

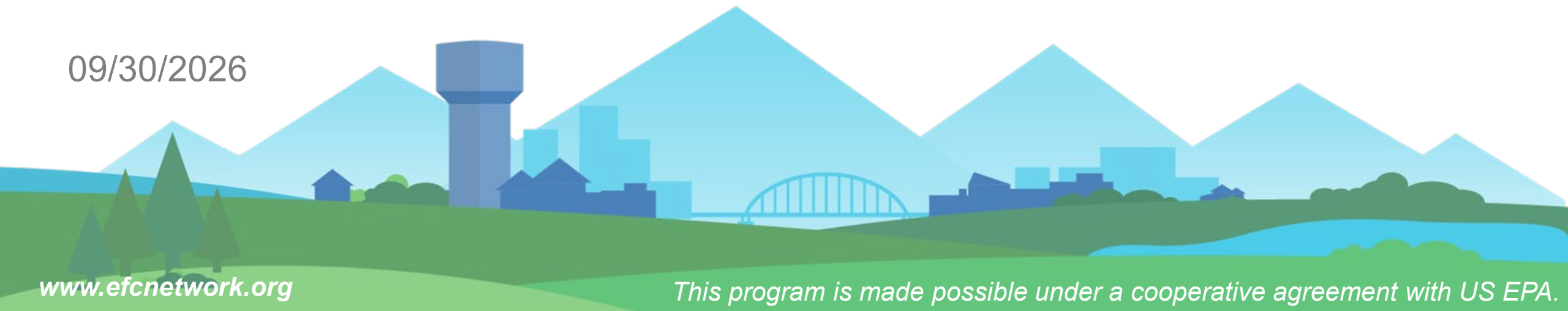


SOUTHWEST
ENVIRONMENTAL
FINANCE CENTER

US Territories Wastewater Operator Training Series

Session 21: Wastewater Sampling

09/30/2026



Your trainers for today



A.J. Barney
Research Engineer



Valeria Cortes-Mora
Water Utility Support
Specialist



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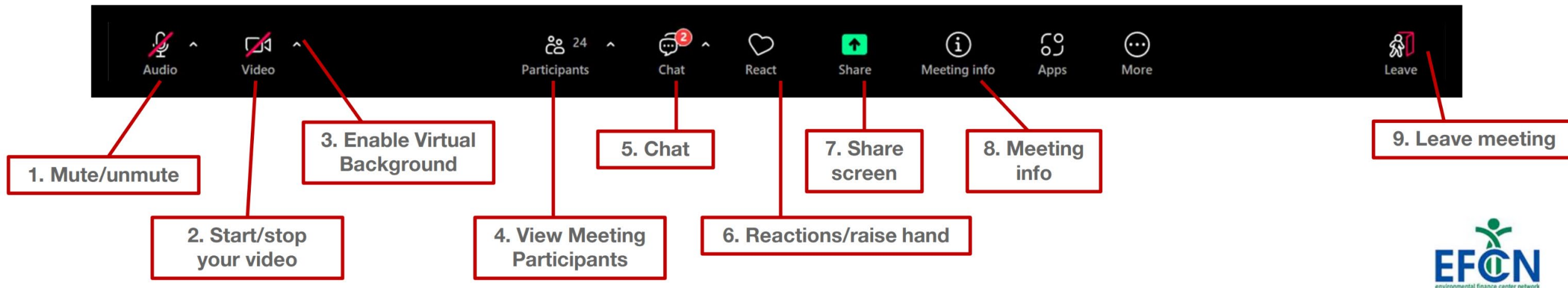
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This training series is funded by the EPA

Attendee Meeting Controls

- Locate your control bar
- All attendees will see a black horizontal bar on their screen
- If your control bar is not visible, it may be hidden
 - Move your cursor to the screen's bottom (or top) to reveal this control bar.



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Standardized Wastewater Treatment Operator Exams

Wastewater Treatment Operator Need-to-Know Criteria

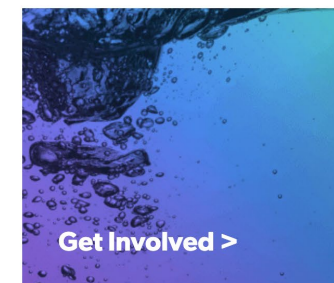
Need-to-Know Criteria outline the content that will be covered on WPI's standardized examinations provided through [ABC Testing](#), a WPI service.

- [Wastewater Treatment Operator Class I](#)
- [Wastewater Treatment Operator Class II](#)
- [Wastewater Treatment Operator Class III](#)
- [Wastewater Treatment Operator Class IV](#)

Wastewater Treatment Operator Formula/Conversion Table

WPI standardized exams are administered with a Formula/Conversion Table containing mathematical formulas and common abbreviations that may be present on the exam.

- [Wastewater Treatment Operator Formula/Conversion Table](#)

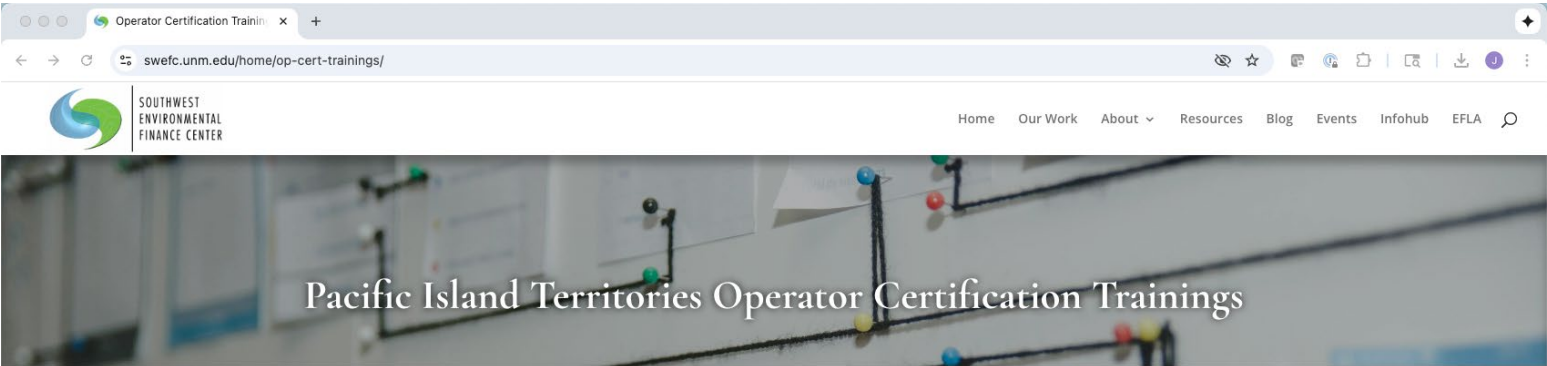


Schedule for 2026:

Date	Topic
1/20/26	Concept and Math Review Session
2/3/26	Disinfection Part 1 (chlorination/dechlorination) + related math
2/17/26	Disinfection Part 2 - UV and other methods
3/3/26	WW Math Part 3 (Flow, Detention Time)
3/17/26	WW Math Part 4 (BOD Math /Advanced WW Math)
3/31/26	Solids Handling Part 1 (Mechanical Solids Separation)
9/16/26	Solids Handling Part 2 (Solids Handling)
9/30/26	Sampling
10/14/26	Regulations (NPDES Permits and Discharge Limitations)
10/28/26	Treatment System Maintenance
11/11/26	Lab Procedures/Analysis/Interpretation or alternate topic
11/25/26	Using Technology in daily operations (SCADA, Computer, Tablets, CMMS, AI, etc.)
12/9/26	Course Review Session - Short sample exam?

Links to recordings and material are available on our website at <https://swefc.unm.edu/home/op-cert-trainings/>

https://swefc.unm.edu/home/op-cert-trainings/



This page is a repository of Wastewater and Drinking Water Operator Certification (Op Cert) Training Webinars offered by the SW EFC for systems in the Pacific Territories. Below you will find the **training webinar schedules (wastewater, then drinking water)** followed by a **training webinar recordings library**.

Jump to Wastewater Trainings

Jump to Drinking Water Trainings

Wastewater Training Schedule

Please note all times are local to CNMI and Guam. The times in American Samoa are one day earlier at 11 am.

Session	Date	Training Topic & Link to Recording (click to view)	Supporting Materials (click to download)
1	6/25/2025	Program Overview, Test Format, Study & Test Tips	PPT slides
2	7/9/2025	Treatment Overview	PPT slides
3	7/23/2025	WW Math Part 1 (Areas & Volumes)	PPT slides
4	8/6/2025	WW Math Part 2 (Flow Rates & Detention Times)	PPT slides
5	8/20/2025	Collection Systems – Gravity systems	PPT Slides
6	9/3/2025	Collection Systems – Pumping & Force Mains	PPT Slides
			Collection Systems (Grades 1 – 2) Course #401
			Tech Brief – Reading Centrifugal Pump Curves
			Grundfos E-cademy – Pump Selection Basics
7	9/17/2025	Collection System Maintenance	Pennsylvania Department of Environmental Protection Module 9: Basics of Pumps and Hydraulics
8	10/1/2025	Operator Safety/OSHA/Chemical Safety & Inventory	PPT Slides
9	10/15/2025	Preliminary Treatment	PPT Slides
10	10/29/2025	Primary Treatment: Sedimentation	

Sign in for every session to ensure you get credit for attending



**US Territories Water & Wastewater Operator Certification
Virtual Training Series Group Attendance Sheet**

Session Title: _____

Session Date: _____

Training Location: _____

Attendee Name	Attendee Signature	Arrival Time	Departure Time

I hereby certify that the individuals listed above attended the referenced training session.

Name: _____

Signature: _____

Title: _____

Date: _____

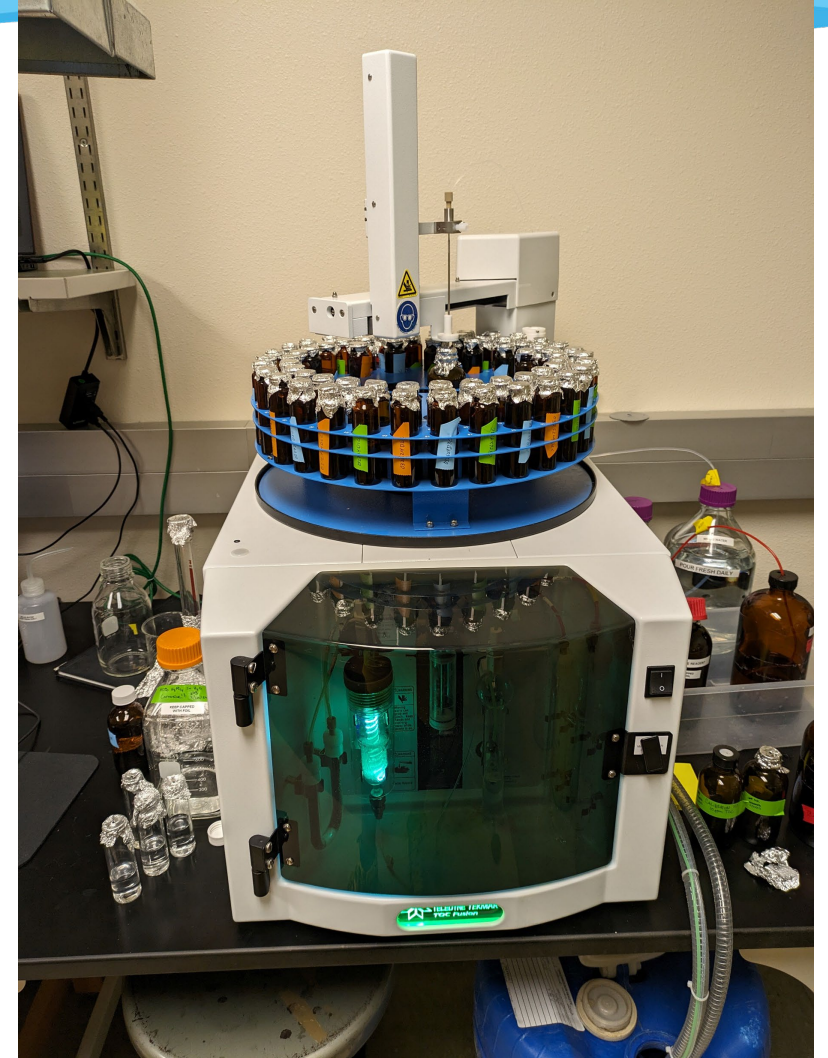
Please scan this sheet after each training session and email it to swefc@unm.edu with the subject line: "US Territories Op Cert Attendance Sheet"

Wastewater Sampling Basics

Wastewater Sampling Introduction

Purpose of sampling

- Regulatory compliance
- Process control
- Public health monitoring
- Environmental protection
- Industrial pretreatment



Basic Sampling

Sample collection consists of:

- Sampling preparation
- Sample collection
- Sample submission

Sampling can differ at different types of wastewater facilities

- Municipal
- Industrial
- Combined system



Representative Sampling

Collecting samples of large bodies of water that represent the water quality for the whole body of water

Sample depict average flow conditions

Best management practices:

- Sample point collects the entirety of the flow
- Sample point provides thorough mixing
- Avoid contamination
- Composite sample is preferable when possible

Types of Wastewater Samples

Grab Samples- Taken a single time in a single location

- Provide snapshot of wastewater conditions
- Used to identify short-term spikes or unusual conditions
- Collected for parameters that degrade quickly (pH, temperature, dissolved oxygen and chlorine residual)

Composite Samples- Combination of small samples (aliquots) throughout the day

- Time or flow based
- Collected for parameters that require average values



Sampling Regulations and Standards



NPDES permits

EPA methods

State/local requirements

Indicate what should be sampled, how it should be sampled, and how results should be reported from a regulatory perspective

Improper Sampling

Operations- Misleading data leads to flawed operational changes

Legal- Improper sampling can lead to permit violations and increased compliance monitoring

Financial- Wasted resources and fines or lawsuits

Loss of Public Trust- Credibility with sewer and downstream users compromised

Increased Workloads- Resampling and additional field work



Sample Collection

Sample Equipment

Sample bottles

- Bottle labels

Sample pole or dipper

Automatic sampler

Ice and cooler

Chain of custody form, tablet, or sample submission form

Notebook

PPE

- Nitrile gloves, safety glasses, safety vest, hard toes shoes, etc.

Field analysis equipment

Bottle Labelling

Correct labeling ensures samples are reputable

Mislabeled samples are the most common reason for sample rejection

Labels can be provided by labs or purchased commercially

Samples should include:

- Location
- Date and time
- Analysis
- Sampler initials
- Preservation

Label samples before taking samples when possible and label bottle with non-running ink



Sample Sites

Location

Sample points

Flow conditions

Site hazards



Grab Sampling



Ready bottle by removing lid and carefully placing lid face up away from contamination

Collect sample in sample bottle directly from sample port or flow facing upstream if possible

- Allow sample valves to clear any old sample water
- Collect mid stream to avoid contamination
- Do not fully submerge if preservative is present

Fill sample bottle to shoulder

Cap bottle, place label if needed, and ready for transfer

Utilize a collection device if necessary

Composite Sampling

Set up sample according to autosampler requirements

- Place sample tubing facing up stream

Pour sample from composite bottle directly into sample bottle

- Mix well before pouring

Fill bottle to the should

Cap bottle, place label if needed, and ready for transfer



Time-Weighted Composite Samples

Uniform sample volumes collected during specific time intervals

Typical programming consists of-
100 mL of sample, collected every
15 minutes, for a 24-hour period

- ~10,000 mL or 10 L
- Increase sample volume if flow is not continuous for 24 hours

Time-Weighted samples ideal for steady flow and limited pollutant slugs



Flow-Weighted Composite Samples

Uniform sample volumes triggered by flow requirements

- Requires a flow meter
- Pacing volume or flow count used to trigger sample aliquot
- Flow counts adjusted based on typical total flow for 24-hours

Average daily flow divided by total samples to determine pacing volume

May require troubleshooting to account for flow variability

Autosampler Parts

Programming computer

Display

Pump

Suction line

Liquid detection sensor

Power supply

Enclosure

Refrigeration systems

Flow meters

Sample Bottle



Calibration and Maintenance



Samplers should be calibrated periodically to ensure representative sampling

- At least weekly

Used for troubleshooting to ensure uniform sampling

Calibration accomplished by requesting a sample of specific volume, comparing that sample to requested volume, inputting actual output

- Samplers auto adjust based on actual output

Replace tubing during new sample cycles and check for issues between sample collections

- Document issues

Field Sample Analysis

Common field measurements

- pH
- DO
- Temperature
- Conductivity
- Turbidity



Logbook

Used to document sample details

Should include and expand bottle label information

➤ Adds unusual conditions, changes in pumped volume, sample characteristics, and weather conditions

Logbook can play role in legal procedures



Preservation and Sample Submission

Sample Preservation



Preservation prevents biological, chemical, and physical changes in wastewater samples

➤ Ensures representative samples

Sample analysis can be influenced by:

➤ Biological activity

➤ Chemical reactions

➤ Environmental conditions

➤ Temperature

➤ Light

Preservation Methods

Chemical

Filtration

Temperature

Bottle Types



Holding Times



Ensures sample degradation does not occur

Holding times are specific to analysis being conducted

Requires lab coordination

➤ Clearly communicate with lab on desired analysis and collection capacity

Temperature Control Methods

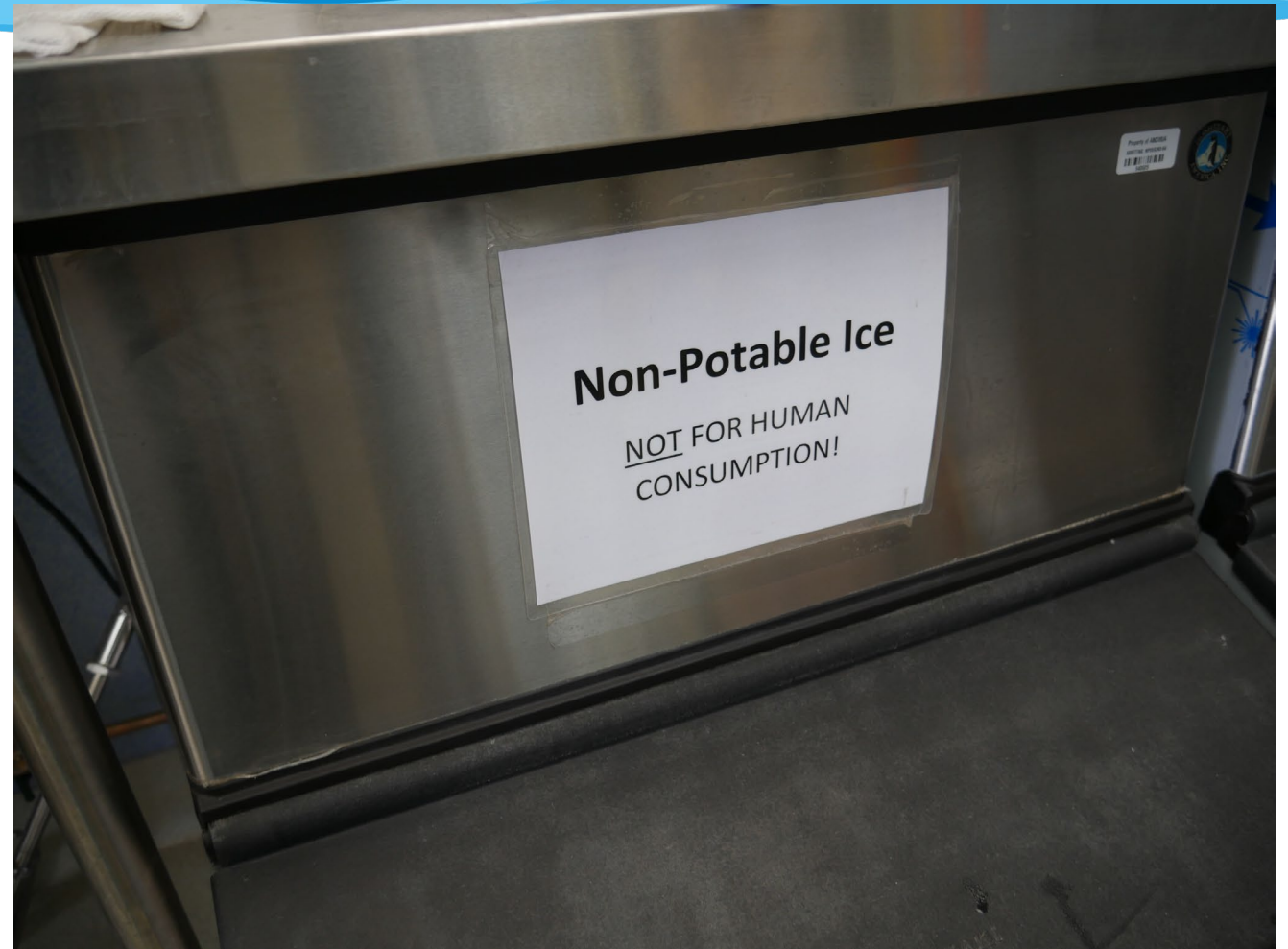
Ice

Coolers

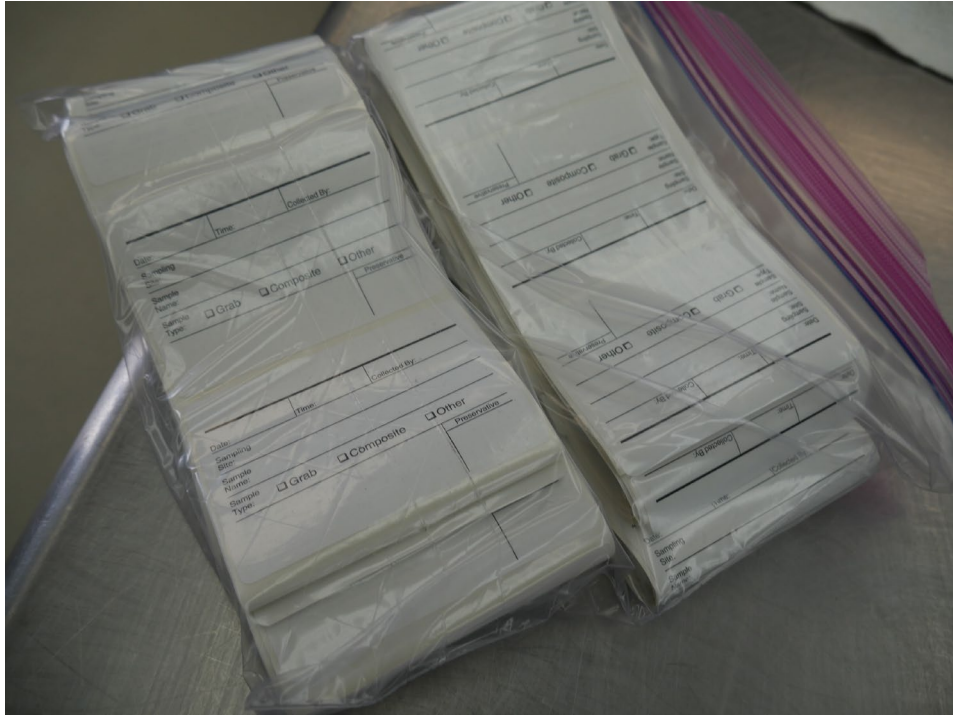
Transportation

Refrigeration

Timing



Sample Submission and Chain-of-Custody



Sample submittal and delivery accompanied by chain-of-custody

Record of each person involved in handling and possession of a sample

- Paper or electronic
- Includes bottle label information and handling after submission
 - Storage conditions, post collect preservation
- Starts with sampler, then anyone involved with transportation or processing sample, lab Analyst, and finally a witness to sample disposal

Process Specific Sampling

Influent

Used for baseline characterization and identifying unusual contaminant loads

Composite or Grab

Large variety of possible parameters

- Biochemical Oxygen Demand (BOD)
- Solids
- Ammonia
- Metals, PPCPs, PFAS, etc.

Compare to effluent samples for removal efficiencies

Primary

Determine the impact of
suspended solids removal

Typically composite samples

- Total Solids
- Total suspended solids (TSS)
- BOD



Biological



Measure the result of biological activity and nutrient removal

Composite, grab, or in-line probes

- BOD
- Ammonia
- Nitrate
- Dissolved Oxygen (DO)
- TSS (MLSS)

Secondary clarifiers that accompany biological processes may be analyzed for solids

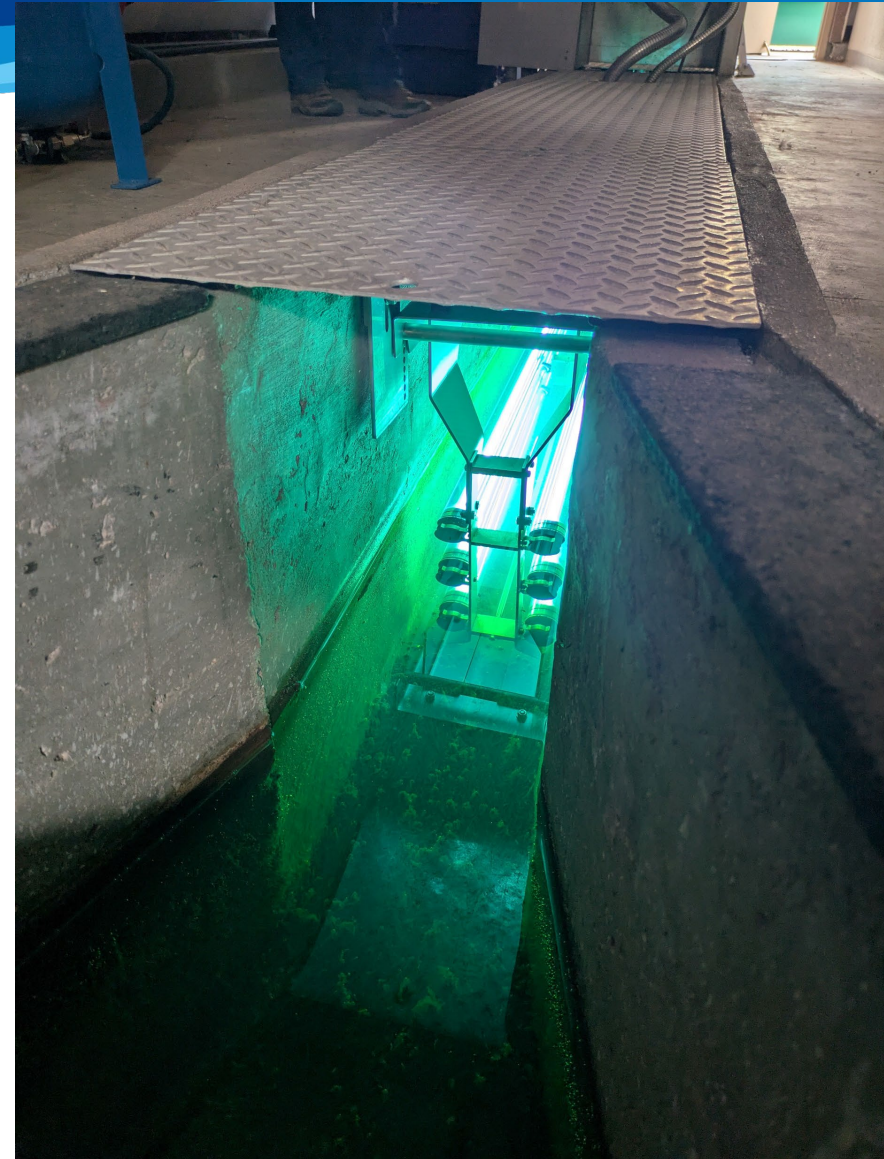
Disinfection

Measures residual disinfection chemicals and effectiveness of disinfection

Grab samples used due to short hold times

- Chlorine residual
- Fecal Coliform

UV process have inline meters to measure flow, UV intensity, turbidity, etc.

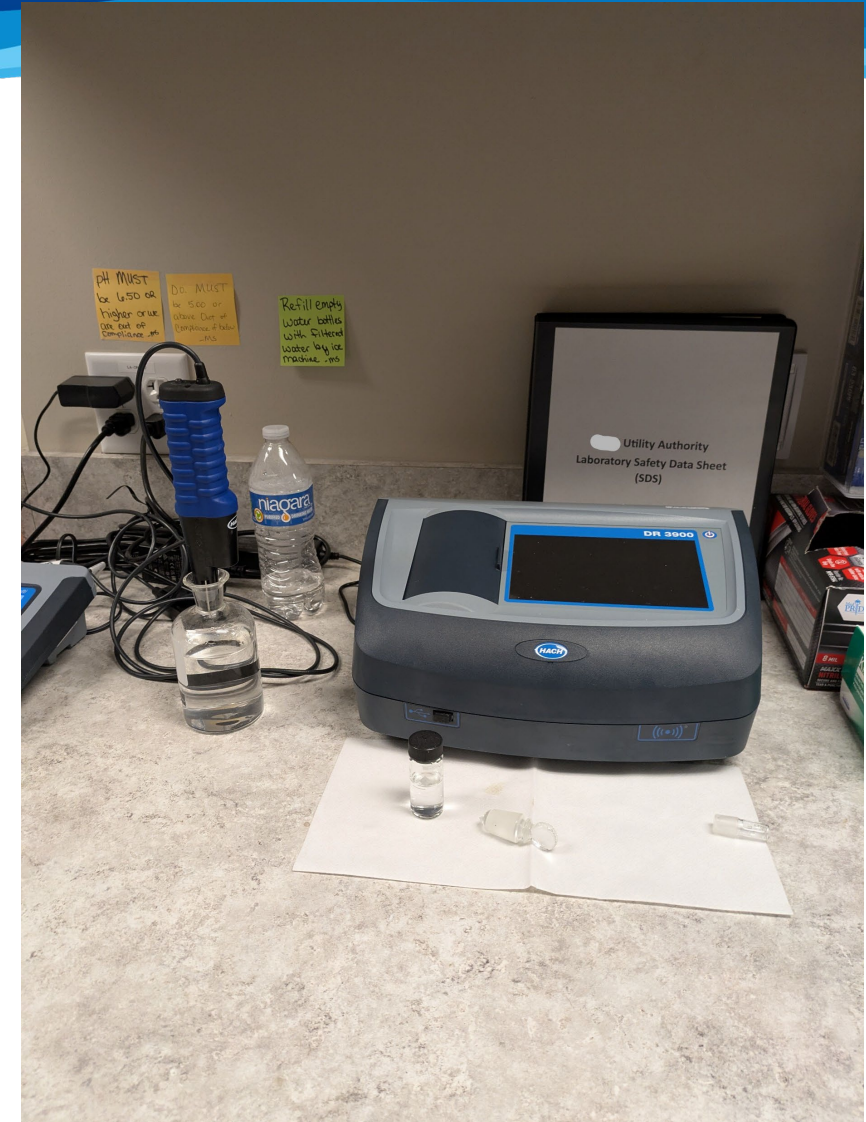


Final Effluent

Important regulatory and process samples

Composite and grab samples

- BOD
- TSS
- Other parameters as needed by permit or desired for plant assessment



Solids Handling

Determine the effectiveness of stabilization, process health, and dewatering

Typical parameters

- Total solids
- pH and temperature
- Fecal coliform



Quality Control

Quality Control

Ensures data is accurate and reliable

Required for regulatory compliance and process control

➤ Proves credibility

Sampler measures:

➤ Reduce sampling errors

➤ Managerial controls

➤ Following field controls

➤ Decontaminating sample equipment

Sampling Errors

Human

- Improper sample location
- Improper preservation
- Exceeding holding time

Environmental

- Weather
- Slugs

Equipment

- Requires proper maintenance and inspection

Managerial controls/ SOPs used to mitigate errors

Water Utility Authority

Effective Date:	Program:	Protocol	Revision:
4/30/21	PR	ESMLF	12

Objective: Required monitoring for Silver, Aluminum, Boron, Arsenic, Cadmium, Chromium, Copper, Molybdenum, Mercury, Nickel, Lead, Selenium, Zinc, Fluoride, COD, TSS, Ammonia, and Hardness.

Reference Document(s): NPDES permit NM0022250, effective December 1, 2019. 40 CFR 403 (g) (3), 40 CFR 136, Individual Industrial Pretreatment Permits, Sewer Use and Wastewater Control Ordinance, Water Authority Rate Ordinance.

Sample Purpose: Compliance Monitoring and Extra-Strength Surcharge Monitoring.

Sample Collection Type/Details: Time-weighted composite, aliquots collected every 15th minute for a total of 96 aliquots per day.

Sample Collection Frequency: Quarterly, Semiannual, Annual and as needed.

Sample Matrix: Industrial or Commercial Wastewater

Sample Point Nomenclature Convention: Use industry permit numbers, multiple sample points are denoted with letters (2048A, 2048B, etc.)

Sampling Personnel: Water Quality Specialist, Monitoring Technician, Intern, Engineer, P2 Specialist, Program Manager.

Field Instructions: Record visual observations and field environment. Cool COD, Ammonia and TSS samples cool to ≤ 6°C. Ammonia bottle is pre-preserved with Sodium Thiosulfate. COD is prepreserved with H2SO4. Mix composite jug and pour samples into sample bottles.

Laboratory Instructions: Immediately upon receipt, acidify metals sample with nitric acid (HNO₃). Acidify Ammonia upon receipt with H2SO4 to pH <2.

External Laboratory Instructions: Applicable only if WQL services not available. Notify NPDES Program Manager or Compliance Division Manager. Send LIMS compatible Electronic copy to WQL.

Special Handling Instructions: Any method or protocol change must be approved by the Program manager (NPDES/WQ or WQL), or Compliance Division Manager.

Chain of Custody: Required: Yes ☒ No ☐

QA/QC Data Requirements: QA/QC data required and available upon request.

Compliance Division Protocol Agreement

Current approved version of this document is only available on SharePoint

Page 1 of 2

NOTES

OR (GI) INFORMATION

Pumping Frequency:	Manifests or Logs:	Most Recent two (2) Pumpings:
Wkly	Confirmed	
Mthly	New GI	
Qtrly	Self-Clean Log	
2x/yr	Unavailable	
Other	Other	

Pamphlet provided? Yes No

OR COMMENTS

PASS FAIL

Water Authority Sewer Use Ordinance (SUO) Provision

§ 3-3-2-B (See back)

§ 3-3-2-C (See back)

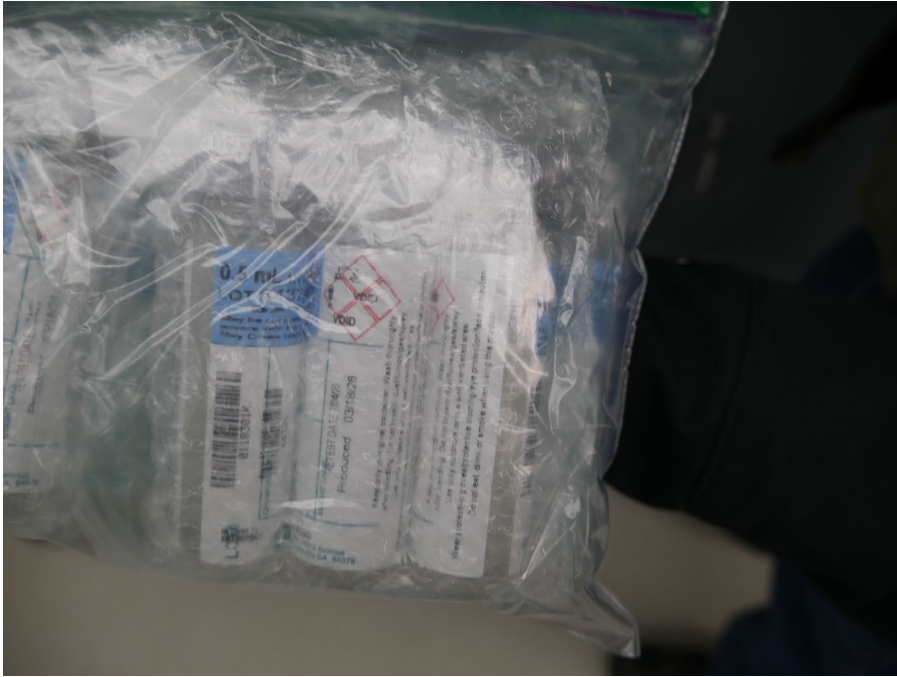
§ 3-3-2-D (See back)

§ 3-3-2-E (See back)

§ 3-3-2-F (See back)

DEFICIENCY NOTICE: Actions will be implemented within the next 15 business days for each violation checked above. Failure to implement will result in a \$50 Reporting Violation.

Field Quality Control



Duplicates- Should provide similar data as used samples

Blanks- Verifies lack cross-contamination

Equipment and trip blanks used for similar purposes

Samples should always be mixed thoroughly

Decontamination



Proper equipment cleaning prevents contamination of wastewater samples

➤ Residual pollutants cause unusually high results

Use new equipment when possible

Utilize lab provided bottles

Utilize deionized water, effective detergents, and acid rinse when necessary

Questions?

CONTACT INFORMATION



SOUTHWEST ENVIRONMENTAL FINANCE CENTER

A.J. Barney: ajbarney1@unm.edu

Department of Civil Engineering MSCo1 1070
1 University of New Mexico
Albuquerque, NM 87131
505-277-0644
swefc@unm.edu
<http://swefc.unm.edu>