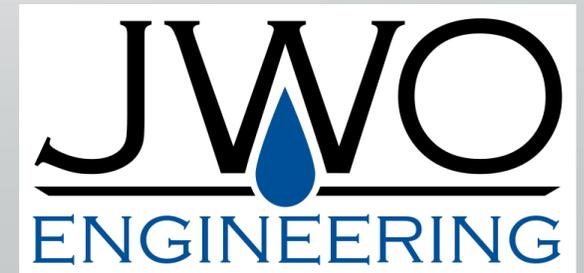




# LOCAL LIMITS DEVELOPMENT

The What and How



# Local Limits Statutory Authority

- Statutory authority for the National Pretreatment Program lies in the Clean Water Act (CWA)

# STEPS TO DEVELOPING LOCAL LIMITS

1. Determine Pollutants of Concern
2. Collect and Analyze Data
3. Calculate MAHLs for Each POC
4. Designate and Implement Local Limits
5. Addressing Collection System Concerns



# STEP 1: DETERMINE POLLUTANTS OF CONCERN

# Identifying Pollutants of Concern (POC)

- A POC is any pollutant that might potentially cause pass through or interference, cause problems in the collection system, or cause harm to workers.
- A pollutant that causes operational problems can be considered a POC even if it does not cause NPDES permit violations.

# National POCs

- Arsenic
- Cadmium
- Chromium
- Copper
- Cyanide
- Lead
- Mercury
- Nickel
- Silver
- Zinc
- Molybdenum
- Selenium
- BOD<sub>5</sub>
- TSS
- Ammonia

# Other Potential POCs

- Pollutants included in the POTW's NPDES permit
- Water Quality Criteria
- Sludge Quality Standard
- Air Quality Standard
- Resource Protection Criteria
- Pollutants that cause interference at POTW
- Pollutants that may cause harm to POTW, collection system, or workers
- Other pollutants identified as discharged to the POTW

# Summary of POCs

Pollutants should be designated POCs if they:

- Are on EPA's list of 15 pollutants of concern
- Have a pre-existing local limit
- Are limited by a permit or applicable environmental criteria
- Have caused environmental problems in the past
- Have harmful implications for treatment works, collection works, or POTW workers

# Screening

- Not everything identified as a potential POC will necessarily undergo local limits development
- The EPA recommends POTWs check with their Approval Authority for methodologies to screen out certain POCs before expending resources on sampling and analysis.



## STEP 2: COLLECT AND ANALYZE DATA

# Data Needed to Develop Local Limits

- Pollutant concentration data from:
  - POTW (influent, effluent, primary effluent, biosolids)
  - collection system
  - receiving stream
  - IUs
- Flow data from:
  - POTW (total, biosolids to digester, biosolids to disposal)
  - IUs
  - receiving stream
  - hauled waste
  - domestic flows
  - commercial flows

# Initial Local Limits Development

**Table 4-1: Minimum Recommended Sampling Days\* for Initial Local Limits Development**

Parameter	POTW			Residential/ Commercial
	Influent (days to sample)	Effluent (days to sample)	Sludge (days to sample)	Collection System (days to sample)
Organic Priority Pollutants (1)	1 - 2	1 - 2	1	1 - 2
National POCs (2)	7 - 14	7 - 14	2	7
POTW-specific POCs (2)	7 - 14	7 - 14	2	7
Percent solids, sludge (3)			2	
TCLP pollutants (4)			1	

\*Sampling days are defined as the number of days that samples are collected for a parameter. Sampling days should be consecutive days for National POCs and POTW-specific POCs. Samples should be 24-hour composite samples unless sampling methods only allow for grab samples (see Section 4.5).

(1) Conducted once or twice to determine potential POCs.  
 (2) The range of values for sampling days (7-14) for influent and effluent sampling of POCs is a minimum recommended range for the number of days to sample. POTWs that are small [up to 5 million gallons per day (MGD)] should have at least 7 consecutive sampling days for POCs while larger POTWs (5-10 MGD) should have at least 14 consecutive sampling days. POTWs larger than 10 MGD should consider more sampling according to local concerns and economics. POTWs should seek input from the Approval Authority for their sampling plan.  
 (3) The sludge regulations at 40 CFR Part 503 already require the percentage of solids to be determined every day that sludge is applied to land.  
 (4) Sample for TCLP pollutants if sludge is disposed, or is likely to be disposed, in a landfill.

# Ongoing Local Limits Analysis and Evaluation

**Table 4-2: Minimum Recommended Sampling Frequencies for Ongoing Local Limits Analysis and Evaluation**

Parameter	Location	Less than 5 MGD	5 – 10 MGD	10 – 50 MGD	Greater than 50 MGD
Pollutants for which local limits were adopted	Influent, Effluent, Sludge	Once every 3 months	Once every 3 months	Once every 3 months	Once every 2 months
Pollutants for which MAHLs were calculated, but for which no local limits were adopted	Influent, Effluent, Sludge	Once every 12 months	Once every 6 months	Once every 6 months	Once every 3 months
Organic Priority Pollutants	Influent	Once per year	Once per year	Once per year	Once every 6 months
TCLP Pollutants (1), sludge	Sludge	Once per year	Once per year	Once per year	Once per year
Sludge percent solids and specific gravity (2)	Sludge	Once every 6 months	Once every 4 months	Once every 3 months	Once every 2 months

(1) Conducted if sludge is (or is likely to be) disposed of in a landfill.

(2) The sludge regulations at 40 CFR Part 503 already require the percentage of solids to be determined every day that sludge is applied to land.

# Sampling Method

- Flow-proportioned sample or flow-weighted sample
  - A set aliquot of the wastestream is taken after the passage of a set amount of wastewater
- Time-composite sample
  - Equal-volume aliquots taken at regular intervals throughout the sampling period
  - Statistical variability of data will be greater than that of flow-proportioned samples due to varying flow rates
- Grab sample
  - Individual aliquots collected at intervals of at least 15 minutes without regard to flow rate
- Biosolids samples
  - Take composite samples of the biosolids mass



STEP 3: CALCULATE MAHLS FOR EACH  
POC

# Steps for Developing MAHLs

- Calculate POTW removal efficiency for the POC
- Calculate allowable headworks loadings (AHLs) for each environmental criterion
- Designate as the MAHL the most stringent AHL for the POC

# Removal Efficiency Calculation Methods

- Average Daily Removal Efficiency (ADRE)
  - Calculation requires an influent sample paired with a lagged effluent sample
  - Samples are lagged by the hydraulic residence time of wastewater within the treatment plant
  - CALCULATION: Calculate removal efficiency for all paired data, then take the mean of the calculated removal efficiencies

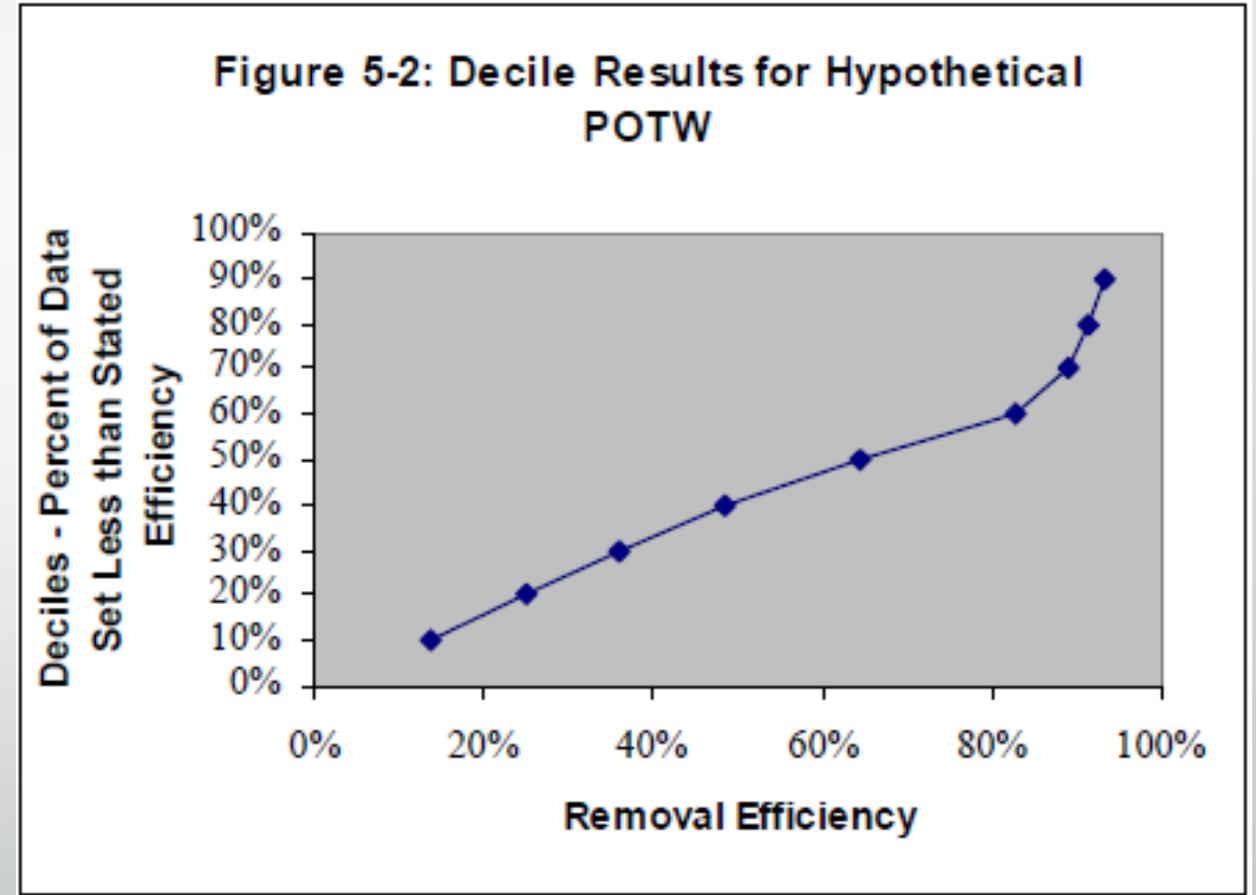
# Removal Efficiency Calculation Methods

- Mean Removal Efficiency (MRE)
  - More flexible than the ADRE method, the MRE can be used with data suitable for the ADRE method AND data that have not been lagged or paired
  - Data does not need to be paired, but it must be from the same time period to avoid bias
  - CALCULATION: Take the mean of all influent values, and then take the mean of all effluent values. Calculate the removal efficiency using the two mean values.

# Removal Efficiency Calculation Methods

- Decile Method
  - Requires at least nine daily removal efficiency values based on paired sets of influent and effluent data
  - Decile method sorts daily removal efficiency values from highest to lowest and calculates the percentage of the percentage above or below a specified removal efficiency

STEP 3: CALCULATE MAHLs FOR EACH POC



# Removal Efficiency Calculation Methods

- Using Biosolids Data to Calculate Removal Efficiency
  - Useful for conservative pollutants when influent data is above detection but inadequate detections in effluent
  - Due to data quality, the MRE method (shown right) is often more suitable than the ADRE method

$$R_{potw} = \frac{(S_u * 8.34 * PS/100 * Q_{slg} * G_{slg})}{(I_r * 8.34 * Q_{potw})}$$

Where:

- $R_{potw}$  = Plant removal efficiency from headworks to plant effluent, as decimal
- $I_n, I_r$  = POTW influent pollutant concentration at headworks, mg/L
- $PS$  = Percentage solids of sludge to disposal
- $Q_{slg}$  = Total sludge flow rate to disposal, MGD
- $Q_{potw}$  = POTW average flow rate, MGD
- $G_{slg}$  = Specific gravity of sludge, kg/L
- $8.34$  = Unit conversion factor
- $S_n, S_u$  = Sludge pollutant concentration, mg/kg
- $n$  = Paired observations, numbered 1 to  $N$
- $u$  = Sludge samples, numbered 1 to  $U$
- $r$  = Influent samples numbered 1 to  $R$

STEP 3: CALCULATE MAHLs FOR EACH POC

# EPA Guidance on Different Methodologies

- EPA recommends the MRE over the ADRE method if less than ten data pairs are available, because it is generally less sensitive to variation in daily removal efficiencies.
- Although requiring more data, the decile approach allows for a more comprehensive view of removal rates than the ADRE and MRE methods because it provides a frequency distribution and allows for explicit incorporation of daily removal efficiency.
- Although an overall depiction of the POTW removal efficiency frequency is gained in the decile method, an individual decile estimate, depending on how conservative the POTW wants to be in establishing removal efficiencies, can be less precise than the MRE and ADRE estimates.

# Data Quality

- Outliers
  - If the data approximate normal distribution, any data point more than two standard deviations from the mean is considered an outlier.
  - If the data do NOT approximate normal distribution, outliers can be determined based on the interquartile range (IQR) of the data set. The IQR equals values between the 1<sup>st</sup> and 3<sup>rd</sup> quartile. Any data point more than 1.5 times this IQR beyond Q1 or Q3 is considered an outlier.

# Data Quality

**Table 5-1: Options for Managing Sampling Results Below the ML in Removal Efficiency Calculations**

<b>If only a few data values are below the ML:</b>	<b>If most data values are below the ML:</b>
Option 1: Use surrogate value of $\frac{1}{2}$ ML.	Option 1: Re-evaluate the need for a local limit for the pollutant. (However, if the pollutant is one of the 15 EPA POCs an AHL should be developed.)
Option 2: Discard the few samples below the ML. (Influent and effluent data should be discarded in pairs.)	Option 2: Use removal rate data from other plants. (See Section 5.1.4.)

# Data Quality

- Negative Removal Efficiency
  - Unless technical justification can be given, negative removal rates should be retained.
  - POTWs do not operate in a steady state. Negative removal rates are often found in the ADRE method due to this variability.
  - Unless an underlying problem exists in the sampling, data analysis, or plant operations, the MRE method should eliminate negative removal efficiencies.
  - The decile method can also be used since it ranks instead of averages daily removal efficiencies.

# Removal Efficiencies by Others

- Removal efficiencies are based largely on site-specific conditions, but some POTWs do not have adequate data to calculate removals.
- POTWs may selectively use removal efficiencies reported by other POTWs or by EPA and professional studies.
- Performance data should be from plants employing the same treatment technology and similar discharging sources.

# Steps for Developing MAHLs

- Calculate POTW removal efficiency for the POC
- Calculate allowable headworks loadings (AHLs) for each environmental criterion
- Designate as the MAHL the most stringent AHL for the POC

# Calculation of Allowable Headworks Loadings

- An allowable headworks loading (AHL) is an estimated maximum loading of a pollutant that should not cause violation of a particular plant limit.
- Local limits development uses a mass-balance approach to determine the AHLs for a POTW based on environmental and treatment plant criteria for each pollutant.
- Effluent, Biosolids, Inhibition, Air Quality, and Resource Protection Based Criteria relevant to the POTW should each have an AHL developed.

# Effluent-Quality Based AHLs

- National Pollutant Discharge Elimination System (NPDES) Permit
- Water Quality Standards or Criteria
- Resource Protection

# Biosolids-Quality Based AHLs

- Land Application
- Surface Disposal
- Incineration
- Municipal Solid Waste Landfill's Hazardous Waste Requirements

# Inhibition-Based AHLs

- Secondary and Tertiary Treatment Unit Inhibition
- Digester Inhibition

# Air-Quality Based AHLs

- While rare, some POTWs may be regulated as air pollution sources and have air emission standards for specific toxics.
- The EPA's guidance manual has two equations for calculating the AHL based on volatilization rates and existing emissions.

# AHLs for BOD/TSS

- The EPA recommends using:
  - the POTW's rated average design capacity as a "monthly average" – based MAHL
  - the POTW's peak loading capacity as a "daily maximum" – based MAHL
- The EPA recognizes that these may be too conservative when considering industrial allocation. Other technically defensible arguments for MAHL may be used. Examples can be found in the guidance manual.

# AHLs for Ammonia

- If specific engineering POTW processes were designed to remove ammonia, the engineering specifications for design loading rates should be used as the MAHL.
- Most ammonia removal in POTWs is incidental. An AHL can be determined using removal efficiency .
- NPDES ammonia limits are often seasonal. A seasonal limit for IUs may be developed as well.

# AHL Options for Oil and Grease

- POTW could use a local limit of 100 mg/L based on the application of best management practices (BMPs). The basis of 100 mg/L is from an April 1975 EPA document title *Treatability of Oil and Grease Discharged to Publicly Owned Treatment Works*.
- POTW could determine FOG removal efficiency and develop an AHL based on numeric NPDES permit limits.
- POTW could determine FOG inhibition criteria and removal efficiencies, then use equations from the guidance manual to determine the inhibition-based AHL

# Steps for Developing MAHLs

- Calculate POTW removal efficiency for the POC
- Calculate allowable headworks loadings (AHLs) for each environmental criterion
- Designate as the MAHL the most stringent AHL for the POC

# Determining the MAHL

- After calculating AHLs for each POC, MAHL determination is straight forward.
- The lowest of the AHLs for each POC is selected as the MAHL for that pollutant. This will lead to compliance for all environment and treatment plant criteria.



# STEP 4: DESIGNATE AND IMPLEMENT LOCAL LIMITS

# Determine The Need for New Local Limits

- Some Approval Authorities require that local limits be established for a specific set of pollutants regardless of headworks loading analysis results.
- Compare the MAHL to actual POTW loadings.
- Review past NPDES permit violations, biosolids disposal restrictions, or inhibitions incidents to identify pollutants that need local limits.
- For conventional pollutants, alternatives should be investigated in addition to local limits including: controlling quantity of sewer connections, optimizing POTW performance, expanding POTW capacity, financial incentives, and others.

# Calculation of Maximum Allowable Industrial Loading

- The Maximum Allowable Industrial Loading (MAIL) is calculated by subtracting from the MAHL estimates of:
  - Loadings from uncontrolled sources
  - Hauled waste not regulated through local limits
  - Growth allowance
  - Safety Factor

## Equation 6.2: MAIL Calculation

$$MAIL = MAHL(1 - SF) - (L_{UNC} + HW + GA)$$

Where:

*MAIL* = Maximum allowable industrial loading, lb/day

*MAHL* = Maximum allowable headworks loading, lb/day

*SF* = Safety factor, if desired

*L<sub>UNC</sub>* = Loadings from uncontrolled sources (uncontrolled sources = domestic + some commercial + I&I)

*HW* = Loadings from hauled waste, if not regulated through the local limits

*GA* = Growth allowance.

# Estimating Loading from Uncontrolled Sources

- Use site-specific monitoring of the uncontrolled discharges at sewer trunk lines receiving from only these sources to develop data on average pollutant concentration levels.
- If site-specific data are not available, Appendix V in the Guidance Manual includes data on typical domestic wastewater pollutant concentrations. Use this data with care.
- If loading from uncontrolled sources approaches or exceeds MAHL, evaluate sources for potential control.
- Consider the potential impact of infiltration and inflow.
- Consider estimating uncontrolled loadings by subtracting controlled loadings from total influent loadings.

# Estimating Loading from Hauled Waste

- Use pollutant concentrations and flows from waste haulers collected by sampling hauled waste brought to the facility.
- Regularly sample hauled loads to ensure compliance with regulations.
- Hauled waste loads from IUs are subject to pretreatment standards.

# Estimating Expansion/Growth Allowance

- If a significant amount of growth is anticipated in the future, the POTW may consider holding a portion of the MAHL in reserve.
- It is most commonly justified for BOD, TSS, and other pollutants the POTW was designed to remove.
- This provides a portion to allocate to new discharges without needing to revise existing IU permits or SUO.

# Determining the Safety Factor

- The safety factor is to address data uncertainties that affect the ability to calculate accurate local limits.
- EPA generally recommends a 10% safety factor
- The size of the safety factor depends on: data variability, amount of data used to develop MAHLs, literature data, history of compliance for POC, potential for IU slug loadings, and the size of each IU with respect to the total POTW flow rate.

# Calculation of Maximum Allowable Industrial Loading

- The Maximum Allowable Industrial Loading (MAIL) is calculated by subtracting from the MAHL estimates of:
  - Loadings from uncontrolled sources
  - Hauled waste not regulated through local limits
  - Growth allowance
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## Equation 6.2: MAIL Calculation

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*SF* = Safety factor, if desired

*L<sub>UNC</sub>* = Loadings from uncontrolled sources (uncontrolled sources = domestic + some commercial + I&I)

*HW* = Loadings from hauled waste, if not regulated through the local limits

*GA* = Growth allowance.

# MAIL Allocation

- POTWs may allocate the MAIL using concentration-based limits (mg/L), mass based limits (lb/day), or both.
- How these limits are applied to industrial users is up to the POTW. Options include:
  - Limits Based on IU Contributions of a Pollutant (contributory flow or mass proportion)
  - Uniform Limits for All Controlled Dischargers
  - Basis of IU Needs for Discharge Loading/Case-by-Case Basis
  - Creative Allocation Methods

# MAIL Allocation

**Table 6-2: Options for Allocating and Implementing Local Limits**

<b>Method</b>	<b>Pros</b>	<b>Cons</b>
Allocate MAILs uniformly among all IUs and place uniform concentration limits in the local SUO	<ul style="list-style-type: none"><li>-Limits are clear to IUs</li><li>-Requires little time to calculate limits</li><li>-Easy to determine compliance</li></ul>	<ul style="list-style-type: none"><li>-Need to update SUO when limits change</li><li>-Inflexible</li><li>-Limits may be overly stringent because some IUs may get an allocation but do not discharge a pollutant</li></ul>
Place general language about complying with local limits in the local SUO and announce the actual uniform limits outside the SUO	<ul style="list-style-type: none"><li>-Do not have to revise the SUO every time local limits change</li><li>-Easy to monitor for compliance</li><li>-Relatively easy to calculate limits</li></ul>	<ul style="list-style-type: none"><li>-IUs may not be clear on the limits with which they must comply</li><li>-Action may be overlooked by the general public and interested parties</li></ul>

# MAIL Allocation

<p>Place general language about complying with local limits in the local SUO and place individual limits in IU permits</p>	<ul style="list-style-type: none"> <li>-Do not have to revise the SUO every time local limits change</li> <li>-Provides flexibility</li> </ul>	<ul style="list-style-type: none"> <li>-Requires issuing a permit to all IUs to which the POTW wants limits to apply</li> <li>-Action may be overlooked by the general public and interested parties</li> </ul>
<p>Put MAILs in SUO, allocate loadings on an IU contributory flow or mass proportion basis, and place limits in IU permits</p>	<ul style="list-style-type: none"> <li>-Only IUs that discharge a pollutant are given a full allocation so limits are more efficiently allocated</li> <li>-Helps avoid setting excessively stringent or unattainable limits</li> </ul>	<ul style="list-style-type: none"> <li>-Requires knowing more about IU discharges (need to know their pollutant content)</li> <li>-Requires updating the SUO when MAILs change</li> <li>-Requires issuing permits to all IUs with specific limits</li> <li>-May penalize IUs that are currently pretreating if others are not</li> </ul>
<p>Put MAILs in SUO, allocate loadings on a case-by-case basis to those IUs that need an allocation for a specific pollutant, and place limits in IU permits</p>	<ul style="list-style-type: none"> <li>-Only IUs that discharge a pollutant are given a full allocation so limits are more efficiently allocated</li> <li>-Helps avoid setting excessively stringent or unattainable limits</li> <li>-Provides flexibility</li> </ul>	<ul style="list-style-type: none"> <li>-Requires knowing more about IU discharges (need to know their pollutant content) and applicable pretreatment systems</li> <li>-More time-consuming to determine allocation</li> <li>-Can lead to an inequitable allocation among IUs</li> <li>-Requires updating SUO when MAILs change</li> <li>-Requires issuing permits to all IUs with individual limits</li> </ul>

# Limit Duration

- POTW may establish limits that are daily maximums, monthly averages, or instantaneous maximums.
- Limit durations should be based on the long-term or short-term criteria used to develop the local limit.
- Most local limits will be implemented as daily maximums as the protection is short term and most IU sampling is infrequent.

# Common Sense Test for Developed Local Limits

- Are the limits technologically achievable?
- Can the POTW and dischargers determine compliance with the local limits?
- Are the limits sensible in light of actual conditions at the treatment plant and past compliance experience?

# Approval Authority and Adoption Process

- Specifics may differ depending on Approval Authority, but the general process follows these steps:
  - 1) POTW develops or recalculates draft local limits
  - 2) POTW submits draft local limits and supporting documentation to Approval Authority for review, makes limits available for public comment, and provides individual notice to affected parties
  - 3) Approval Authority notifies POTW of submission adequacy
  - 4) POTW adopts the accepted limits and provides opportunity for public review and comment.
  - 5) Approval Authority publicly notices and approves the formal pretreatment program modification



# STEP 5: ADDRESS COLLECTION SYSTEM CONCERNS

# Potential Collection System Problems to Evaluate

- **Fires and Explosions** (flashpoint limit, lower explosive limit monitoring, headspace monitoring, flammability and explosivity discharge screening levels)
- **Corrosion** (pH, corrosive pollutants)
- **Flow Obstructions**
- **Temperature**
- **Toxic Gases, Vapors, and Fumes**

# STEPS TO DEVELOPING LOCAL LIMITS

1. Determine Pollutants of Concern
2. Collect and Analyze Data
3. Calculate MAHLs for Each POC
4. Designate and Implement Local Limits
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# Questions?

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