US EPA Pretreatment Webcast Series

The Pretreatment 101 Series: POTW's Procedures for Conducting Compliance Monitoring

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Presented by: U.S. EPA, Office of Wastewater Management

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Overview of the Pretreatment 101 Webcast Series

Jan Pickrel, National Pretreatment Coordinator

EPA Office of Wastewater Management

Pretreatment 101

- Purpose
- Previous Webcasts (www.epa.gov/npdes/training)
  - Industrial User Wastewater Survey Procedures
  - POTW Procedures for Conducting Compliance Inspections (will be archived soon)
- Future Training Webcasts
  - Legal Authority & Permitting
  - Funding/Resources
  - Local Limits
  - Enforcement

Pretreatment 101: Legal Authority

- Compliance with the federal requirements of 40 CFR 403.8(f)(1)

- Ordinance Requirements
  - 2005 changes to the general pretreatment regulations regarding legal authority
  - Multijurisdictional Agreements

- Issuing Control Mechanisms
  - Individual and general permits

Pretreatment 101: Funding/Resources

- Compliance with the federal requirements of 40 CFR 403.8(f)(3)
- Organization and Staff
- Adequate Equipment
- Funding

Pretreatment 101: Local Limits

- Compliance with the federal requirements of 40 CFR 403.5(c) & 403.8(f)(4)
- When to develop and revise local limits
- How to develop local limits
  - Determining pollutants on concern
  - Data needed to develop local limits
  - Calculation of MAHLs
  - Designating and implementing local limits

Pretreatment 101: Enforcement

- Compliance with the federal requirements of 40 CFR 403.8(f)(5)
- Enforcement Response Plans
  - How to investigate instances of noncompliance
  - Identifying violations
  - Enforcement actions
- Significant noncompliance

Frequency and Types of Compliance Monitoring

Jan Pickrel

National Pretreatment Coordinator

EPA Office of Wastewater Management

Water Permits Division

Purpose and Objectives

- Collection information and data
- Verify accuracy and representativeness of IU self-monitoring data
- Determine compliance with regulations and control mechanism requirements
- Support enforcement actions
- Determine if previously identified problems have been resolved

Purpose and Objectives Cont.

- Generate data for the POTW's annual report
- Identify impacts on the POTW's influent, effluent, and sludge quality
- Evaluate the need to revise local limits
- Maintain current data on each regulated IU
- Assess the adequacy of the IU's self-monitoring requirements

Regulation Background

- POTW pretreatment programs must conduct surveillance activities [40 CFR 403.8(f)(2)(v)]
- **The Rule**: POTWs are required to conduct compliance monitoring at each SIU at least annually.
- **The Exceptions**:
  - POTW has assumed all monitoring responsibilities
  - Middle-tier CIU (MTCIU)
  - CIUs with monitoring waivers for pollutants not expected to be present
  - Nonsignificant Categorical Industrial User (NSCIU)

What is a SIU?

40 CFR 403.3(v)(1)

- **SIU** (Significant Industrial User) is:
  - All industrial users (IUs) subject to categorical Pretreatment Standards
  - Any other IU that:
    - Discharges an average of 25,000 gallons per day or more of process wastewater to the POTW
    - Contributes a process wastestream which makes up 5% or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant
    - Is designated as such by the Control Authority on the basis that the IU has a reasonable potential for adversely affecting the POTW's operation

Who is responsible for monitoring according to The Rule?

[40 CFR 403.8(f)(2)(v), 403.12(e) & (g)]

- Both the POTW and the IU are responsible for monitoring
  - **POTW Compliance Monitoring**: Routine Compliance Monitoring by the Control Authority
  - **IU Self-Monitoring**: Monitoring conducted by the IU

POTW Compliance Monitoring

The RULE: POTWs are required to conduct annual compliance monitoring of all regulated pollutants at each SIU

40 CFR 403.8(f)(2)(v)

POTW Compliance Monitoring

[40 CFR 403.8(f)(2)(v) & (vii)]

- Conducted by the POTW, independent from any IU self-monitoring
- Can be announced or unannounced
- Can be conducted independently or in conjunction with compliance inspections
- Used to satisfy the federal requirements
- Samples must be taken with sufficient care to provide defensible data

IU Self-Monitoring

[40 CFR 403.12(e) & (g)]

The RULE: SIUs are required to conduct self-monitoring at least once every 6 months for all regulated pollutants

40 CFR 403.12(e) & (g)

IU Self-Monitoring

- Conducted by the IU
- IU does not need to notify the POTW when it is conducting its monitoring
- Samples must be representative of discharge for the reporting period
- Samples must be taken at the designated sampling location

Reasons for an Increased Monitoring Frequency

- IU's continued noncompliance with pretreatment requirements
- Complaints
- IU with variable processes, production, and wastewater discharge

The Exceptions to the Rule: POTW is Conducting All Monitoring

[40 CFR 403.12(g)(1)]

- The POTW must conduct compliance monitoring at its SIUs least once every 6 months for all regulated pollutants
- The SIU is not responsible for conducting any self-monitoring

Pros and Cons: POTW Conducting All Monitoring

- ***Pros***
  - All samples are considered independent of the IU
  - Appropriate sample collection methods
  - Samples taken at the correct sampling location
- ***Cons***
  - IU might not have a good grasp of the performance of its pretreatment process
  - POTW must conduct repeat sampling after a violation unless the POTW has notified the IU to perform repeat sampling
  - POTW might not be aware of all IU process variabilities

Exceptions to the Rule: MTCIUs

[40 CFR 403.12(e)(3)]

- **MTCIU** (Middle-Tier CIU) is a discharger that:
  - Discharges <0.01% of the design dry weather hydraulic capacity, or 5,000 gpd (whichever is smaller)
  - Discharges < 0.01% of the design dry weather organic treatment capacity of the POTW
  - Discharges < 0.01% of the maximum allowable headworks loading for any pollutant regulated by the applicable categorical pretreatment standard for which approved local limits were developed
  - Has not been in significant noncompliance (SNC) for any time in the past two years
  - Does not have significantly variable daily flow rates, production levels, or pollutant levels

Exceptions to the Rule: MTCIUs

[40 CFR 403.12(e)(3)]

- POTW must conduct compliance monitoring at the MTCIU at least once every 2 years
- The IU must conduct self-monitoring at least once per year.

Exceptions to the Rule: CIUs with Monitoring Waivers

40 CFR 403.12(e)(2)

- Control Authorities may authorize a CIU to forego sampling of a pollutant regulated by a categorical Pretreatment Standard

- The CIU must demonstrate:
  - The pollutant is neither present nor expected to be present, OR
  - Is present at background levels from intake water and without any increase in the pollutant due to IU activities

Exceptions to the Rule: CIUs with Monitoring Waivers

40 CFR 403.12(e)(2)

- POTW must monitor for the pollutant with the waiver at least once during the effective period of the permit
- IU is not required to self-monitor for the pollutant with the waiver, but must submit a certification statement with each periodic compliance report

Exceptions to the Rule: CIUs with Monitoring Waivers

40 CFR 403.12(e)(2)

- Monitoring waivers are **POLLUTANT SPECIFIC**
- If a waived pollutant is found to be present, the IU must comply with the minimum monitoring requirements established by "**THE RULE**"

Exceptions to the Rule: NSCIU

[40 CFR 403.3(v)(2)]

- **NSCIU** (Nonsignificant CIU) is a discharger that:
  - Discharges ≤ 100 gpd of total categorical wastewater
  - Is consistently compliant with all applicable categorical pretreatment standards and requirements
  - Never discharges any untreated concentrated wastewater to the POTW
  - Has consistently complied with all applicable categorical Pretreatment Standards

Exceptions to the Rule: NSCIU

[40 CFR 403.3(v)(2)]

- POTW must conduct an annual assessment of the NSCIU's compliance with federal regulations.
- This assessment can be performed through
  - Reviewing IU reports
  - Conducting site inspection
  - Conducting compliance monitoring

Exceptions to the Rule: NSCIU

[40 CFR 403.3(v)(2)]

- IU is not required to conduct any self-monitoring, but must submit an annual certification that the IU:
  - Has complied with the NSCIU definition
  - Has complied with all applicable pretreatment standards and requirements
  - Has never discharged more than 100 gallons of total categorical wastewater on any given day during the reporting period

Implementation of MTCIU & NSCIU Classifications and Monitoring Waivers

- Prior to implementing these exceptions:
  - POTW must have the legal authority to implement these provisions
  - CIUs must demonstrate consistent compliance
    - As defined at 403.12(e)(3) for MTCIUs
    - As defined at 403.3(v)(2)(i) for NSCIUs
  - Monitoring waivers for pollutants not expected to be present
    - CIU must demonstrate that the pollutant is neither present nor expected to be present [40 CFR 403.12(e)(1)]

Monitoring Frequencies When Both IU and POTW Are Conducting Monitoring

	Minimum Required POTW Compliance Monitoring	Minimum Required IU Self-Monitoring
All SIUs	At least once per year	At least once every 6 months
CIUs with Monitoring Waivers	***Pollutants with waivers:*** At least once during the effective period of the permit ***All other pollutants:*** At least once per year	***Pollutants with waivers:*** Submit certification statement with each self-monitoring report ***All other pollutants:*** At least semi-annually
MT CIUs	At least once every other year	At least once per year
NSCIUs	At least an annual evaluation	Annual certification
Other IUs	Random assessments	None required

Other Types of Monitoring Events

- **Surcharge Monitoring**: Monitoring to evaluate fees and surcharges
- **On-Demand Monitoring**

Surcharge Monitoring

- Monitoring associated with surcharge fees or for billing purposes
- Surcharge limits are NOT the same as local limits
- A POTW can establish both a surcharge and a local limit for the same pollutant
- Typically for BOD, CBOD, and TSS

On-Demand Monitoring

- In response to:
  - Emergency Situations
  - Complaints
  - Unusual observations in collection system or at WWTP
- To identify or verify source of discharge causing problems
- To gather information for enforcement actions

Summary

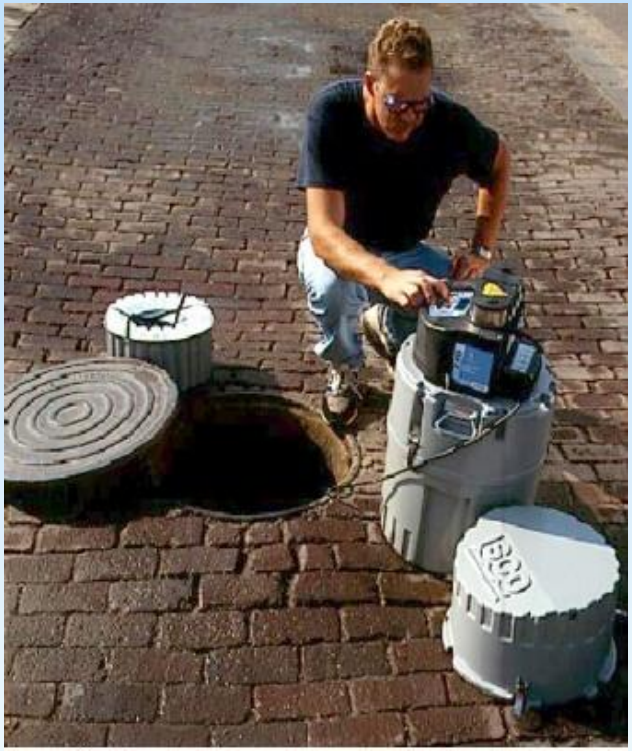
THE RULE:

- POTWs must conduct annual compliance monitoring at all SIUs
- SIUs must conduct self-monitoring at least once every 6 months

Questions?

Questions?

U.S. EPA Pretreatment 101 Series



Compliance Monitoring/Sampling

Byron Ross

Monitoring and Management Services, LLC

Sampling Plan – Documentation

- Sample location*
- Order of sampling
- Type of sample (grab vs. composite)**
- Type of flow measurement
- Parameters for analysis**
- Sample volume
- Sample containers
- Preservation techniques
- Sample identification procedures
- Packaging and shipping
- Safety concerns
- Hazardous waste
- Chain-of-custody
- QA/QC procedures

***Sample location description needs to be in SIU Permit, and recommend photo documentation of the sample location in the SIU file**
****Other information that must be the SIU permit**

Types of Samples

- Time Composite
  - 24-Hour Time Composite
  - Discrete Sampling set up
- Flow Proportional Composite
  - 24 Hour Flow Proportional Composite
- Grab Samples (why are these grabs?)
  - O&G
  - pH
  - VOCs
  - Phenol
  - Cyanide
  - Hydrogen sulfide
  - Fecal coliform
- QA/QC samples

When to use composite samples

- Highly variable effluent (flow or pollutants)
- Categorical standards (generally)
- Permit that specifies daily maximum limits

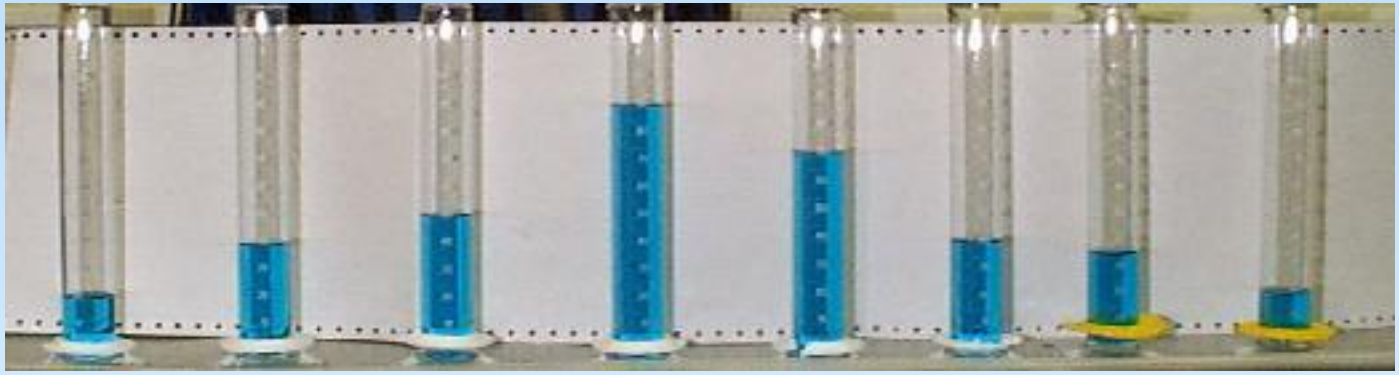
- *Minimum volume of each sample?*
  - US EPA sampling guidance documents state that a minimum of 100 mLs should be collected per individual sample

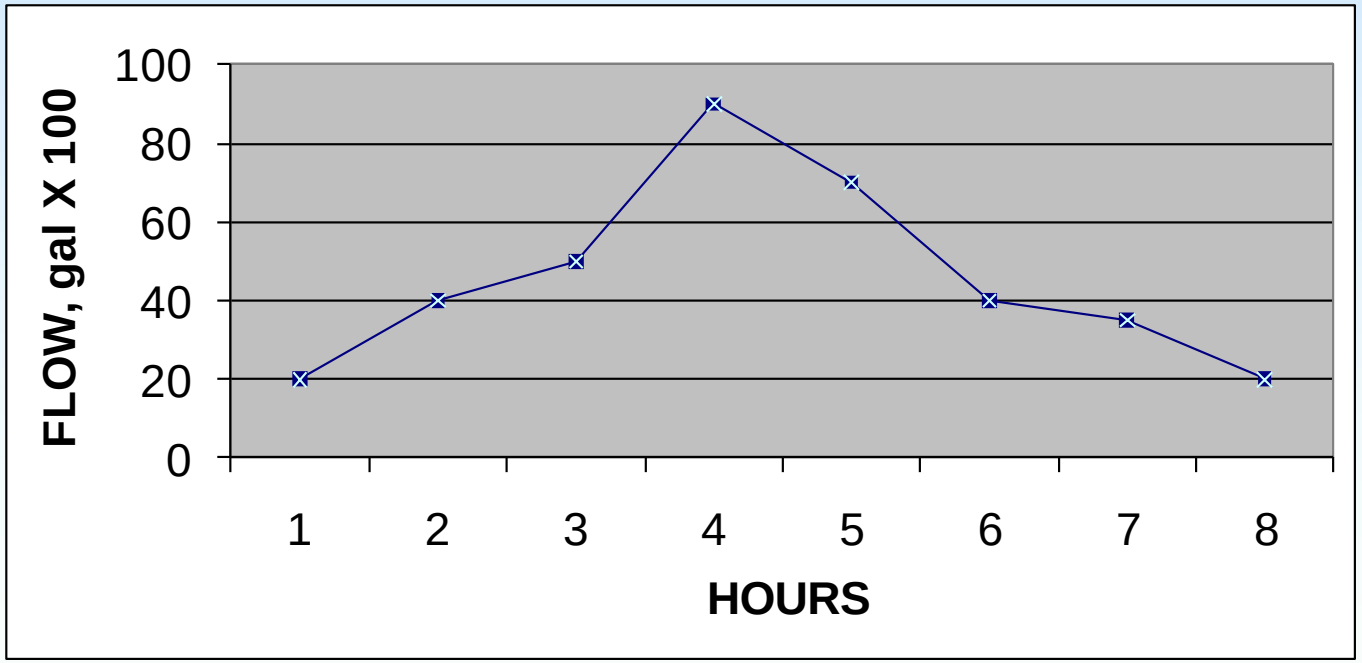
24-Hour Time Composite

- Example: 100 mLs collected every 15 minutes for a 24 hour period
- Use if flow is constant and pollutant concentrations are constant throughout the day.
- If flow or concentrations vary then the time composite sample will not be best to use or will not be representative

24-Hour Flow Proportional Composite

- Equal volume aliquots at varying time intervals proportional to flow
  - Need to calculate sample frequency and volume to ensure a representative sample with adequate volume.
  - Example: IU with 45,000 gpd. Programmed to collect a 100 mLs sample every 600 gallons, which results in 75 total samples to make the flow proportional composite. *This ensure that if flow varies, a representative sample can still be collected.*





Example of sample volume collected based on flow

24-Hour flow proportional composite sample preferred!

- Example…
  - SIU discharges 70,000 gpd, however the flow varies. Some days 35,000 gallons of flow is discharged within 2 hour period. If time composite used (i.e., 100 mLs every 15 minutes) then 8% of samples would represented 50% of the discharge.
- Control Authority must document Sample type used.
- Sample type should be designated in the SIU permit
- If time composite used, why is Control Authority allowing this instead of flow proportional composite?

If 24-hour time composite used, why is Control Authority allowing this; instead of 24-hour flow proportional composite?

- 40 CFR 403.12(g)(3):

  ...*Where time-proportional composite sampling or grab sampling is authorized by the Control Authority, the samples must be representative of the Discharge and the decision to allow the alternative sampling must be documented in that Industrial User file for that facility or facilities.*

  Document why an IU is allowed to use time-proportional composite sample.

When to use grab samples

- Batch discharges
  - Example: all process wastewater collected in 500 gallon storage tank and is well mixed, with discharge to sewer one time per week.
- Permits that have instantaneous maximum limits
- Parameters not amenable to composite sampling (e.g., pH, total phenols, VOCs, cyanide, O & G, sulfides)
- Checking for extreme conditions

Oil & Grease Sampling

- Most desirable sampling location is the area with greatest mixing
- Collect directly into sample container. Plunge sample container into the wastewater using a swooping motion with the mouth of the container facing upstream.
- Make sure not to overfill container and do not skim surface while collecting sample.

Sampling Requirements For Differing Effluent Limits

- Instantaneous Maximums
  - Measured as a single point in time during the operating day
  - Grab samples must be taken to evaluate compliance
- Daily Maximum
  - Measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling
  - Composite samples or multiple grab samples must be taken to evaluate compliance

Sampling Requirements For Differing Effluent Limits

- 4-Day averages
  - Applied as an average from 4 consecutive sampling days
  - Samples do not need to conducted on consecutive calendar days
- Monthly Averages or 30-Day Averages
  - Applied as an average wastewater strength over the course of a calendar month
  - Compliance is evaluated as the sum of all daily discharge samples during a calendar month and divided by the number of daily samples taken

Common Problems

- Wrong sample type used
- Wrong sample location
- Did not collect a representative sample
  - Collected 1500 mLs and expected 9500 mLs; or sampler container overflow, with 34 samples collected and expected to collect 56 samples.
- Automatic sampler tubing or container dirty

Common Problems Continued

- Sample line placement (avoid sags in line)
- Contamination – car exhaust, tobacco smoke, etc…
- Wrong preservative
- Missed holding time (due to sampler or lab)
- Analysis – not using 40 CFR Part 136 methods

QA/QC – validate the quality

- Equipment blanks
  - Example: Sampling DI water through the automatic sampler prior to going in field to sample; analyze for metals, BOD5, etc…
- Trip blanks
  - Example: VOC vial taken with sampling team
- Duplicate samples
  - Example: 2 O&G samples collected at same sample location and as near same time as possible.
- Split samples – for composite samples make sure sample is thoroughly mixed

QA/QC – protect quality

- Sample from least to most contaminated sampling locations
- Wear gloves
- Proper preservation
- Do not exceed holding times
  - Many POTWs do not adequately check SIU self-monitoring data, and in some cases the labs are not reporting analysis dates, or for other pollutants such as SVOC… the extraction date.

Preventative sampler maintenance

- Pump tubing replacement
- Suction line replacement
- Container replacement
- Diagnostic routines
- Volume calibration

Bottle cleaning – inorganic and general parameters

- Wash with non-phosphate detergent
- Scrub with brush
- Wash liners and caps separately
- Rinse with tap water, then distilled water

What to document

- Cleaning
- Calibration
- Equipment maintenance
- Preservation
- Chain-of-custody
- Date and time of samples
- Ambient field conditions
- Sampling personnel
- Field measurements (pH, temperature)
- Anything unusual that may effect sample (power outage, holding time exceeded).

Flow Measurement in Pretreatment

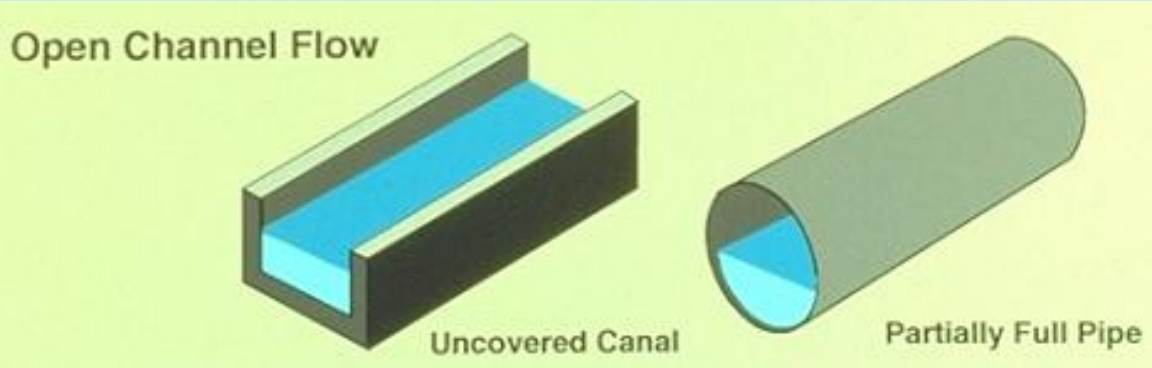
The measurement of flow along with sampling is essential to almost all water pollution control activities.

Flow Measurement in Pretreatment

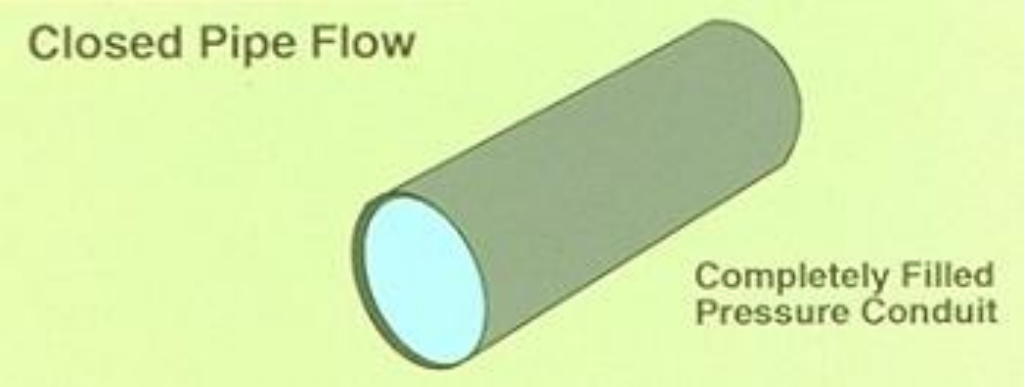
- Discharge permits which limit mass loading
- Design of wastewater monitoring/treatment facilities
- Flow-proportional composite sampling Preservation
- Combined wastestreams
- Surcharge basis

Two Types Of Flow

Open Channel



Closed Channel



Flow Measurement Systems

Any flow measurement system can be considered to consist of two distinct parts:

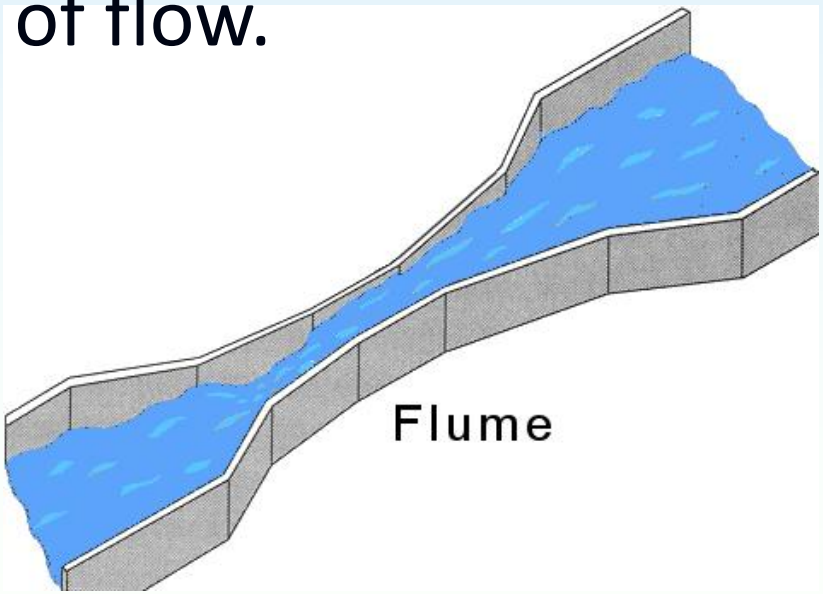
- a **primary device,** and
- a **secondary device**

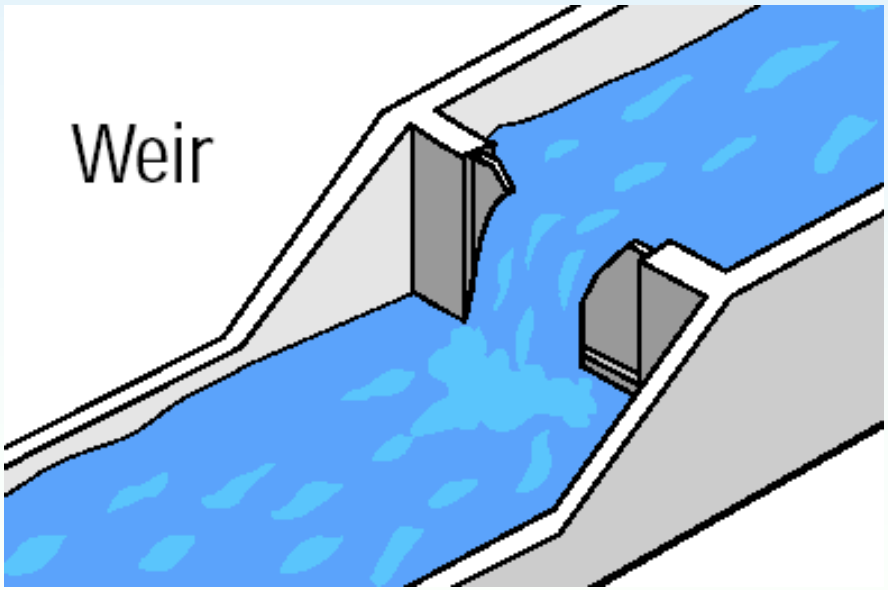
Each device has a separate function to perform:

- The flow passes through the primary device in a continuous, uninterrupted stream
- The secondary device uses that information to determine the quantity of flow per unit time

Primary Devices

- Weirs and flumes are the most common primary flow measurement devices.
- Calibration These devices are hydraulic structures, installed in the flow stream, which create a geometric relationship between flowrate and depth of flow.

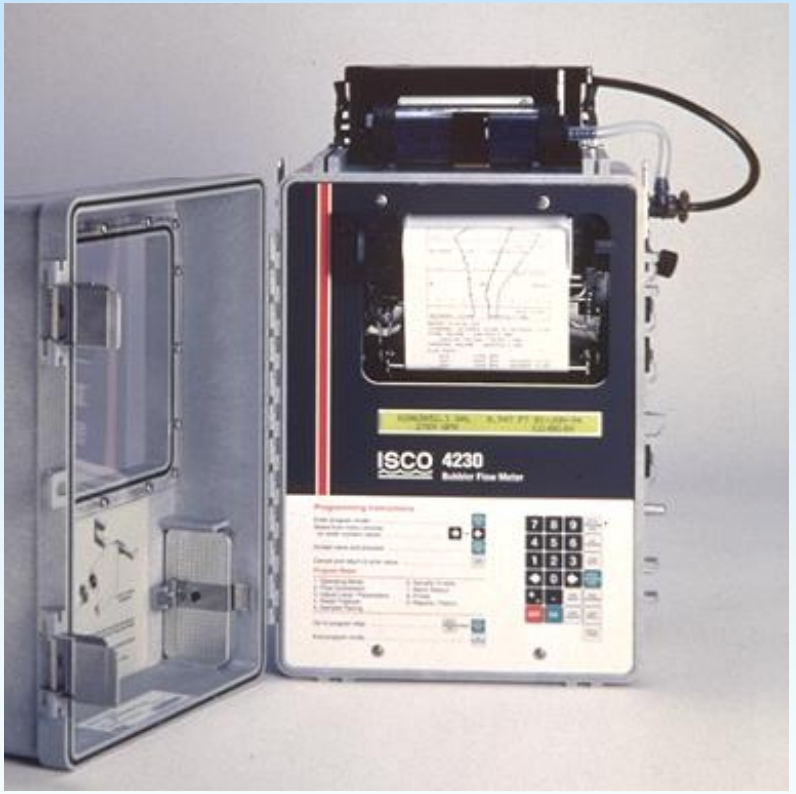




Secondary Devices

Typical secondary devices:

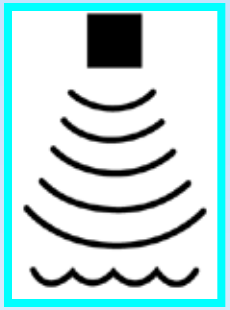
- measure level
- convert level to flow rate
- display data



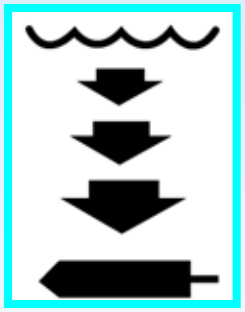
Level/Depth Measurement

Three most common technologies utilized are:

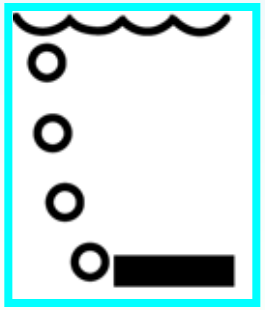
1. Ultrasonic – the sensor transmits high frequency pulses which hit the surface of the liquid and return to the sensor. The electronics measure the time it takes the sound to return



2. Pressure Transducer – water pressure is sensed by mechanical elements in the sensor which converts the pressure to a voltage



3. Bubbler – A constant flow of bubbles are continuously pushed through a small tube in the flow stream and the backpressure changes in proportion to the liquid level in the flow stream



Flow Measurement Installation & Monitoring Errors

- Faulty fabrication of the primary device
- Improper gauge or head measuring location
- Incorrect zero setting
- Improper head measurement
- Use of primary device outside its proper range
- Improper installation or maintenance of weirs
- Turbulence and surges in the approach channel

Calibration of Flow Measurement Equipment

- Permit should have requirement on flow meter calibration
- 3rd Party calibration frequency and recordkeeping
- Report all calibration procedures to Control Authority

Sampling – other considerations

- Field Log Book (Got to have it)
  - Record field readings, times, & dates
  - Book should be bound w/ hardback cover. (Critical for enforcement issues.)
- pH meter calibration & documentation
  - 3 buffer check (4, 7, 10).
  - Check/calibrate meter daily, and field test again prior to measurements

Sampling – other considerations

- Other measuring equipment?
  - Consider Conductivity Meter.
  - Related to TDS and salinity.
  - Also can correlate to metals

Some IUs say the analysis is wrong, but you need to investigate, it may be by-product formation or unknown chemical in supplied item

Example1:

Chloroform result was 9.5 mg/L, but IU said that they don't have chloroform. After inspection, found that they used HTH product to prevent coloration in process. Chlorine + organic matter can produce chloroform.

Some IUs say the analysis is wrong, but you need to investigate, it may be by-product formation or unknown chemical in supplied item

Example 2:

Zinc problem found when suppliers for rubber product changed. Zinc stearate is used to coat rubber so it doesn't stick together.

Analysis variation?

- Ammonia
  - Seasonal variation in domestic sewage
  - Treatment mechanism at POTW
- TKN
  - Ammonia plus Organic N
  - Interferences in analysis? Nitrates > 10 mg/L
- BOD5 vs. CBOD5 & various solids analysis (TSS, TDS, %TS, etc…)
  - Be aware of differences

Wet Chemistry

- Total Phenols
  - Especially at Landfills
  - INTERFERENCES are primarily **sulfide and color—as with most wet chemistry analyses**

- Cyanide
  - If chlorine present add ascorbic acid and then NaOH
  - Low level detection (< 0.10 mg/L) due to lab method or interferences. Check w/ lab on QA for low level detection

Metals Analysis …
ICP- Perkin Elmer 4300

Total metals or dissolved metals?

ORGANICS…
GC/MS

ORGANICS

- Two (2) major groups
  - Semi-volatile and Volatile
  - Semi-volatiles have two other categories: Acid Extractables and Base Neutral Extractables
  - Sample Semi-volatiles using glass container. Why? Phthalates and other organics;
  - Check analysis date, but also the extraction date. For semi-volatiles, only have 7 days to get extraction completed.

ORGANICS

- VOC (Volatile Organic Compounds)
  - Special vials (normally 2 – 40 mL vials)
  - NO air bubbles in samples… Why no air bubbles?
  - VOCs, as name implies, can change. Sometimes rapidly if low concentration or conditions favorable for change.
  - VOC Case Scenario - chloroform

Questions?

Questions?

Speaker Contact Information

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