April 24, 2025

7:30-8:00 **Login and Opening**

8:00-9:00 **How to Get What you Want (Need) from your Analytical Lab**
Diane Rosseter, Environmental Consultant, Georgia-Pacific

9:00-10:00 **Regulatory Relationships**
Forrest Westall, McGill Associates, P.A.

10:00-10:15 **Break**

10:15-11:15 **Laboratory QA/QC, Assessing Vendor Labs**
Steve Guptill, Johnny Haynes and Garrett Hutchings
Duke Energy Corporation, Inc.

11:15-11:45 **Lunch Break**

11:45-12:45 **Emergency Preparedness**
Brenna Cook, City of Asheville

12:45-1:00 **Break**

1:00-2:00 **Aquatic Toxicity Unit Updates**
Cindy Moore and Molly Nicholson
NCDEQ Aquatic Toxicology Branch

2:00-3:00 **Aquatic Toxicity Testing**
Jim Sumner and Jaydon Perez, ETS, Inc.

Help Your Lab Help You:

How to Get What You Want (and NEED) from Your Analytical Laboratory

Presented by
Diane Rosseter

Data generated from collection and analysis of environmental samples provides the decision-making backbone for environmental compliance and assessment activities....

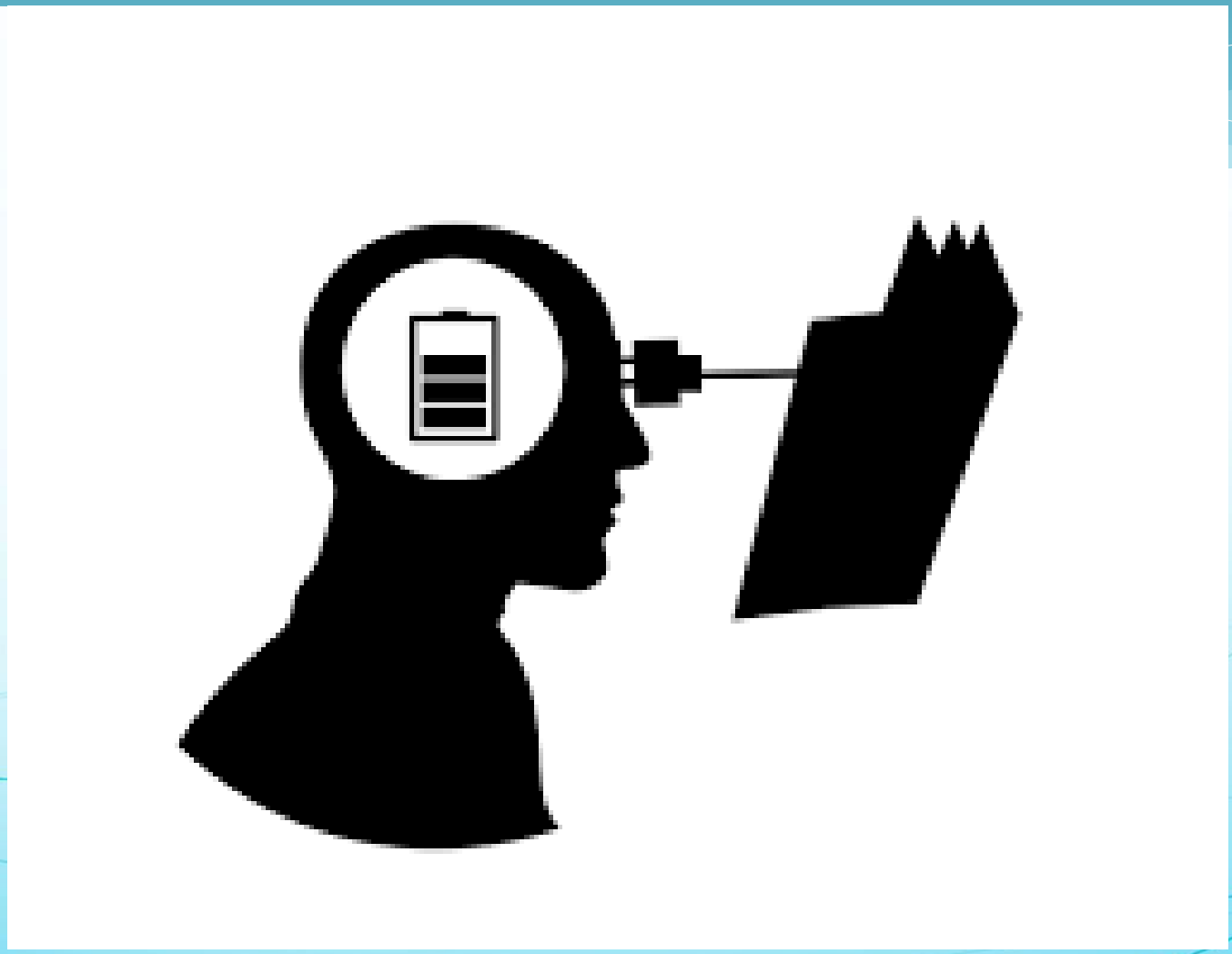
Underlying goal of all environmental sampling activities should be…..

- To understand the fundamental reasons behind sample collection
- To collect and/or generate data that is reliable and usable
- To obtain data and produce reports that are technically sound and meet regulatory compliance obligations
- To understand how to accurately interpret and use the data

Where Do I Start?

NEVER ASSUME ANYTHING

None of us are mind readers…



Project Planning

Fundamental Considerations….

- For what purpose is the data being collected?
- What type of data/reporting is required?
- Is a Sampling Plan required (i.e. regulatory preapproval)?
- Is the sampling routine or special?

Determine the Basics

- Sampling protocols
- Documentation requirements
- Lab / Sampling certification requirements
- Test methods and reporting limits - including parameter lists
- Laboratory deliverables and QA levels

Choosing a Laboratory

Contract Laboratory Selection

- ***All labs are NOT the same (even within the same network)***
- ***You OFTEN get what you pay for***

Evaluation and Selection Process

- **“Certified” does not necessarily mean *qualified***
- **Differing certification programs and requirements – some states have NONE**
- **Differences in turnaround time, pricing, capabilities, deliverables**

ASK AROUND!!!!!

Communicate Objectives

Put It All in Writing and Get It All in Writing

Send the lab a copy of your wastewater permit

A. (1.) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS – FINAL

During the period beginning on the effective date of this permit and lasting until expiration, the Permittee is authorized to discharge from outfall 001. Such discharges shall be limited and monitored by the Permittee as specified below:

EFFLUENT CHARACTERISTICS	LIMITS			MONITORING REQUIREMENTS		
	Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location
Flow[1]	0.035 MGD			Continuous	Recording	Influent or Effluent
BOD, 5-day (20ºC)	30.0 mg/L		45.0 mg/L	2/Month	Composite	Effluent
Total Suspended Residue	30.0 mg/L		45.0 mg/L	2/Month	Composite	Effluent
NH_3 as N (April 1 – October 31)	11.0 mg/L			2/Month	Composite	Effluent
NH_3 as N (November 1 – March 31)	22.0 mg/L			2/Month	Composite	Effluent
Fecal Coliform (geometric mean)	200/100 ml		400/100 ml	2/Month	Grab	Effluent
Total Residual Chlorine				2/Week	Grab	Effluent
Temperature (ºC)				Weekly	Grab	Effluent
pH[2]				2/Month	Grab	Effluent

And your drinking water monitoring requirements and schedule

https://www.pwss.enr.state.nc.us/NCDWW2/

And ANYTHING else that might help YOU make sure YOU get what YOU NEED

Communicate Objectives

- **Start with a phone call**
- **Submit some form of Task Order or Email**
  - ✓ Project Requirements
  - ✓ Methods
  - ✓ Parameters
  - ✓ Reporting limits
  - ✓ Number and type of samples
  - ✓ Turnaround time (TAT)
  - ✓ Certifications
  - ✓ QA deliverables, etc.

Communicate Objectives

- **Confirm pricing based on level of deliverables and TAT**
- **Resolve any issues before sample kits are sent**
- **Receive sampling kits and confirm contents prior to stepping out in the field - *familiarize yourself with any special sampling requirements***

Communicate Objectives

Contact lab just prior to sampling

- Is it a good time to sample?
- Is the lab open (weekend / holidays)?
- Will the lab have enough time to meet the hold time?
- Will the lab have enough time to meet my deadline?
- Will the lab have enough time to meet the state reporting deadline?

Communicate Objectives

Confirm receipt of samples by lab

- ✓ verify analyses
- ✓ sample IDs
- ✓ collection dates and times
- ✓ condition upon receipt

Stay in touch with your project manager throughout the analytical process

"Anything that can go wrong, will go wrong"

We don’t know ANYTHING about multi-tasking……

Sample Collection

Before collecting any samples or field data….

- **Understand why the sample is being collected**
- **Research and follow proper sampling protocols**
- **Determine what is and how to collect a REPRESENTATIVE SAMPLE**
- **Know your monitoring schedule!!!**

Sample Collection Considerations

- **Know the analytical method / field method requirements**
  - ✓ Vary between regulatory programs and states
  - ✓ ***Check your permit***
- **Know the analytical parameter list**
  - Vary between programs and states
  - ✓ ***Check your permit***

Example
Sludge or Waste Characterization

- Why is the waste being characterized
- Who will be receiving the waste
- How will the waste be treated
- What is the waste type
- What is a representative sample
- To what criteria will the results be compared
- When was waste last characterized

Other Considerations

- **TCLP versus Direct**
  - ✓ What is TCLP (Toxicity Characteristic Leaching Procedure)
  - ✓ Sample is prepared using TCLP then analyzed RCRA hazardous waste constituents unless otherwise specified
- **Wet Weight versus Dry Weight**
- **Total versus Dissolved**

Sample Collection Considerations

And…..

- **Properly and *completely* label sample containers**
- **Know sample handling/transport/shipping requirements**
- **ALWAYS COMPLETE a chain of custody form – be specific**
- **Retain any shipping records**

These are legal documents!!!!!

Example: Basic Wastewater Tests

Parameter	Volume	Preservation	Hold Time
BOD (biological oxygen demand)	1-L	None	48-hours
TSS (total suspended solids)	1-L	None	7-days
Ammonia	250-mL	H_2SO_4,	28-days

Samples must be received on ice

- Composite samples must be received at $\leq$ 6.0°C
- Grab samples must be able to document a downward temperature trend
- Laboratory is required to document temperature, preservation and chlorine upon sample receipt

Test Method Resources

- 40 CFR Part 136
- Standard Methods for Examination of Water and Wastewater
- US EPA SW 846 - Test Methods for Evaluating Solid Waste (also includes some aqueous)
- ASTM (American Society for Testing and Materials)

Question

What is the method-required hold time for TSS analysis?

Sloppy field practices lead to sloppy, unreliable data

Data is not as good as the paper it's printed on if the samples were not properly collected and handled

Field Data Collection

Maintain field notes from beginning to end – *required by permit!*

- Date and time sample collected
- Sample site
- Sample collector
- Sample analysis date and time
- Analyst initials
- Instrument calibration including time
- Field log records must be maintained for period specified in permit

If you didn't write it down, it didn't happen

Question

True or false

A completed chain-of-custody form is a legal document.

Data Interpretation and Review

So now that I've collected all this data, what the heck does it mean?

How to Read a Lab Report

Know your units

- ✓ Milligrams (ppm) versus micrograms (ppb)
- ✓ Solid sample - milligrams per kilogram (mg/kg) or micrograms per kilogram (ug/kg)
- ✓ Aqueous sample or TCLP – milligrams per liter (mg/L) or micrograms per liter (ug/L)

How to Read a Lab Report

Know your “limit” terminology

- ✓MDL – Method Detection Limit
- ✓PQL – Practical Quantitation Limit
- ✓RL – Reporting Limit
- ✓LOQ – Limit of Quantitation

How to Read a Lab Report

Know to what criteria you're comparing the results

- ✓**Drinking Water MCLs**
- ✓**Permit Limits**
- ✓**Haz Waste Limits**

Analytical Data

Client:

Job Number: 680-50304-1

Client Sample ID: **TW-01-11'**

Lab Sample ID: 680-50304-1
Client Matrix: Solid
% Moisture: 13.3

Date Sampled: 08/24/2009 1035
Date Received: 08/28/2009 0957

6020 Metals (ICP/MS)

Method:	6020	Analysis Batch: 680-147117		Instrument ID:	ICPMSA
Preparation:	3050B	Prep Batch: 680-146864		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	1.20 g
Date Analyzed:	09/03/2009 0227			Final Weight/Volume:	1000 mL
Date Prepared:	09/01/2009 1126				

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	RL
Antimony		<1.9		1.9
Arsenic		<0.48		0.48
Barium		9.6		0.96
Beryllium		0.19		0.096
Cadmium		<0.096		0.096
Chromium		7.2		0.96
Cobalt		0.56		0.096
Copper		1.3		0.96
Lead		5.3		0.38
Nickel		1.4		0.19
Selenium		<0.96		0.96
Silver		<0.19		0.19
Vanadium		9.3		0.96
Zinc		<3.8		3.8
Thallium		<0.19		0.19
Mercury		<0.19		0.19

Client:

Job Number: 680-49699-1

Client Sample ID: **TW-01**

Lab Sample ID: 680-49699-1
Client Matrix: Water

Date Sampled: 08/03/2009 1110
Date Received: 08/07/2009 1005

6020 Metals (ICP/MS)

Method:	6020	Analysis Batch: 680-145568		Instrument ID:	ICPMSA
Preparation:	3010A	Prep Batch: 680-145216		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	08/14/2009 2027			Final Weight/Volume:	250 mL
Date Prepared:	08/12/2009 1151				

Analyte	Result (ug/L)	Qualifier	RL
Antimony	<5.0		5.0
Arsenic	<2.5		2.5
Barium	36		5.0
Cadmium	<0.50		0.50
Chromium	<5.0		5.0
Copper	<5.0		5.0
Lead	<1.5		1.5
Nickel	2.2		2.0
Selenium	<2.5		2.5
Silver	<1.0		1.0
Vanadium	<10		10
Zinc	<20		20
Thallium	<1.0		1.0
Mercury	<0.80		0.80

Method:	6020	Analysis Batch: 680-145569		Instrument ID:	ICPMSA
Preparation:	3010A	Prep Batch: 680-145216		Lab File ID:	N/A
Dilution:	1.0			Initial Weight/Volume:	50 mL
Date Analyzed:	08/15/2009 1614			Final Weight/Volume:	250 mL
Date Prepared:	08/12/2009 1151				

Analyte	Result (ug/L)	Qualifier	RL
Beryllium	<0.50		0.50
Cobalt	13		0.50

TCLP Semivolatiles

Client:

Description: **Special Waste**

Date Sampled: **08/03/2011 1330**

Date Received: **08/03/2011**

Laboratory ID: **MH03038-001**

Matrix: **Solid**

% Solids: **65.5** **08/03/2011 2158**

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch	Leachate Date
1	1311/3520C	8270D	10	08/13/2011 0329	JWS	08/08/2011 1206	65189	08/04/2011 2031

Parameter	CAS Number	Analytical Method	Result	Q	PQL	Units	Run
1,4-Dichlorobenzene	106-46-7	8270D	ND		0.50	mg/L	1
2,4-Dinitrotoluene	121-14-2	8270D	ND		1.0	mg/L	1
Hexachlorobenzene	118-74-1	8270D	ND		0.50	mg/L	1
Hexachlorobutadiene	87-68-3	8270D	ND		0.50	mg/L	1
Hexachloroethane	67-72-1	8270D	ND		0.50	mg/L	1
2-Methylphenol	95-48-7	8270D	ND		0.50	mg/L	1
3 & 4-Methylphenol	106-44-5	8270D	ND		1.0	mg/L	1
Nitrobenzene	98-95-3	8270D	ND		0.50	mg/L	1
Pentachlorophenol	87-86-5	8270D	ND		2.5	mg/L	1
Pyridine	110-86-1	8270D	ND		0.50	mg/L	1
2,4,5-Trichlorophenol	95-95-4	8270D	ND		0.50	mg/L	1
2,4,6-Trichlorophenol	88-06-2	8270D	ND		0.50	mg/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
2,4,6-Tribromophenol		83	41-144
2-Fluorobiphenyl		99	37-129
2-Fluorophenol		74	24-127
Nitrobenzene-d5		76	38-127
Phenol-d5		78	28-128
Terphenyl-d14		41	10-148

TCLP Semivolatiles

Client

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Parameter	CAS Number	Analytical Method	Result	Q	PQL	MDL	Units	Run
1,4-Dichlorobenzene	106-46-7	8270D	ND		0.50	0.030	mg/L	1
2,4-Dinitrotoluene	121-14-2	8270D	ND		1.0	0.11	mg/L	1
Hexachlorobenzene	118-74-1	8270D	ND		0.50	0.012	mg/L	1
Hexachlorobutadiene	87-68-3	8270D	ND		0.50	0.030	mg/L	1
Hexachloroethane	67-72-1	8270D	ND		0.50	0.030	mg/L	1
2-Methylphenol	95-48-7	8270D	ND		0.50	0.040	mg/L	1
3 & 4-Methylphenol	106-44-5	8270D	ND		1.0	0.10	mg/L	1
Nitrobenzene	98-95-3	8270D	ND		0.50	0.030	mg/L	1
Pentachlorophenol	87-86-5	8270D	ND		2.5	0.18	mg/L	1
Pyridine	110-86-1	8270D	ND		0.50	0.16	mg/L	1
2,4,5-Trichlorophenol	95-95-4	8270D	ND		0.50	0.060	mg/L	1
2,4,6-Trichlorophenol	88-06-2	8270D	ND		0.50	0.050	mg/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
2,4,6-Tribromophenol		83	41-144
2-Fluorobiphenyl		99	37-129
2-Fluorophenol		74	24-127
Nitrobenzene-d5		76	38-127
Phenol-d5		78	28-128
Terphenyl-d14		41	10-148

Why Review Analytical Data?

Isn't that the lab's job?

Environmental professionals take responsibility for the content of documents or reports bearing their signature.

Why Assess Data Quality?

- Determine reliability and usability of data
- Lab QA/QC program does not ensure reliable data
- Project size and type does not limit liability
- Confident decision making

What Does it Involve?

- **Field Data/Documentation**
  - ✓ Sample collection
  - ✓ Custody
  - ✓ Handling
  - ✓ Condition
- **Analytical Data**
  - ✓ Handling
  - ✓ Method compliance
  - ✓ QC requirements - precision, accuracy, and completeness

Field Data Review

Sloppy field work leads to unreliable analytical data

- **Field Meter Calibration**
- **Field Readings**
- **Collection logs – complete, legible, proper protocol followed, any anomalies or special conditions noted**
- **Chain of Custody – traceable, properly filled out, complete, matches collection logs**
- **Shipping records**

Analytical Data Review

Did you get what you asked (and PAID) for?

- **Compare chain of custody to lab report**
  - ✓ sample condition upon receipt
  - ✓ samples checked in properly
  - ✓ transcription errors
- **Proper handling of samples**
  - ✓ holding times (especially for dilutions)
  - ✓ cooling, preservation, *etc.*
- **Analytical results – appropriate parameters and test methods**
- **UNITS, UNITS, UNITS**
- **Method blank contamination (esp. metals and VOCs)**

Analytical Data Review

And…..

- **Reporting limit requirements**
- **Ever-changing reporting limits**
- **Footnotes or comments**
- **Common laboratory contaminants**
  - ✓ Acetone
  - ✓ Methylene chloride
  - ✓ 2-Butanone (MEK)
  - ✓ Cyclohexane
  - ✓ Phthalates
  - ✓ Chloroform*

Analytical Data Review

And…

- **“E” flags**
- **“J” flags**
- **“B” flags**
- **“U” flags**
- **“P” flags**
- **Lab-specific flags**

Understand what they all mean – can vary from lab to lab

Analytical Data Review

And…..

- **Carryover contamination**
- **Across-the-board dilutions**
- **UNITS, UNITS, UNITS**

So now what???

Contact lab with any concerns

- Verification of questionable results – ALWAYS ASK!
- Corrections
- QA/QC issues – ALWAYS ASK!

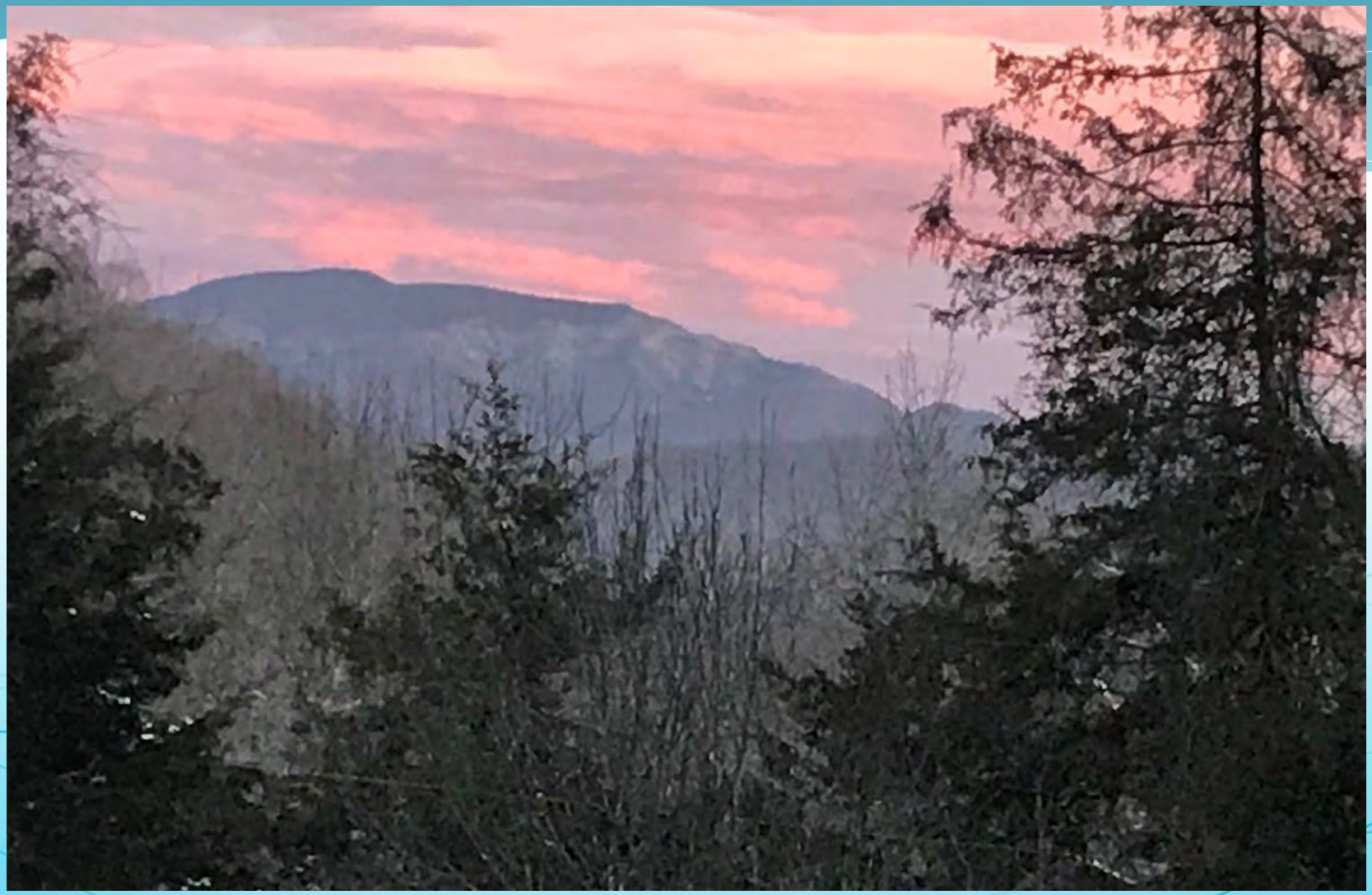
Qualify analytical data (if appropriate – consult with someone qualified first!)

- Based on both field and lab non-conformances
- Note all discrepancies, no matter how minor

Conclusions

- EDUCATE YOURSELF
- UNDERSTAND PROJECT OBJECTIVES
- PLAN, PLAN, PLAN
- UNDERSTAND AND FOLLOW PROTOCOLS
- KNOW WHAT THE DATA MEANS AND HOW TO USE IT
- NEVER BE AFRAID TO ASK

Questions?



REGULATORY RELATIONSHIPS: 2024-2025 HAS BEEN DIFFERENT

Toxicology Workshop, April 24, 2025

Forrest R. Westall, Sr.
McGill Associates, P.A.

mcgill Shaping Communities Together®

If I had only known! Plan for the Worse, Hope for the Best!

What we Thought We Knew: PREVIOUS DEFINITION OF A RELATIONSHIP

NOUN

*1) T*he way in which two or more concepts, objects, or people are connected, or the state of being connected:
"the study will assess the relationship between unemployment and political attitudes“.

2) The state of being connected by blood or marriage:
"they can trace their relationship to a common ancestor“.

3) The way in which two or more people or separate groups regard and behave toward each other:
Examples: "the landlord–tenant relationship“; "she was proud of her good relationship with the staff“.

What Happens When the World Gets Turned Upside Down?

Helene!
Government Upheaval!
New Science—New Problems!

Helene—Where no one has Gone Before!

Question:

National Pollutant Discharge Elimination Permits (NPDES) are designed to deal with natural disasters like Helene? True or False

Response: False

NPDES Permits assume operational conditions that fall between normal and reasonably expected abnormal conditions. Helene was a storm of extraordinary power and impact. It was outside of any reasonable prediction of rainfall-runoff conditions. The rules and statutes themselves acknowledge that violations during extraordinary conditions may not apply.

Nevertheless, getting back to “normal” carries with it the responsibility to comply. So, your regulatory relationship is still important.

What we Know or Think we Know Impacts What we do or are Required to do!

- Science is often ahead of our ability to respond
- The public is alarmed about what may be in their water, land, and air
- Regulatory agencies are under lots of pressure
- Lawmakers are divided over what to do
- Emerging Contaminants--PFAS, 1-4, dioxane, and Similar Substances: Pretreatment, Collection System, Effluent Limits, Sludge: Expectations are High!
- Nutrients: Concerns Remain—Requirements are here or coming: Neuse Estuary, Tar River/Pamilco Sound, Albermarle Sound, Jordan Reservoir, Falls Lake, High Rock Lake, Middle Cape Fear River, etc.

Policy and Law Changes—Requirements are in Flux and agency funding is being targeted!

- Pull and tug: NC General Assembly verses the Executive Branch
- Federal changes and pressure on Agencies
- Agency staff are concerned and under fire
- Vacancy levels are high
- Statutory changes has restricted some regulatory authority at the state and local level
- However, the enabling laws remain in place (you still have to get permits, approvals, and meet requirements)
- Water and Wastewater, two sides of one coin—control for protection of drinking water—putting water and sewer managers between a rock and a hard place
- Morale is low and those close to retirement are considering their options

Some Proposed NC Legislation—Not Passed

- H 870 would require the General Assembly to approve any memorandum of agreement between the Federal Government and an agency of the State charged with implementation of state or federal environmental law
- H 929 would prohibit introducing fluoride or any chemical containing fluoride to a public water system by any person
- H 876 would require local governments to review and determine whether applications for development approval are complete within two days submittal.
- H 808 would designate water treatment facilities as “critical infrastructure” and require criminal history background checks for applicants to become operators at water treatment facilities
- Several PFAS bills

Even When Things are off Scale, Some aspects do not Change: Relationships are “Dependent” or “Independent”

No matter the current instability: You still have a Regulatory Relationship

The term “Regulatory Relationship” may seem like a contradictory concept.

Maybe, but it is a reality that the regulated community and their agents must deal with.

It is always important to remember that the agency must deal with it as well.

When no one really knows what to do, doing the “right thing” is always a good path.

The Importance of Your Regulatory Relationship

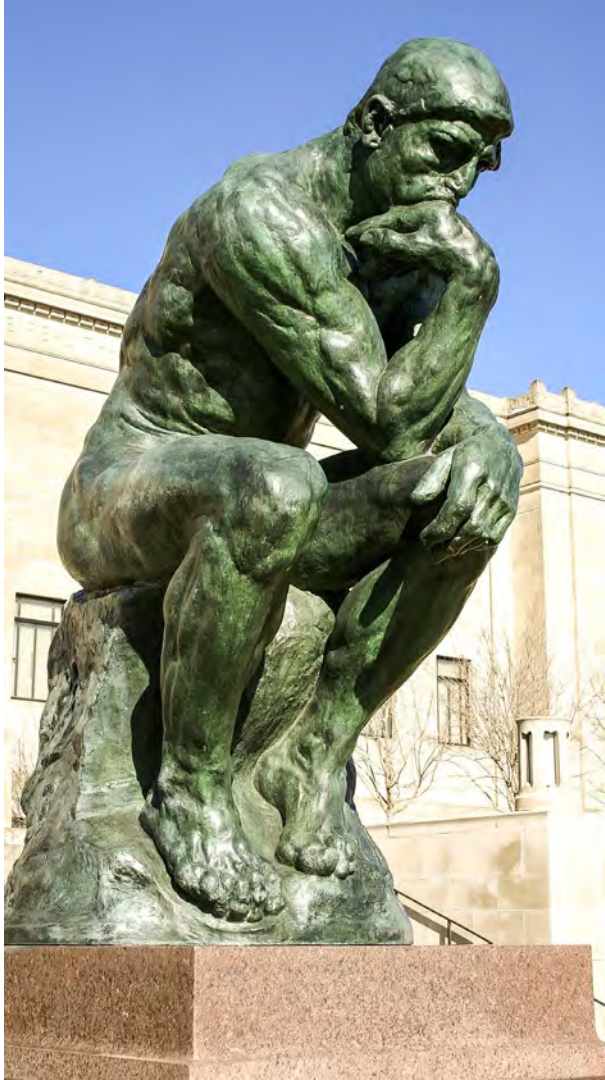
- This relationship is “contractual” because you or your clients have performance requirements under this relationship (rules, permit conditions, other legal obligations, and other agency requirements)
- These “relationships” affect your job and the ability of you or your client to effectively provide “service” or to produce their “product”
- The implications of failing to meet your permit obligations are real, can impact your image, may be monetary and are certainly legally based
- The simple fact that cannot be escaped is that all human interaction is based on conditional relationships

Critical Thinking About Your Regulatory Relationship Requires Point of Reference

- The Past—Do not Dwell there, but Learn From what You and Others have Experienced

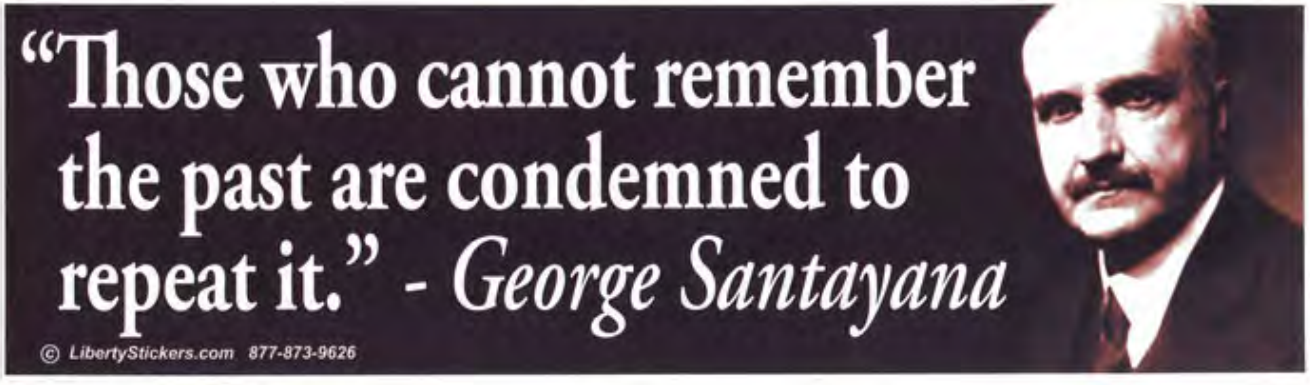
- The Present—Making Sure You are in the Now

- What is Coming—The most difficult consideration before you—but you have to take care of business



Why the past is important…But the now is the wolf at the door

- Try not to repeat problematic things from the past.
- A child educated only at school is an uneducated child.
- There is no cure for birth and death save to enjoy the interval.



George Santayana
1863-1952

How We Got To Where We Are?

- Pre-1972, Water and Wastewater Management
- The “Watershed” Year of 1972, The Clean Water Act, Safe Drinking Water Act
- How the CWA Changed Everything
- The Criteria For “Success” In Water Pollution Control
- Climate Change: the Weather And Water—Hot And Dry = Worry and Passing New Laws
- COVID and Infrastructure Funding
- Emerging contaminates and the current political landscape
- We woke up and it was 2025!

What Do You Have on Your Plate: Negotiation of Now: Compliance and Enforcement, Permits, etc.

But Remember, it is a Negotiation, and you have options—keep your interests in the forefront

What is Your Need

- Permit Issuance/Revision
- Permit Renewal Concerns
- Enforcement Action
- Permit Compliance Issue(s)
- SOC Issuance/Compliance
- Collection System Permit
- Stream/Wetland Impacts
- Environmental Assessment for a New Project
- Toxicity Reduction Actions
- Pretreatment Issues
- Operational Questions

Which Permit or Approval?

- Municipal WWTP
- Industrial Process WW
- Industrial Stormwater
- Industrial Pretreatment
- Collection System Permit
- NPDES, Stormwater, Pretreatment, Land Application
- Individual Permit or General Permit
- 404/401 Permitting
- Erosion and Sediment Control
- New Facility, Renewal, Expansion
- SEPA/NEPA, EA, EIS FONSI

Which Agency?

- NC Division of Water Resources
- NC Division of Energy, Minerals and Land Resources (DEMLR)
- Army Corps of Engineers (ACOE)
- Wildlife Resources Commission (WRC)
- US Fish and Wildlife Services (USFWS)
- Local Pretreatment Program
- NC Department of Administration (SEPA)
- Federal EPA
- Solid and Hazardous Waste

What Laws and Rules Apply?

- Federal Clean Water Act
- Federal Regulations
- WQ Standards
- Federal Effluent Guidelines
- Stream Classifications
- Groundwater Standards
- NC Environmental Policy Law
- Policy or Procedural Guidance
- Other Requirements

What Part of What Agency?

- DWR-Stream Classifications
- DWR-Nutrient Management
- DWR-Surface Water Protection
- DWR-Wetlands and Stormwater
- DWR-Point-Source
- DWR-Toxicity
- DWR-Pretreatment
- DWR-Aquifer Protection
- DEMLR-Stormwater
- ACOE-Regional Office
- DWQ-Regional Office
- Regional Staff-USFWS
- Regional Staff-WRC
- Municipal/County Governments

Know Your Facts

- Read the Statutes/Rules
- Study the Policy Documents
- Use the Agency Website (Water Resources | NC DEQ)
- Evaluate the Basis of the Agency's Responsibility (under what law and rule are they operating?)
- Talk to the Agency and Ask for Guidance and Information
- Ask for documentation: Get Copies of all Regulatory Documentation (permit file, policy documents, statutory requirements, etc.)
- Before you Proceed Make Sure that Your Position is Clear Within Your Organization
- Trace the Decision Trail and Identify Key Staff

Regardless of what you may think or even told, the permit holder has significant rights to affect the regulatory framework and to question the basis and details of the requirements under which they operate.

Finding Solutions to Issues: Informal Negotiation is Usually An Option—Use it when you can

- Permit Conditions are Developed “Based on” Rules, but Can Often be Revised
- Staff Perspective is Vitally Important
- Enforcement Actions are Primarily Based on Self-Monitoring Results
- Legal Rights Exist and Can be Critical in Establishing Leverage
- Most of the Time, Informal Negotiation is the Best Way to Proceed
- Formal Negotiation Typically Involves Attorneys
- Being Sure Means You Stick to Your Guns
- Mutual Respect is Essential

Legal Challenge is an Option when Your Case is Strong

Reminder of the Things You May be Facing

- Emerging Contaminates: impacts to raw water, effluent limits, biosolids management
- Nutrient Management in the Neuse, Tar, and Cape Fear Basins
- Pretreatment Challenges—what happens when you do not control the situation through treatment?
- Keeping an eye on your permit status—DWR isn't required to notify you if something needs to be done to keep your permit valid
- Moving targets—policies verses rules
- Expected toxic materials: DWR may set limits, even if there is no specific standard in place

From Concept to Reality

Things to Consider as the ORC (Operator in Responsible Charge)

- You have Specific Regulatory Responsibilities
- These Responsibilities are Assigned to You Personally
- Compliance is More than Operational Attention (though that is essential)
- Typically, an ORC is not the Owner or the Responsible Management Official
- Communication to Your Employer is Extremely Important: Inform them of your Needs for Compliance Beyond Operation—Documentation if Essential

Dealing With Enforcement Actions

- Rule number 1, Avoid them if at all Possible
- Stay “Ahead” of the Process
- Seek to know your status before there is Action
- If the Agency’s Procedure is to Issue an NOV First, Work to Avoid Enforcement after the NOV
- Assessment of Penalties can be Contested, You can Pay them, or Seek Remission
- Find out the Core Objective of an agency Enforcement Action
- The Application of a Schedule of Compliance or Order May Help Avoid Penalties—Chronic Issues

Who makes sure water/wastewater systems work and protect us and the environment…?

Operators and System Managers

When thanking those who have so greatly improved water quality management in NC, sometimes we forget…

The people who DO the work!

… including the Operator Training and Certification Programs for water and wastewater.

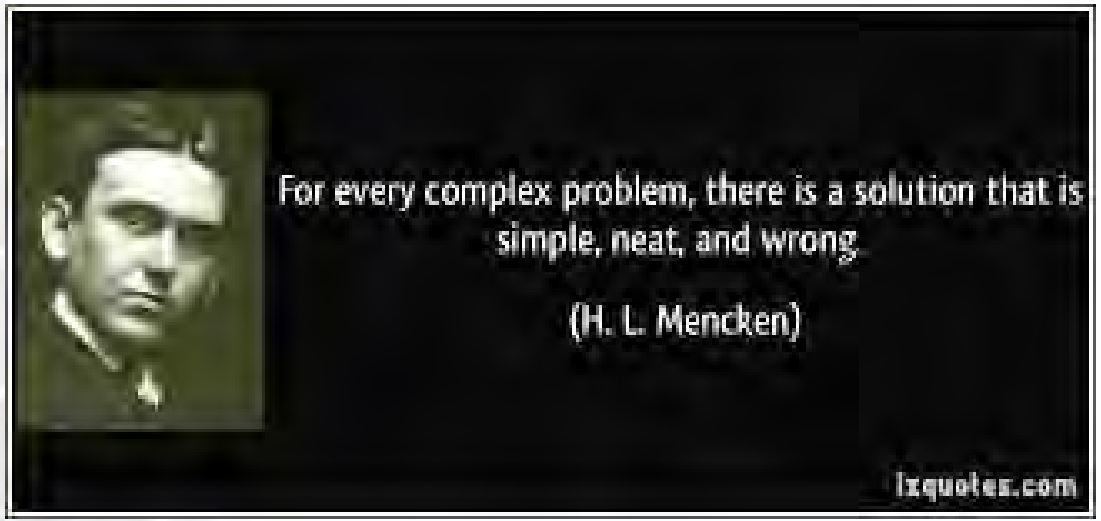
Effective water management requires professional and trained operators and managers

Proper funding and support from system owners allow operators and system managers to do their job effectively

The Future Holds Expansion of Responsibility and Challenges of Finding Personnel Resources.

The World of Water Management is Changing

Unfortunately, there are no easy answers. Owners and Operators are on the Bleeding Edge!



Question: True of False

A new permit condition is always negotiable, even if you don’t catch it when the revised permit is issued.

Answer:

False. A new permit condition proposed when a permit is up for renewal can be questioned. However, the time "window" for formally objecting to a new condition is legally set by rule and law. You must respond in a timely manner with a legally valid request to contest the requirement. If you are able to settle the issue through negotiation without a legal process, that is the preferred path. However, if you fail to formally contest an unacceptable condition within the timeframe provided, it becomes a part of your permit.

A job is a job, but your life is more than your job.

Have a Career Plan—And take care of your family

Forrest R. Westall, Sr., PE, McGill Associates, P.A.
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Laboratory QA/QC Practices Used in Assessing Vendor Labs

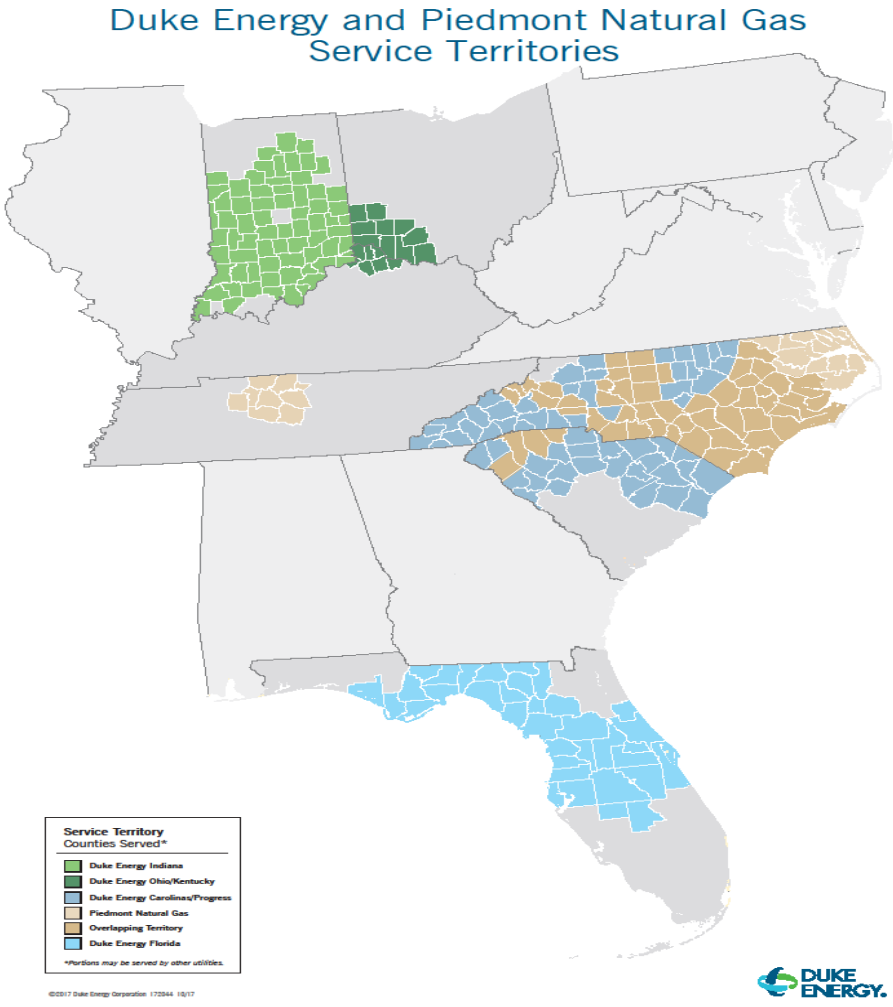
GARRETT HUTCHINGS
SR. SCIENTIST, QA OFFICER

DUKE ENERGY CENTRAL LABORATORY, HUNTERSVILLE, NC

Key Highlights of the Presentation:

- Duke Energy Service Area
- Duke Energy's Analytical Lab Capabilities
- Reasons for Auditing Vendor Labs
- Process of Auditing
- Report Preparation and Closing the Audit
- A Summary of a Vendor Lab Audit
- Conclusions
- Quiz
- Q&A Time

Duke Energy Service Area



Generation Portfolio:

Natural Gas: 43%

Nuclear: 37%

Coal: 17%

Solar: 1%

Hydroelectric: 1%

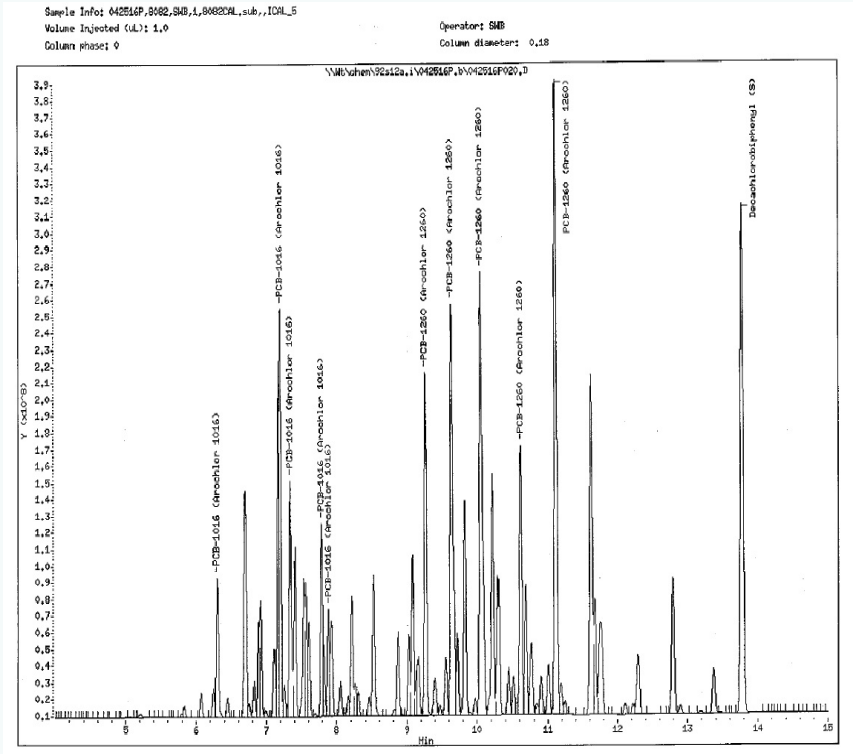
Oil: <1%

Duke Energy Analytical Capabilities

- Laboratory Area - 10,000 Sq. Ft.
- Analytical Staff – 20 + Scientists and Technical Personnel
- 5 Program Managers that Review Vendor Lab Data
- 6 ICP –OES (Methods 200.7 and 6010D)
- 3 ICP-MS (Methods 200.8 and 6020B)
- 2 TOC Analyzers
- 7 Ion Chromatographs
- Wet Chemistry, Mercury Analysis (245.1)
- Fuels and Oil Laboratory
- Certified in NC and SC

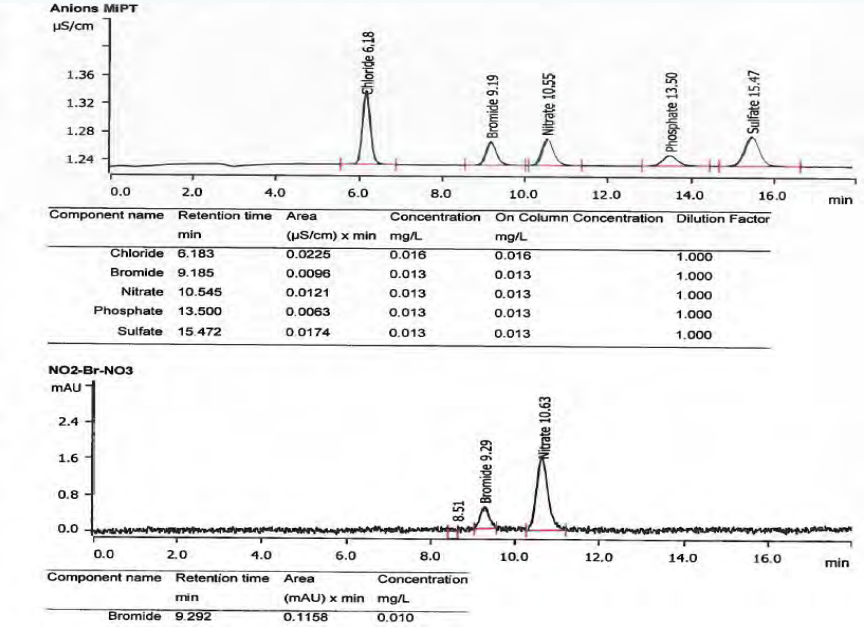
Reason for Auditing Vendor Labs

- Analytical Cost of Vendor Work: $~4,000,000/Year
- New Projects Require Special Analyses
- Changes in Regulatory Requirements
- New Labs Needed for Back-up Support
- To Assure Proper Data Quality From Vendor Lab(s)
- Labs Supporting Nuclear Stations Require Frequent Audits.



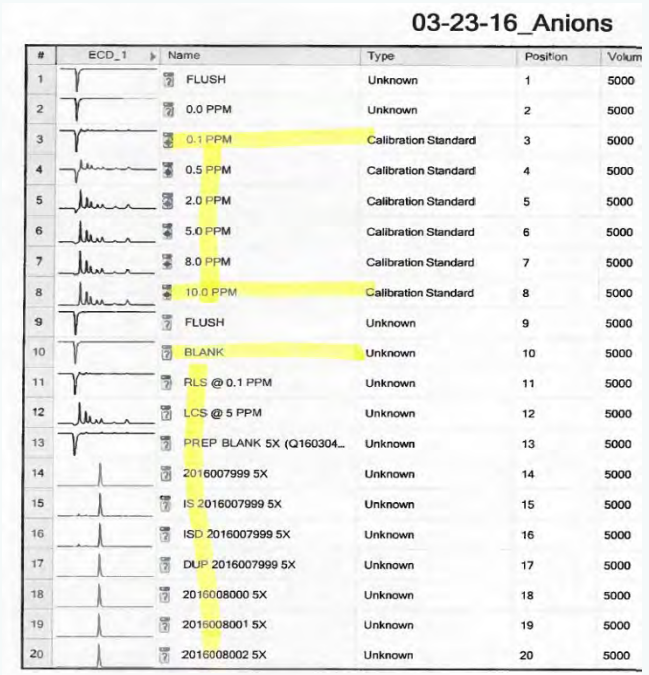
"Laboratory Certification does not guarantee good quality. It merely states that the laboratory has met the minimum requirements of Certification and possesses the capacity for meeting State and Federal requirements."

Gary Francis (Former NCDEQ Certification Officer)



Component name	Retention time min	Area (µS/cm) x min	Concentration mg/L	On Column Concentration mg/L	Dilution Factor
Chloride	6.183	0.0225	0.016	0.016	1.000
Bromide	9.185	0.0096	0.013	0.013	1.000
Nitrate	10.545	0.0121	0.013	0.013	1.000
Phosphate	13.500	0.0063	0.013	0.013	1.000
Sulfate	15.472	0.0174	0.013	0.013	1.000

Component name	Retention time min	Area (mAU) x min	Concentration mg/L
Bromide	9.292	0.1158	0.010



03-23-16_Anions

#	ECD_1	Name	Type	Position	Volum
1		FLUSH	Unknown	1	5000
2		0.0 PPM	Unknown	2	5000
3		0.1 PPM	Calibration Standard	3	5000
4		0.5 PPM	Calibration Standard	4	5000
5		2.0 PPM	Calibration Standard	5	5000
6		5.0 PPM	Calibration Standard	6	5000
7		8.0 PPM	Calibration Standard	7	5000
8		10.0 PPM	Calibration Standard	8	5000
9		FLUSH	Unknown	9	5000
10		BLANK	Unknown	10	5000
11		RLS @ 0.1 PPM	Unknown	11	5000
12		LCS @ 5 PPM	Unknown	12	5000
13		PREP BLANK 5X (Q160304...	Unknown	13	5000
14		2016007999 5X	Unknown	14	5000
15		IS 2016007999 5X	Unknown	15	5000
16		ISD 2016007999 5X	Unknown	16	5000
17		DUP 2016007999 5X	Unknown	17	5000
18		2016008000 5X	Unknown	18	5000
19		2016008001 5X	Unknown	19	5000
20		2016008002 5X	Unknown	20	5000

Process for Auditing Vendor Labs

- Identify, Establish Contact, and Initiate communication with the Vendor Lab
- Set Audit Date and Send Agenda
- Request for Procedures and Data Packages for Review
- Laboratory Visit – Review of laboratory practices and discuss deviations at the exit meeting
- Report preparation and closing of audit

Example of a Vendor Lab Audit Agenda

Sample Name: CCV				Sample Type: Control Sample			
Measure Date: 2019-05-15 11:34:32	State: Checked		Quality:		Total Dilution: 1.000000		
Sample ID#	Weight	Dilution	Weight	Position			
CCV				0/03a			

	Al 396.152	Al 167.078	B 249.677	B 249.773	Ba 455.404	Ba 233.527	Ca 315.887
Conc 1	2.0046[ppm]	2.0865[ppm]	2.0016[ppm]	1.9955[ppm]	2.0367[ppm]	2.0402[ppm]	2.0226[ppm]
Conc 2	2.0139[ppm]	2.1343[ppm]	2.0141[ppm]	1.9997[ppm]	2.0708[ppm]	2.0456[ppm]	2.0371[ppm]
Conc 3	1.9839[ppm]	2.1052[ppm]	1.9804[ppm]	1.9716[ppm]	2.0097[ppm]	2.0168[ppm]	2.0048[ppm]
Conc 4	1.9883[ppm]	2.1020[ppm]	1.9796[ppm]	1.9815[ppm]	2.0252[ppm]	2.0206[ppm]	2.0082[ppm]
Conc Mean	**1.9977[ppm]**	**2.1070[ppm]**	**1.9939[ppm]**	**1.9871[ppm]**	**2.0358[ppm]**	**2.0314[ppm]**	**2.0181[ppm]**
Conc RSD	*0.7008*	*0.9458*	*0.8457*	*0.6513*	*1.2745*	*0.6636*	*0.7324*
Conc SD	*0.0140[ppm]*	*0.0199[ppm]*	*0.0169[ppm]*	*0.0129[ppm]*	*0.0259[ppm]*	*0.0135[ppm]*	*0.0148[ppm]*

	Ca 396.847	Cu 327.396	Cu 324.754	Fe 259.941	Fe 238.204	K 766.491	Li 670.780
Conc 1	2.0052[ppm]	2.0218[ppm]	2.0147[ppm]	2.0314[ppm]	2.0650[ppm]	2.0079[ppm]	1.9927[ppm]
Conc 2	2.0025[ppm]	2.0328[ppm]	2.0277[ppm]	2.0478[ppm]	2.0801[ppm]	2.0202[ppm]	2.0007[ppm]
Conc 3	1.9930[ppm]	2.0040[ppm]	1.9980[ppm]	2.0187[ppm]	2.0457[ppm]	2.0139[ppm]	1.9716[ppm]
Conc 4	2.0009[ppm]	2.0055[ppm]	2.0052[ppm]	2.0135[ppm]	2.0408[ppm]	1.9910[ppm]	1.9813[ppm]
Conc Mean	**2.0004[ppm]**	**2.0160[ppm]**	**2.0114[ppm]**	**2.0278[ppm]**	**2.0579[ppm]**	**2.0082[ppm]**	**1.9866[ppm]**
Conc RSD	*0.2621*	*0.6821*	*0.6390*	*0.7544*	*0.8808*	*0.6258*	*0.6427*
Conc SD	*0.0052[ppm]*	*0.0138[ppm]*	*0.0129[ppm]*	*0.0153[ppm]*	*0.0181[ppm]*	*0.0126[ppm]*	*0.0128[ppm]*

	Li 670.791	Mg 279.079	Mg 279.553	Mn 257.611	Mn 259.373	Na 589.592	Na 588.995
Conc 1	1.9911[ppm]	2.0253[ppm]	2.1056[ppm]	2.0455[ppm]	2.0437[ppm]	1.9934[ppm]	2.0233[ppm]
Conc 2	1.9997[ppm]	2.0275[ppm]	2.1322[ppm]	2.0767[ppm]	2.0898[ppm]	2.0032[ppm]	2.0307[ppm]
Conc 3	1.9704[ppm]	1.9998[ppm]	2.0830[ppm]	2.0245[ppm]	2.0200[ppm]	1.9678[ppm]	1.9980[ppm]
Conc 4	1.9795[ppm]	1.9933[ppm]	2.0681[ppm]	2.0255[ppm]	2.0245[ppm]	1.9697[ppm]	1.9989[ppm]
Conc Mean	**1.9852[ppm]**	**2.0115[ppm]**	**2.1022[ppm]**	**2.0431[ppm]**	**2.0395[ppm]**	**1.9835[ppm]**	**2.0127[ppm]**
Conc RSD	*0.6479*	*0.8686*	*1.0560*	*1.1957*	*1.1068*	*0.8835*	*0.8317*
Conc SD	*0.0129[ppm]*	*0.0175[ppm]*	*0.0222[ppm]*	*0.0244[ppm]*	*0.0226[ppm]*	*0.0175[ppm]*	*0.0167[ppm]*

	Sr 421.552	Sr 407.771	Zn 206.200	Zn 213.856	Sc 361.384		
Conc 1	1.9909[ppm]	2.0000[ppm]	2.0673[ppm]	2.0532[ppm]	16642500		
Conc 2	1.9857[ppm]	1.9967[ppm]	2.0616[ppm]	2.0563[ppm]	16835400		
Conc 3	1.9753[ppm]	1.9939[ppm]	2.0453[ppm]	2.0252[ppm]	17123400		
Conc 4	1.9805[ppm]	1.9931[ppm]	2.0387[ppm]	2.0302[ppm]	17163700		
Conc Mean	**1.9831[ppm]**	**1.9959[ppm]**	**2.0582[ppm]**	**2.0412[ppm]**	**16991300**		
Conc RSD	*0.3379*	*0.1570*	*0.9618*	*0.7752*	—		
Conc SD	*0.0067[ppm]*	*0.0031[ppm]*	*0.0198[ppm]*	*0.0158[ppm]*	*176653*		

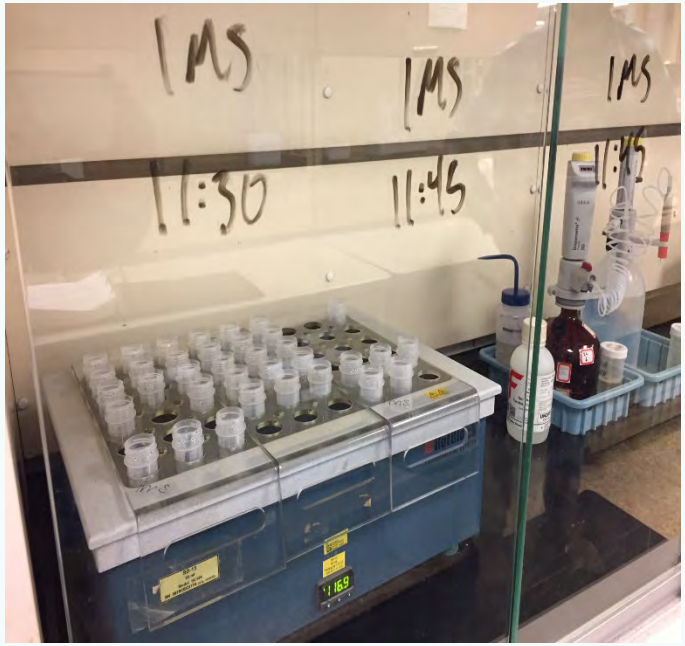
- Housekeeping Practices and General Condition
- Safety in the Laboratory
- Ethics Training Program
- QA Manual, Chemical Hygiene Plan
- Procedures Review
- Data Review and Traceability of Chemicals
- Employees Training Records
- Calibration and Maintenance Records
- PT Results for 2 Years
- Corrective Action Program
- MDLs for 2 Years
- Internal and External Audit Reports

Housekeeping Practices and General Condition of Laboratory

- No Food and Drinks allowed in the Laboratory
- Bench tops are clean, uncluttered and orderly
- Fume-hoods are not used for storage purposes
- Broken Glassware and Bottles are secured
- Flammable Solvents are Stored in Flammable Cabinets
- Aisles and Exits are Free of Obstructions
- Gas Cylinders are Secured Properly
- Empty Boxes are Discarded at the end of the day

NOTE: YOUR JOB IS NOT COMPLETE UNTIL YOUR WORK AREA IS CLEAN.

Laboratory Safety



- Chemical Hygiene Plan exists
- Use of Proper PPE when working with the samples
- Fume-hoods are checked annually, air flow 100 ft/minute and not used for storage
- Fire extinguishers are located near the exits and are checked quarterly.
- Safety showers are available in lab and flushed regularly
- Eye wash stations flushed weekly, access is not blocked and must be 10 seconds away from work location
- No one is allowed to work alone
- Ventilated works areas when solvents are in use (Methylene Chloride)

Laboratory Safety

Chemical and Solvents

- Chemicals and flammable solvents are stored properly
- All chemicals are labeled for date received, date opened and date expired. (NCDEQ Policy)
- Follow manufactured assigned dates on standards
- No Chemicals and solvents bottles stored on floors.
- Flammable cabinets are vented
- Use rubber buckets for transport

Electrical Hazards

- Electrical Panels should not be blocked
- No over loading of electrical outlets

Ethics and Data Integrity

Common Examples of Poor QC Practices Observed During the Audits:

- Not following SOPs as written
- Using a fan to cool the fecal coliform bath
- Not repairing or replacing the laboratory equipment when needed.
- Digesting soil sample in 2 hours (EPA Method 3050)
- Not checking the balance with 2 mg weight (Method 1664B)
- Making large dilutions and “eye-balling” the membrane filters for reading fecal coliform colonies rather than using proper instrument
- Not filtering enough sample to collect 2.5 mg of residue for TSS
- Manual integration to meet QC requirements (common issue)
- Multiple analyses on PT Samples
- No corrective actions written when QC samples failed

Calibration of Laboratory Equipment

Analytical Equipment	Check Frequency	Frequency of Service
Analytical Balance	Daily w/1 weight, Monthly w/3 weights	Serviced Each year
Weight Set	N/A	Every 5 years
Reference Thermometers	Annual	Certificate expiration, not to exceed 5 years
Digital Thermometers	Every Three Months	Annual
Infrared (IR) Guns	Verified daily with Non-reference Thermometer and accuracy within 0.5C	Verified every three months
Pipets and Fixed Volume Pipettors	N/A	Calibrated every six months
Refrigerators	Daily	
Autoclave /Incubators	Daily	
Ovens/water baths	Daily	

Preservation and Holding Times Reference Method Update Rule 2017

Parameter	Container	Preservation	Maximum Holding Time
Temperature	P, FP, G	None	Analyze w/15 minutes
Sulfite	P, FP, G	None	Analyze w/15 minutes
pH	P, FP, G	None	Analyze w/15 minutes
Total residual Chlorine	P, G	None	Analyze w/15 minutes
Fecal Coliform	PA, G	Cool, <10C, 0.008% Na2S2O3	8 hours
BOD	P, FP, G	Cool, < 6C	48 hours
Nitrate/Nitrite	P, FP, G	Cool, < 6C	48 hours
Turbidity	P, FP, G	Cool, < 6C	48 hours
TSS, TDS, TS	P, FP, G	Cool, < 6C	7 days

Procedures Review

- Procedures are being updated promptly to include latest Method Update Rules
- Analytical procedures are to be reviewed every 2 years – NCDEQ
- Administrative Procedures are to be reviewed every 5 years.
- All QC Elements Included in the Procedures (MUR-2012):
  - Demonstration of Capability (DOC), Method Detection Limit (MDL)
  - Laboratory Reagent Blank (LRB), Laboratory Fortified Blank (LFB, LCS)
  - Matrix Spike and Matrix Spike Duplicate (MS/MSD)
  - Internal Standards for GC/MS analyses
  - Initial Calibration and continuing calibrations
  - Control Charts or other trend analyses for QC samples
  - Corrective action including root cause analysis, QC acceptance criteria
  - Definition of Preparation and analytical batches
  - Minimum frequency for conducting all QC elements
  - Has New MDL Procedure been implemented in lab (MUR 2017)

Procedures Review

Method Specific Requirements

- Ortho-phosphate (OPO4) samples are filtered within 15 minutes and documented
- Ammonia – Samples are distilled or laboratory has Gas diffusion membrane on the instrument (Lachat or Seal)
- TSS – 2.5 mg residue collected if volume is <1000 mL volume used
- Oil and Grease – pH checked before analysis or upon receipt and documented. MDL must meet 1.4 mg/L or less vs. MUR.
- Trace Metals (200.7, 200.8, 6010D and 6020B) – Requirement pH < 2, If adjusting pH in lab, hold for 24 hours before analysis and document it (MUR 2012)

Corrective Action Program

Corrective Actions are Written to Document Any Anomalies with:

- Customer Complaints
- Chemical Hygiene Plan Not Implemented as Written
- Sample preservation and Holding Time
- Procedure Not Reviewed as Per Regulations
- Procedures Not Followed as Written
- On-going Failures on QC Samples (LB, LCS, MS and MSD)
- Failure on PT Samples
- Unethical Behavior of Employees

Quiz Question 1

What is the holding time for a temperature measurement in the field?

Review of Audits – Internal and External

Internal Audits:

- Verify that a process is in place to ensure internal audits are periodically conducted and:
- Follow a predetermined schedule
- Conducted by trained personnel
- Corrective actions are acted on
- Records are maintained
- Follow-up audits are performed if required
- Reports are prepared and submitted to higher management

External Audits:

- Entered in Corrective action Program and Completed in a timely manner

Miscellaneous Records

- Employees Training Records
- Calibration and Maintenance Records
- Traceability of Chemicals and Reagents
- Review of PT Samples Results
- Method Detection Limits and Reporting Limits

Closing of the Audit

1) Exit Meeting
2) Audit Report Preparation
3) Response Review, and formal Closing of Audit

Summary of a Vendor Lab Audits

Housekeeping and Laboratory Safety Issues:

- Lab coats were not mandated for visitors when present in lab.
- During the laboratory walk-through, some analysts were not wearing the safety glasses consistently in the Sample Receipt area.
- The refrigerator used for storing overflow samples was badly corroded and in poor condition.
- The material condition of one of the fume-hoods located near Sample Receipt area was poor. It was badly corroded.
- Analyst eating pizza in the laboratory.
- The house-keeping practices needed immediate improvement.

Summary of a Vendor Lab Audit - 2017

Data Review - Job # 660-831183-1 (continued)

- **Observation:** Ion Chromatography (IC) analysis report indicated that only 1 µL of sample was being injected on the column. The lab Procedure does not specify the volume that should be used for analysis.

- **Deviation:** Retention times of LCS and LCSD were significantly different and not caught by the software, the analyst, and the data reviewer.

Summary of a Vendor Lab Audit

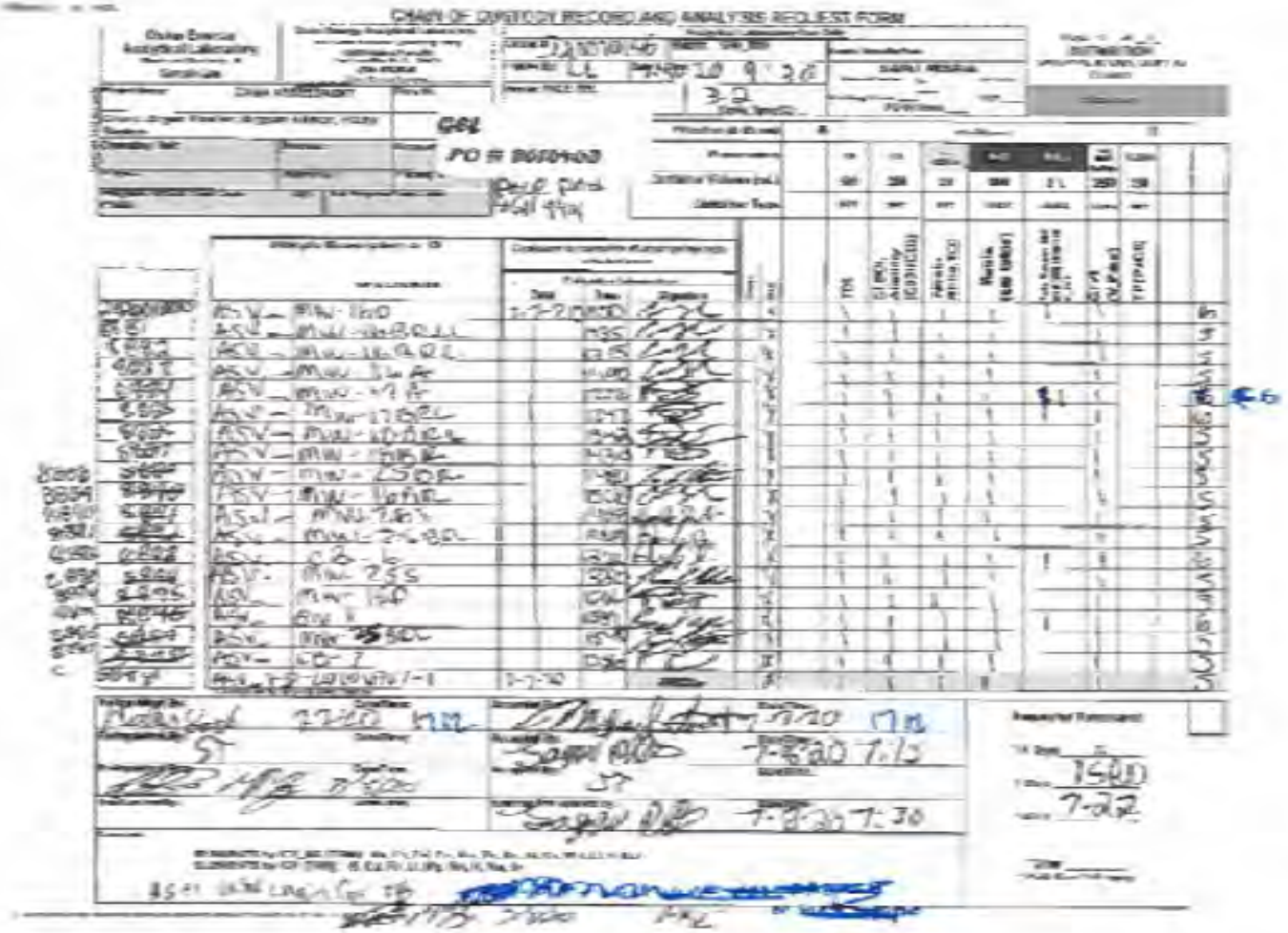
LCS	LCSD	Difference
(Fluoride (2.567 RT)	Fluoride (3.092 RT)	0.525
Chloride (3.133)	Chloride (4.175)	1.042
Sulfate (4.242)	Sulfate (5.283)	1.041
Bromide (5.617)	Bromide (6.658)	1.041

Summary of a Vendor Lab Audits

Data Review:

- Operator ID missing on all chromatograms
- Client sample ID missing on HPLC/IC Organics Analysis Data Sheet. It made it very hard to follow through the package
- No integration marks on raw data unless it was manually integrated. Without integration marks on chromatograms, it was difficult to access the accuracy of data.
- All blanks (method blank, initial calibration blank (ICB) and continuing calibration blank (CCB) were showing low level chloride contamination at level of 0.2 mg/L (RL 0.1 mg/L).

Chain of Custody Example



Conclusions

- Vendor lab data is critical to the operation and environmental monitoring of Duke Energy

- The auditing of vendor labs is an important process to assess the quality of data produced, and to assure the laboratory is meeting all method, procedural, and safety requirements.

Quiz Question 2

What is the minimum amount of residue that should be collected for TSS using 1000 mL or less sample volume?

Q&A Time

Emergency Preparedness

By:
Brenna Cook
Compliance Manager
City of Asheville

Presentation Overview

- 2018 AWIA requirements for RRP and ERP
- Emergency Response Plan
- NIMS
- ICS
- EOC Structures
- MAC Groups – NC Water Warn

Presentation Overview

- COOP
- Training (Available and Recommended)
- Plan Review Schedules and Requirements

2018 AWIA Requirement

- America's Water Infrastructure Act was passed on October 23, 2018
- Required most Community Water Systems to complete a Risk & Resiliency Plan and an Emergency Response Plan

2018 AWIA Requirement

- This act did not require wastewater utilities or drinking water systems that served less than 3300 people to create these plans.
- But EPA did recommend that they review their risks and develop an ERP.

2018 AWIA Requirement

Risk and Resiliency Plans

- Natural Hazards & Malevolent Acts
- Resilience of water facility infrastructure
- Monitoring Practices
- Financial Systems
- Chemical Storage and handling
- Operation and maintenance

Risk and Resiliency Plan

AWWA J100 Standard Process

1 – Asset Characterization

2 – Threat Characterization

3 – Consequence Analysis

4 – Vulnerability Analysis

5- Threat Likelihood

6- Risk/Resilience Analysis

2018 AWIA Requirement

Emergency Response Plans

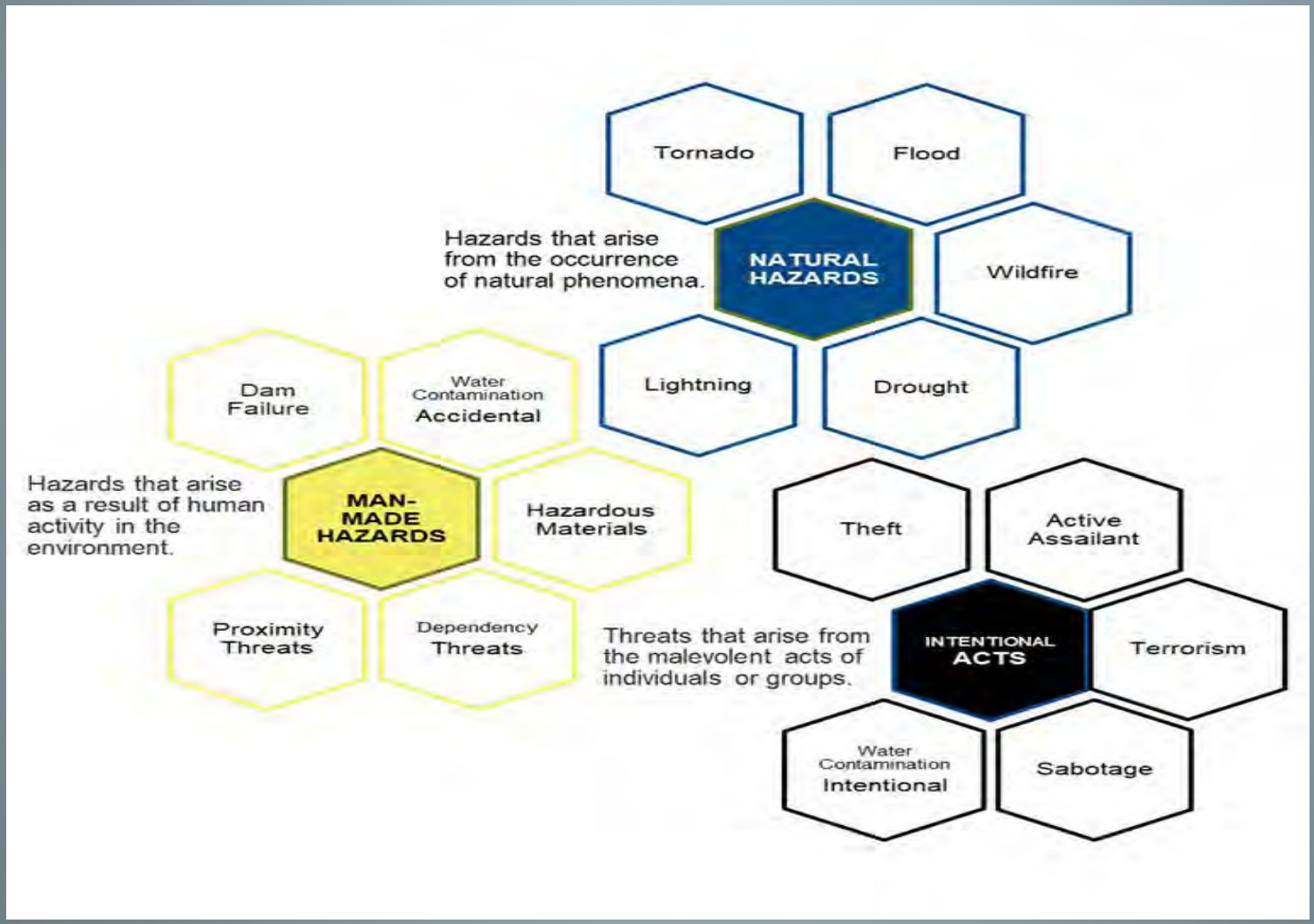
- Strategies and resources to improve resilience, including physical security and cybersecurity.
- Plans and procedures for responding to a natural hazard or malevolent act that threatens safe drinking water.
- Actions & equipment to lessen the impact of these acts.

2018 AWIA Requirement

Emergency Response Plans

- Strategies to detect malevolent acts or natural hazards.
- Utilities were required to coordinate their risk & resiliency and emergency response plans with local emergency planning committees.

Emergency Response Plan



Emergency Response Plan

- Department/City Organization during an emergency
- Incidence Response Procedures for
  - Physical Threats
  - Cyber Incidents
  - Source Water or Distribution Contamination
  - Power Loss
  - Natural Hazards

Emergency Response Plan

- Water Emergency Team
- Department Operations Center (DOC)
- Mutual Aid Operational Plan
- Public Notice Templates
- Training/Exercises
- After Action Reports

Emergency Response Plan

NIMS

- **What is NIMS**?
  - National Incident Management System – FEMA & Homeland Security
  - Over 40 years from experienced emergency responders have helped develop the system.
- **What is it's purpose**?
  - To enhance unity of effort by providing a common approach for managing incidents.

NIMS

- NIMS guides all levels of government, nongovernmental organizations (NGO), and the private sector to work together to prevent, protect against, mitigate, respond to, and recover from incidents.

- NIMS can be applied to all incidents, planned events or unplanned disasters.

NIMS

NIMs is divided into three components:

- Resource Management
- Command and Coordination
- Communications and Information Management

NIMS

Resource Management describes standard mechanisms to systematically manage resources, including personnel, equipment, supplies, teams, and facilities, both before and during incidents in order to allow organizations to more effectively share resources when needed.

NIMS

Command and Coordination describes leadership roles, processes, and recommended organizational structures for incident management at the operational and incident support levels and explains how these structures interact to manage incidents effectively and efficiently.

NIMS

Communications and Information Management describes systems and methods that help to ensure that incident personnel and other decision makers have the means and information they need to make and communicate decisions.

NIMS


National Incident Management System
FEMA
Resource Management
Command and Coordination
Communications and Information Management
Incident Command System

Question #1

What utilities were required to create a Risk & Resiliency Plan per 2018 AWIA?

A: All Utilities (Drinking Water and Wastewater)

B: All Drinking Water Utilities

C: All Drinking Water Utilities serving >3300

D: All Waste Water Utilities serving >3300

Question #1 Answer

What utilities were required to create a Risk & Resiliency Plan per 2018 AWIA?

C: All Drinking Water Utilities serving >3300

ICS

Incident Command System (ICS) is a standardized approach to the command, control, and coordination of on-scene incident management that provides a common hierarchy within which personnel from multiple organizations can be effective.

ICS

It is important to note that the Incident Command System (ICS) is just one part of NIMS.

ICS

- Is used for all kinds of incidents by all types of organizations and at all levels of government; ICS is applicable to small incidents as well as large and complex ones.
- Can be used not only for emergencies, but also for planned events.
- Enables a coordinated response among various jurisdictions and agencies.

ICS

- Establishes common processes for incident-level planning and resource management.
- Allows for the integration of resources (such as facilities, equipment, personnel) within a common organizational structure.

Benefits of ICS

The Incident Command System (ICS) has positively impacted incident management efforts by:

- Clarifying chain of command and supervision responsibilities to improve accountability.
- Leveraging interoperable communications systems and plain language to improve communications.

Benefits of ICS

- Providing an orderly, systematic planning process.
- Implementing a common, flexible, predesigned management structure.
- Fostering cooperation between diverse disciplines and agencies.

ICS Structure

This system includes five major functional areas, staffed as needed, for a given incident:

- Incident Commander (Unified Command)
- Command Staff (PIO, Safety, Liaison)
- Operations Section
- Planning Section
- Logistics Section
- Finance/Administration Section

ICS

Incident Commander and Unified Command (IC or UC):

IC is responsible for the overall management of the incident. A single Incident Commander or Unified Command conducts the command function on an incident.

ICS - Command Staff

PIO – Provides communication internally and to the public.

Liaison – contact for agencies that are not part of the incident command.

Safety - monitors incident operations and advises the Incident Commander or Unified Command on matters relating to the health and safety of incident personnel.

ICS – General Staff

Operations is responsible for managing tactical operations at an incident within the context of the incident action plans.

ICS – General Staff

Planning Section

Collects and evaluates information on the situation and resources, and then processes it for use in developing action plans. This can be in the form of incident action plans, briefings, and map and status board displays.

ICS – General Staff

Finance/Administration Section:

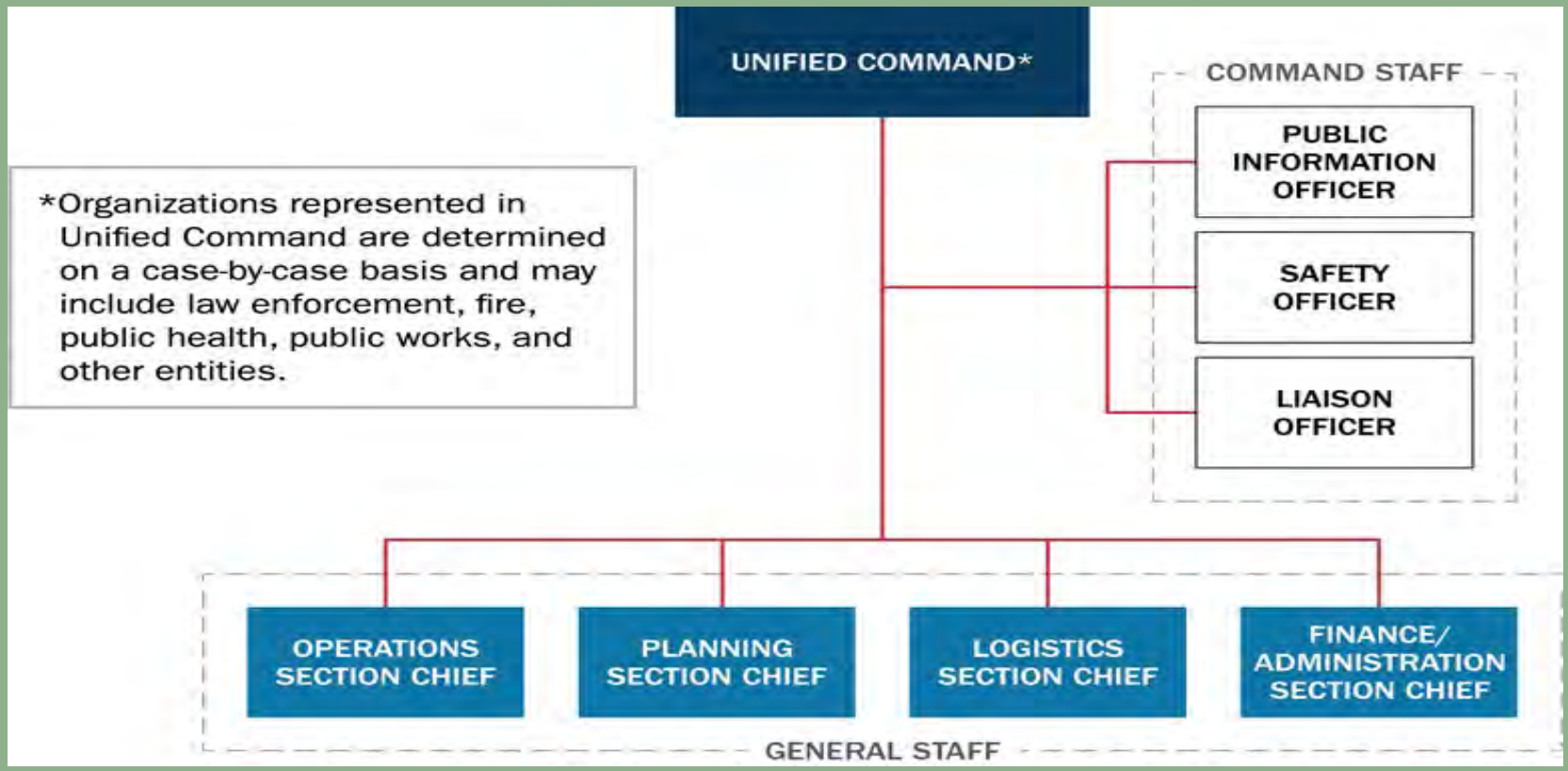
Manages all of the financial aspects of an incident. Not all incidents will require this support, so this section may only be activated if there is a particular need.

ICS – General Staff

Logistics Section:

Is responsible for providing facilities, transportation, communications, supplies, equipment maintenance and fuel, food services, medical services, and other off-incident resources.

ICS Structure



ICS

Core concepts of ICS include

- Common terminology,
- Integrated communications,
- Modular organization,
- Recognized command structure,

ICS

Core concepts of ICS – Cont

- Manageable supervisory structure
- Consolidated action plans
- Comprehensive resource management
- Pre-designated incident facilities

Question #2

True or False

The terms ICS and NIMS are interchangeable.

Question #2 Answer

The terms ICS and NIMS are interchangeable.

FALSE

ICS is only a part of NIMS.

IAP

Incident Action Plan (IAP)

- Different ICS Forms are used to compile the information needed for each operational period.
- Each general staff section uses forms specific to their section to gather needed information.

IAP


Incident Action Plan
• What do we need to do?
• Who is responsible for doing it?
• What resources are needed?
• How do we communicate?

IAP

To be effective, an IAP should:

- Cover a specified timeframe
- Be proactive
- Specify the incident objectives
- State the activities to be completed
- Assign responsibilities
- Identify needed resources
- Specify communication protocols

IAP

For smaller/less complex incidents, the IAP may be oral or written, except for hazardous materials incidents, which require a written IAP. FEMA has developed a series of ICS Forms for use in developing a written IAP.

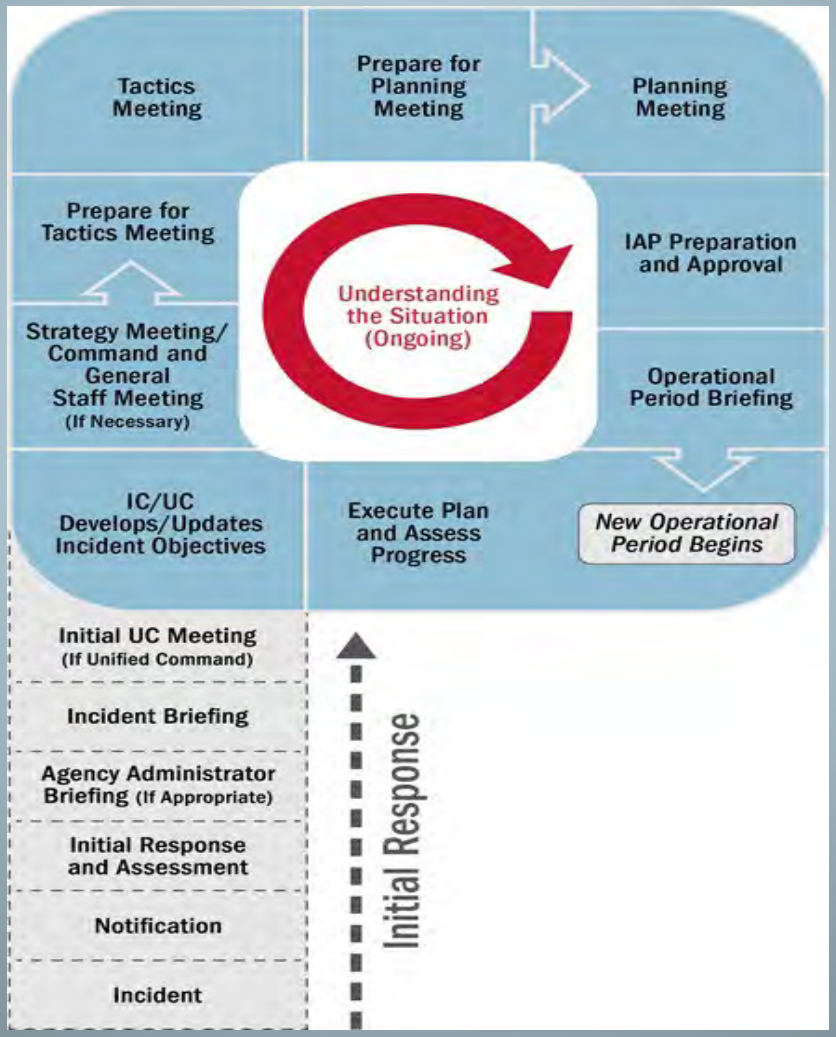
IAP - Components

- Incident Objectives
- Operational Period Command Emphasis
- General Situation Awareness
- Site Safety Plan
- Organization Assignment List

IAP - Components

- Communications Plan
- Medical Plan
- Activity Log
- Maps of Area
- Liaison Contacts

ICS Planning P



EOC Structures

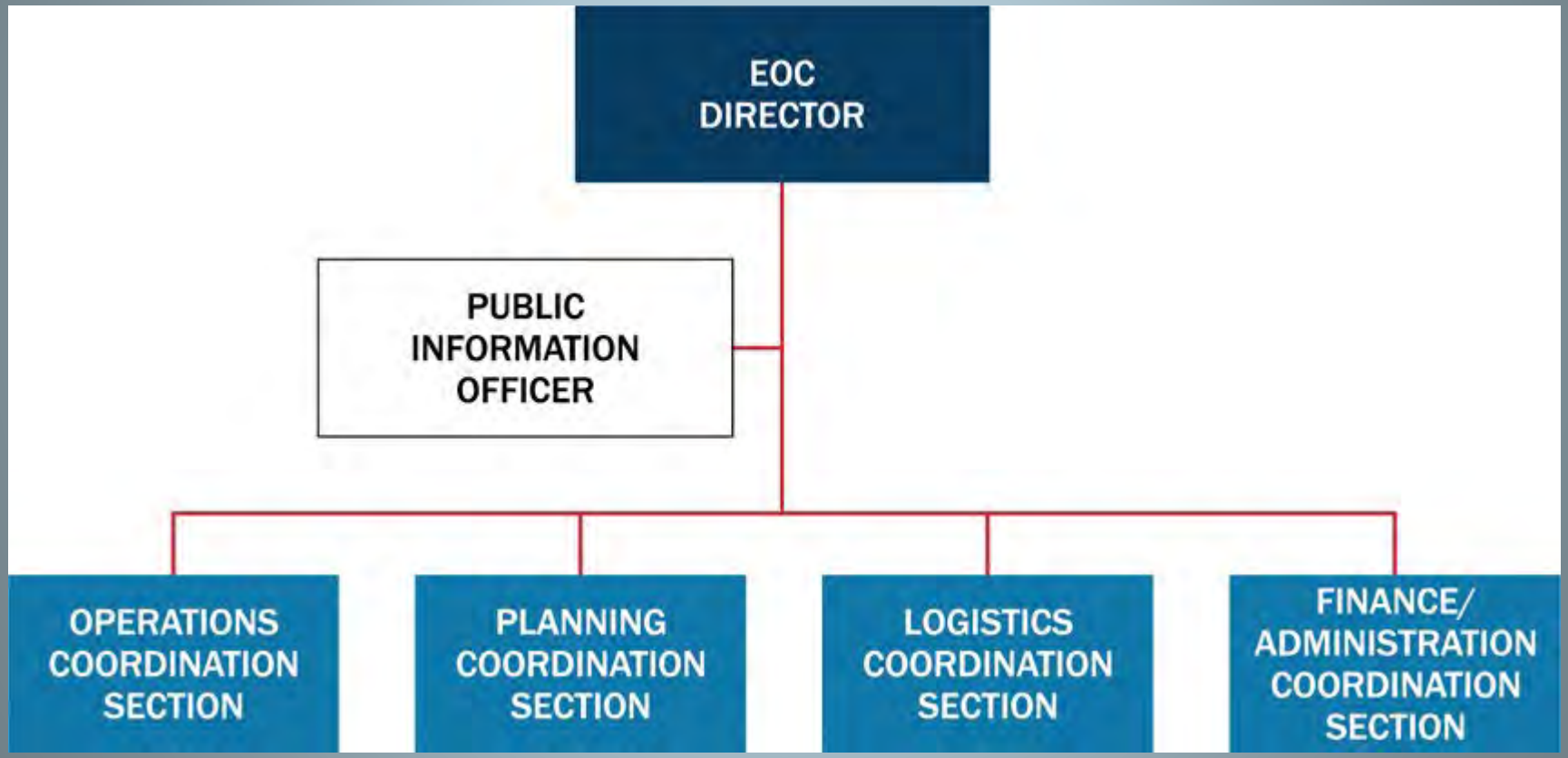
Emergency Operations Center:

An EOC is a facility from which staff provide information management, resource allocation and tracking, and/or advanced planning support to personnel on scene or at other EOCs (e.g., a state center supporting a local center.

EOC Structures

- **DOC** – Department Operational Center
- **City EOC** – Several departments within the City
- **County EOC** -City, Town and County Gov't
- **State EOC**

EOC Structure



MAC Groups

Multiagency Coordination Group:

MAC Groups provide policy guidance to incident personnel, support resource prioritization and allocation, and enable decision making among elected and appointed officials and senior executives in other organizations as well as those directly responsible for incident management.

MAC Groups

Multiagency Coordination Group:

NC Water Warn

Regional Mutual Aid Agreements

COOP

Continuity of Operations Plan

Is there a backup plan?

- Lose a Facility
  - – How to continue operating/providing service?
  - - What are your essential functions to continue operations?

Training

NIMS & ICS Courses are available on the FEMA Website.

- training.fema.gov/NIMS

ICS Courses

- ICS-100: Introduction to the Incident Command System
- ICS-200: ICS for Single Resources and Initial Action Incidents
- ICS-300: Intermediate ICS for Expanding Incidents
- ICS-400: Advanced ICS for Command and General Staff

Training

NIMS Courses

- IS-700: National Incident Management System, An Introduction
- IS-703:NIMS Resource Management
- IS-706:NIMS Intrastate Mutual Aid – An Introduction
- IS-800: National Response Framework, An Introduction

Training

Internal Training

- Annual Desktop Training Exercises for Utilities that have an ERP is recommended.

Review of Plans

- Drinking Water Utilities are required to review their RRPs and ERPs every 5 years.
- Recommended to review annually and update as necessary.

Question #3

How often is it recommended for utilities to perform desktop training?

A: Every 2 Years

B: Quarterly

C: Every 5 Years

D: Annually

Question #3 Answer

How often is it **recommended** for utilities to perform **desktop training**?

D: Annually

Conclusion

- Thank you for your attention.
- Any questions/comments?

NC DWR Aquatic Toxicology Branch

Toxicology Workshop

April 24, 2025

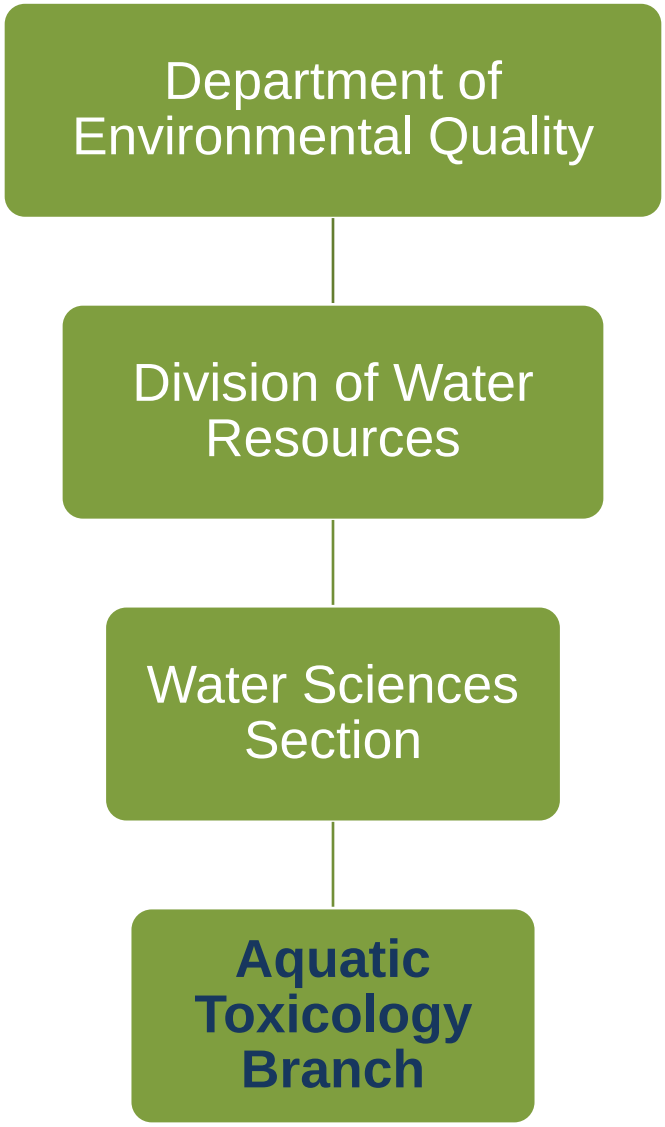
Cindy Moore

Environmental Program Supervisor I

Molly Nicholson

Compliance and Enforcement Specialist

Aquatic Toxicology Branch (ATB)



Mailing: 1621 MSC
Raleigh, NC 27699-1621

Phone: 919-743-8400

Aquatic Toxicology Branch (ATB)

- ATB has three main functions which support the National Pollutant Discharge Elimination System (NPDES) program.

WET Testing and Biological Organism Culture

Biological Laboratory Certification

NPDES Compliance and Enforcement

Whole Effluent Toxicity (WET) Testing Laboratory

- Supported by an EPA 106 Grant
  - Regional office staff perform a bioassay inspection at facility, pulling a sample for WET testing and sending it to ATB.
  - Annually, ATB tests 10% of all major NC NPDES facilities.

- NC Methods Approved by EPA in 1988 and started adding to permits in 1989. EPA promulgated their methods in 1991.

- ATB uses EPA Alternative methods for measuring acute and chronic toxicity of wastewater and surface waters.

Whole Effluent Toxicity (WET) Testing Laboratory

- Culture *Ceriodaphnia dubia* for use in WET testing.
- Other species used in testing are purchased and shipped in to be used for testing.

WET Testing Organisms

Ceriodaphnia dubia
(Cerio, water fleas, bugs)

Pimephales promelas (Fathead minnows)
Menidia menidia (Silverside minnows)

http://www.etsnclab.com/

Americamysis bahia (Mysidopsis bahia)
(Mysid shrimp)

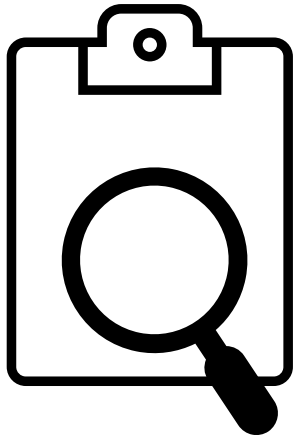
https://aquamania.co.uk/

Biological Laboratory Certification

- Any lab analysis that is used to meet the NC NPDES system.

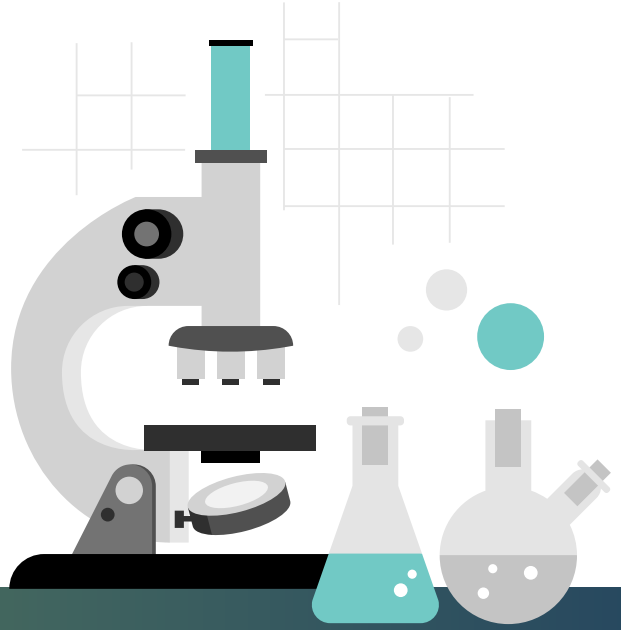
- North Carolina General Statues, G.S. 143-215.3(a)(1) and 143-215.3(a)(10).

- North Carolina Administrative Code, 15A NCAC 2H .0800 & .1100 which details the requirements for both chemical and biological lab certification.



Biological Laboratory Certification & ATB QC

- Conduct lab inspections, track and review data.
- Manage the Annual Proficiency Testing Program mandated by EPA for any facility that submits NPDES tests results.
- Review data and track QC procedures for the ATB lab.
- Monitor and report the EPA 106 Grant data with the help of the regional staff.



NPDES Compliance and Enforcement/Permitting

- Use data from WET testing to track compliance.
- Review toxicity data reported by facilities to verify data quality.
- Ensure compliance on a monthly basis and make enforcement recommendations for non-compliance.
- Provide compliance and enforcement guidance to facilities.
- Review NPDES permits for correct WET requirements.
- Review biocide and PAMS applications.

Biocide & PAMS Applications

Biocide: For any product ultimately discharged into NC surface waters

- Complete biocide application form (Excel or PDF)
- Provide SDS with section 12 data
  - Or perform multiple-concentration chronic *Ceriodaphnia dubia* test

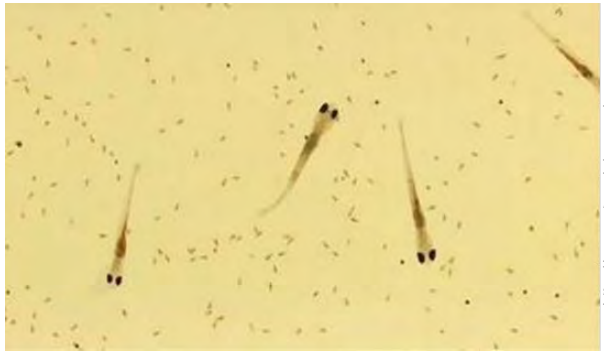
PAMS: Polyacrylamide products used to reduce soil erosion or subsequent sedimentation in streams

- Provide SDS with section 12 data
- Provide information on how product will be applied

Please see ATB Downloads webpage for more info

Second Species Testing (Alternative Species)

- EPA requested that NC major municipal facilities be required to perform 2nd species testing.
- Outlined in EPA form 2A Part E of the permit renewal application.
- Checklist for Municipal Application Requirements: https://deq.nc.gov/water-quality/aquifer-protection/afo/permits/municipal-checklist-2021-dwq-swp-npdes/download
- Second species conditions are included in permits that require it.
- Schedule ahead of time!



MUNICIPAL TYPE	EPA FORM 2A?	IF COMPLETING FORM 2A, DO YOU NEED THE FOLLOWING?					
		PART A - Basic Application Information	**PART B** - Add'l Application Information (expanded testing)	**PART C** - Certification	**PART D** - Priority Pollutant Analysis*	**PART E** - TOX(2nd species)**	**PART F** - SIUs Supplement Info.
Less than 0.1MGD (minor)	No (use NC Short Form A Or Short Form D)	No	No	No	No	No	No
Greater than/equal to 0.1 MGD but less than 1.0 MGD -- without pretreatment	Yes	Yes	Yes	Yes	No	No	No
Greater than/equal to 0.1 MGD but less than 1.0 MGD -- with pretreatment	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.0 MGD or Greater (major) -- without pretreatment	Yes	Yes	Yes	Yes	Yes	Yes	No
1.0 MGD or Greater (major) -- with pretreatment	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*3 samples with seasonal variation (at least 4 months separation between samples)
**4 samples with seasonal variation (for information on second species toxicity testing, call Aquatic Toxicology Unit at 919-743-8401

Second Species Testing – Permit Renewal

(c.) **2nd-Species Toxicity Testing and Reporting.**

(i.) In addition to the quarterly toxicity tests required in Condition A.(2.) CHRONIC TOXICITY PERMIT LIMIT (QUARTERLY), the Permittee shall perform and report the results of four (4) toxicity tests using the same test methods using a second species of test organism suitable to the tests being conducted.

(ii.) The 2nd species toxicity tests shall be conducted either:

(A) Once per quarter in a single 12-month period (four samples); if this option is chosen, the sample for each 2nd species test shall coincide with the quarterly samples collected for (CHRONIC TOXICITY PERMIT LIMIT (QUARTERLY)); or

(B) Once per 12-month period in the four-and one-half year period prior to the scheduled application for permit renewal (four samples); if this option is chosen, three of the samples for the 2nd species test shall coincide with those for the annual effluent scans and the coincident quarterly toxicity test, and each of the four annual samples shall be collected in a different calendar quarter in order to represent seasonal variation.

(iii.) The results of the toxicity tests shall be submitted to the following address:

North Carolina Division of Water Resources
Water Sciences Section/Aquatic Toxicology Branch
1621 Mail Service Center
Raleigh, North Carolina 27699-1621

Or, results can be sent to the email, ATForms.ATB@deq.nc.gov.

(iv.) Results of the 2nd species tests shall also be summarized in Part E (Toxicity Testing Data) of EPA Municipal Application Form 2A when submitting the permit renewal application to the NPDES Wastewater Program.

The Permittee may contact the Division's Aquatic Toxicology Branch at 919-743-8401 for guidance on conducting the additional toxicity tests and reporting of the results.

MAJOR FACILITIES & MUNICIPALITIES

NORTH CAROLINA
Department of Environmental Quality

Question

Which one of the following statements about second species testing is incorrect?

A) Four second species tests must be completed per permit cycle.

B) Second species tests must be completed prior to applying for permit renewal.

C) All second species tests must be performed with *Ceriodaphnia dubia*.

D) Second species tests must be performed in different seasons.

Answer

Which one of the following statements about second species testing is incorrect?

A) Four second species tests must be completed per permit cycle.

B) Second species tests must be completed prior to applying for permit renewal.

C) All second species tests must be performed with *Ceriodaphnia dubia*. X

D) Second species tests must be performed in different seasons.

Important Toxicity Sections of Permit

PARAMETER	Parameter Code	EFFLUENT LIMITS			MONITORING REQUIREMENTS		
		Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location[2]
Flow	*50050*	1.15 MGD			Continuous	Recording	I or E
BOD, 5 day, 20°C [3] (Apr 1 - Oct 31)	*CO310*	5.0 mg/L	7.5 mg/L		2/week [4]	Composite	I and E
BOD, 5 day, 20°C [3] (Nov 1 - Mar 31)	*CO310*	10.0 mg/L	15.0 mg/L		2/week [4]	Composite	I and E
Total Suspended Solids[3]	*CO530*	30.0 mg/L	45.0 mg/L		2/week [4]	Composite	I and E
NH_3 as N (Apr 1 - Oct 31)	*CO610*	1.0 mg/L	3.0 mg/L		2/week[4]	Composite	E
NH_3 as N (Nov 1 - Mar 31)	*CO610*	2.0 mg/L	6.0 mg/L		2/week[4]	Composite	E
Fecal Coliform (geometric mean)	*31616*	200/100 mL	400/100 mL		2/week[4]	Grab	E
Dissolved Oxygen	*00300*	Daily Average ≥ 5.0 mg/L			3/week	Grab	E
pH	*00400*	Between 6.0 and 9.0 Standard Units			3/week	Grab	E
Temperature (°C)	*00010*	Monitor and Report			3/week	Grab	E
Total Residual Chlorine [5]	*50060*			17 µg/L	3/week	Grab	E
Fluoride	00951	1.8 mg/L		5.4 mg/L	Monthly	Composite	E
Total Copper	01042	11.9 µg/L		16.5 µg/L	Monthly	Composite	E
Total Phosphorus (mg/L)	*CO665*	Monitor and Report			Quarterly	Composite	E
Total Nitrogen [6] (mg/L)	*CO600*	Monitor and Report			Quarterly	Calculated	E
TKN (mg/L)	*00625*	Monitor and Report			Quarterly	Composite	E
NO_3-N + NO_2-N (mg/L)	*00630*	Monitor and Report			Quarterly	Composite	E
Chronic Toxicity [7]	*TGP3B*	Monitor and Report			Quarterly	Composite	E
Effluent Pollutant Scan [8]	*NC01*	Monitor and Report			Footnote 8	Footnote 8	E
PFAS[9]	*various*	Footnote 9			Footnote 9	Grab	E
Hardness[10]-Total as $CaCO_3$ (mg/L)	*00900*	Monitor and Report			Quarterly	Composite	E
Dissolved Oxygen (mg/L)	*00300*	Monitor and Report			Variable[2]	Grab	U and D
Temperature °C	*00010*	Monitor and Report			Variable[2]	Grab	U and D

7. Chronic Toxicity (*Ceriodaphnia dubia*) P/F at 90% with testing in January, April, July and October. See Special Condition A.(2.).

NORTH CAROLINA
Department of Environmental Quality

A. (2.) CHRONIC TOXICITY PERMIT LIMIT (QUARTERLY)
[15A NCAC 02B .0200] [15A NCAC 02B .0500 et seq]

The effluent discharge shall at no time exhibit observable inhibition of reproduction or significant mortality to ***Ceriodaphnia dubia*** at an effluent concentration of **90%**.

The permit holder shall perform at a minimum, **quarterly** monitoring using test procedures outlined in the "North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure," (Revised December 2010, or subsequent versions) or "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised December 2010, or subsequent versions). The tests will be performed during the months of **January, April, July, and October**. These months signify the first month of each three-month toxicity testing quarter assigned to the facility. Effluent sampling for this testing must be obtained during representative effluent discharge and shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

If the test procedure performed as the first test of any single quarter results in a failure or ChV below the permit limit, then multiple-concentration testing shall be performed at a minimum, in each of the two following months as described in "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-December 2010, or subsequent versions).

All toxicity testing results required as part of this permit condition will be entered electronically using the Division's eDMR system for the months in which tests were performed, using the parameter code **TGP3B** for the pass/fail results and **THP3B** for the Chronic Value. Additionally, DWR Form **AT-3** (original) is to be sent to the following address:

North Carolina Division of Water Resources
Water Sciences Section/Aquatic Toxicology Branch
1621 Mail Service Center
Raleigh, NC 27699-1621

Or, results can be sent to the email, ATForms.ATB@deq.nc.gov.

Completed Aquatic Toxicity Test Forms shall be filed with the Water Sciences Section no later than 30 days after the end of the reporting period for which the report is made.

NORTH CAROLINA
Department of Environmental Quality

Important Toxicity Sections of Permit

A. (2) CHRONIC TOXICITY PASS/FAIL MONITORING (QUARTERLY)
[15A NCAC 02B .0500 et seq.]

The permittee shall conduct **quarterly** chronic toxicity tests using test procedures outlined in the "North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure," (Revised December 2010, or subsequent versions).

The effluent concentration defined as treatment two in the procedure document is **79.22**%. The testing shall be performed as a *Ceriodaphnia dubia* 7-day pass/fail test. The tests will be performed **during the months of March, June, September, and December**. These months signify the first month of each three-month toxicity testing quarter assigned to the facility. Effluent sampling for this testing must be obtained during representative effluent discharge and shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered electronically using the Division's eDMR system for the month in which it was performed, using the parameter code **TGP3B**. Additionally, DWR Form **AT-1** (original) is to be sent to the following address:

NORTH CAROLINA
Department of Environmental Quality

Dual Reporting Requirement

All ATB WET Testing has a dual-reporting requirement

Monthly, quarterly, or annual test results MUST BE:

AT Form emailed (or mailed) to ATB

+

Reported on the eDMR

All toxicity testing results required as part of this permit condition will be entered electronically using the Division's eDMR system for the months in which tests were performed, using the parameter code **TGP3B** for the pass/fail results and **THP3B** for the Chronic Value. Additionally, DWR Form **AT-3** (original) is to be sent to the following address:

North Carolina Division of Water Resources
Water Sciences Section/Aquatic Toxicology Branch
1621 Mail Service Center
Raleigh, NC 27699-1621

Or, results can be sent to the email, ATForms.ATB@deq.nc.gov.

Completed Aquatic Toxicity Test Forms shall be filed with the Water Sciences Section no later than 30 days after the end of the reporting period for which the report is made.

Test data shall be complete, accurate, include all supporting chemical/physical measurements and all concentration/response data, and be certified by laboratory supervisor and ORC or approved designate signature. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should there be no discharge of flow from the facility during a month in which toxicity monitoring is required, the Permittee will complete the information located at the top of the aquatic toxicity (AT) test form indicating the facility name, permit number, pipe number, county, and the month/year of the report with the notation of "No Flow" in the comment area of the form. The report shall be submitted to the Water Sciences Section at the address cited above.

Should the Permittee fail to monitor during a month in which toxicity monitoring is required, monitoring will be required during the following month. Assessment of toxicity compliance is based on the toxicity testing quarter, which is the three-month time interval that begins on the first day of the month in which toxicity testing is required by this permit and continues until the final day of the third month.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Water Resources indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

If a facility experiences:

No flow	→	Submit AT form with "No flow for [month]" written in comments
Missed testing	→	Submit AT form with an explanation written in comments. ATB will ask you to test the following month.

Reasons for Missed Tests:

Invalid Tests

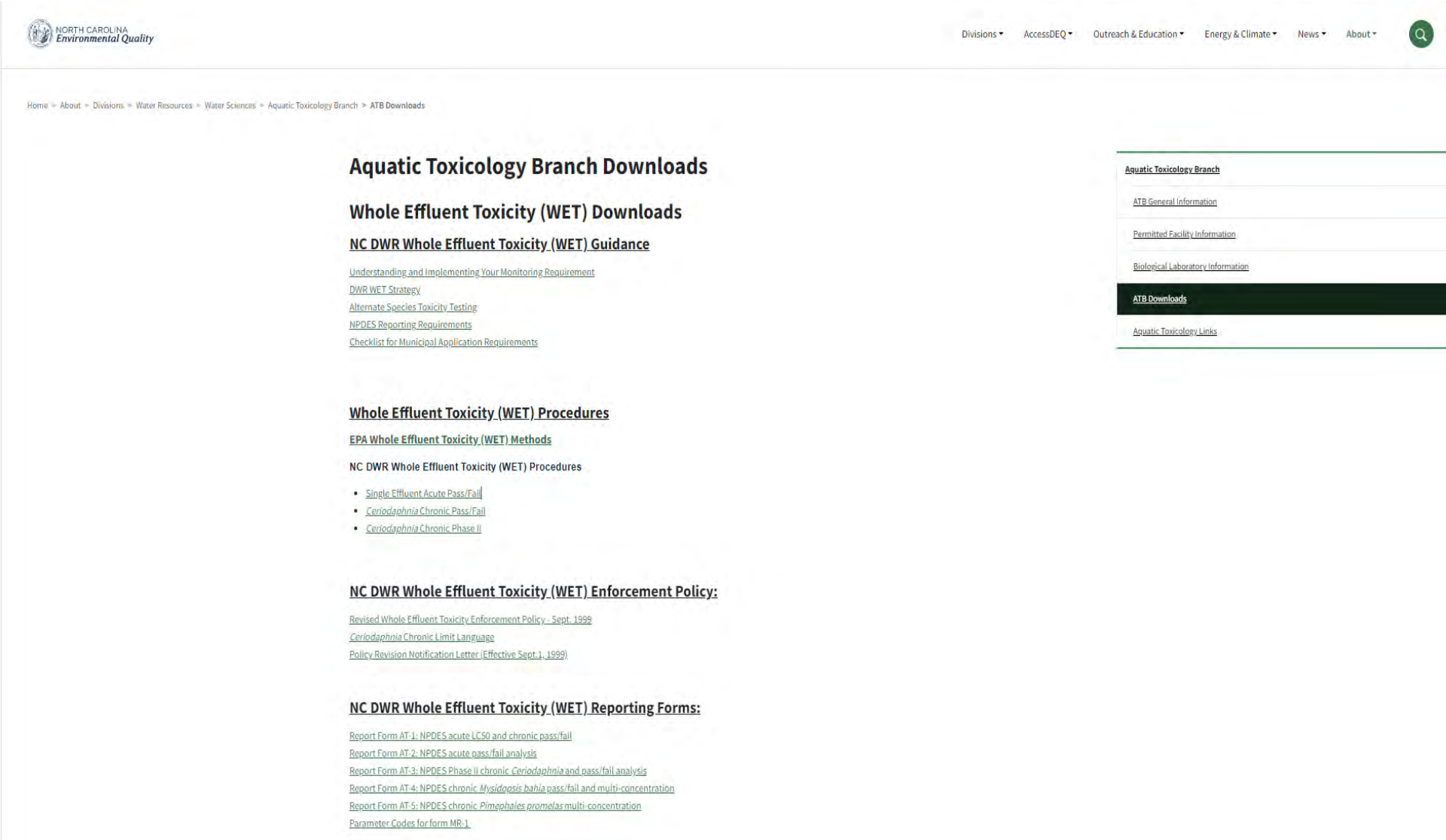
- Poor health of control
- Second effluent sample didn’t arrive

Missed Tests

- Shipping error
- Lab capacity issues
- Natural disaster (eg. Hurricane Helene)

NORTH CAROLINA
Department of Environmental Quality

Blank AT Forms



https://www.deq.nc.gov/about/divisions/water-resources/water-sciences/aquatic-toxicology-branch/aquatic-toxicology-branch-downloads

Effluent Toxicity Report Form- Chronic Pass/Fail and Acute LC50

Date _____

Facility _____ NPDES#NC _____ Pipe # _____ County _____

Laboratory Performing Test _____

Comments _____

x _____
Signature of Laboratory Supervisor ORC Phone / Email

x _____
Signature of Laboratory Supervisor

MAIL ORIGINAL TO:

Environmental Sciences Section
Div. of Water Resources
N.C. DENR
1621 Mail Service Center
Raleigh, North Carolina 27699-1621

North Carolina *Ceriodaphnia* Chronic Pass/Fail Reproduction Toxicity Test

CONTROL ORGANISMS	1	2	3	4	5	6	7	8	9	10	11	12
# Young Produced												
Adult (L)ive (D)ead												

Effluent% _____

TREATMENT 2 ORGANISMS	1	2	3	4	5	6	7	8	9	10	11	12
# Young Produced												
Adult (L)ive (D)ead												

Chronic Test Results

Calculated t _____
Tabular t _____
% Reduction _____

%Mortality	Avg Reprod.
Control	Control
Treatment 2	Treatment 2

Control CV _____

% control organisms producing 3rd brood _____

PASS ☐ FAIL ☐ Check One

pH	1st sample start	1st sample end	1st sample start	1st sample end	2nd sample start	2nd sample end
Control						
Treatment 2						

D.O.	1st sample	1st sample	2nd sample
Control			
Treatment 2			

Complete This For Either Test

Test Start Date ___/___/___

Collection (Start) Date
Sample 1 ___/___/___ Sample 2 ___/___/___

Sample Type/Duration

	Grab	Comp.	Duration
Sample 1			
Sample 2			

	Dilution	1st Tox Sample	2nd Tox Sample (Pass/Fail Only)
Hardness(mg/l)			
Spec.Cond.(µmhos)			
Chlorine(mg/l)			
Sample temp. at receipt			

LC50/Acute Toxicity Test

(Mortality expressed as %, combining replicates)

%	%	%	%	%	%	%	%	%	%	
										Concentration
%	%	%	%	%	%	%	%	%	%	
										Mortality

LC50=_____%
95% Confidence Limits
_____%-_____%

Method of Determination
Moving Average ☐ Probit ☐
Spearman Karber ☐ Other_____

Organism Tested _____ Duration (hrs)_____

Note: Please Complete This Section Also

	start/end		start/end
Control			
High Conc.			
	pH		D.O.

Question

If a facility is unable to test for toxicity during a required testing month, what should they do?

A) Test the following month.

B) Submit a blank AT form to ATB explaining the issue, then test the following month.

C) Call their regional office, then test the following month.

D) Submit a blank AT form to ATB explaining the issue, then test next quarter.

E) Be proud of yourself for trying, then move on and try again next quarter.

Answer

If a facility is unable to test for toxicity during a required testing month, what should they do?

A) Test the next month.

B) Submit a blank AT form to ATB explaining the issue, then test the following month.

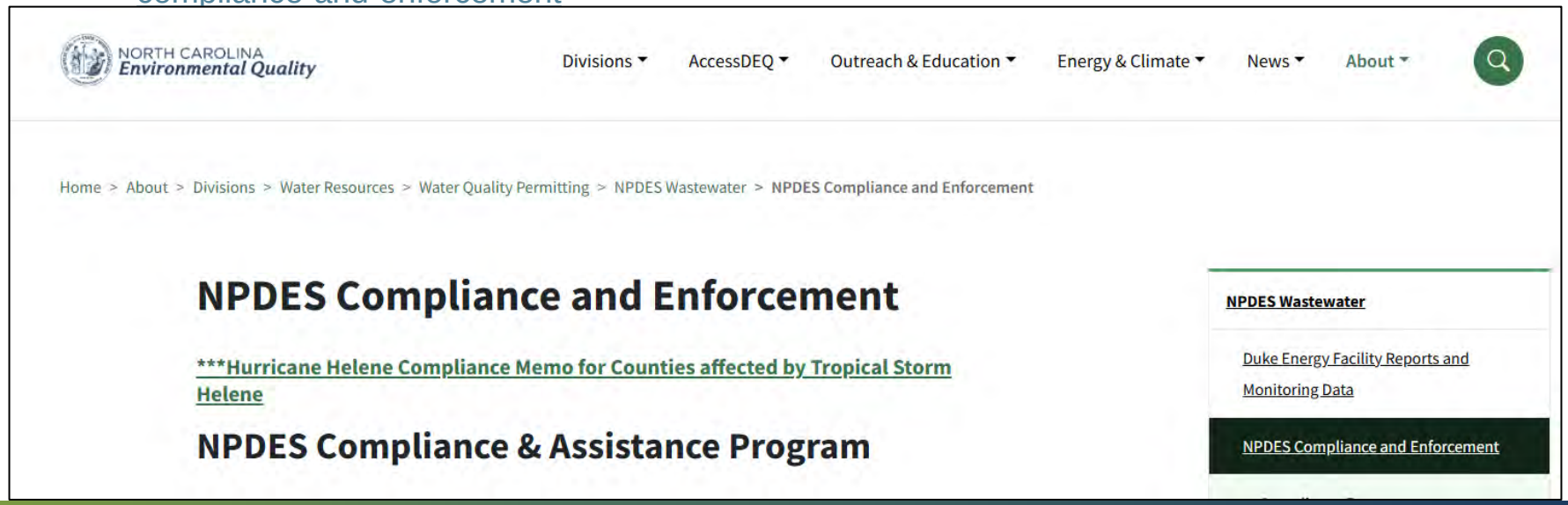
C) Call their regional office, then test the next month.

D) Submit a blank AT form to ATB explaining the issue, then test next quarter.

E) Be proud of yourself for trying, then move on and try again next quarter.

Hurricane Helene

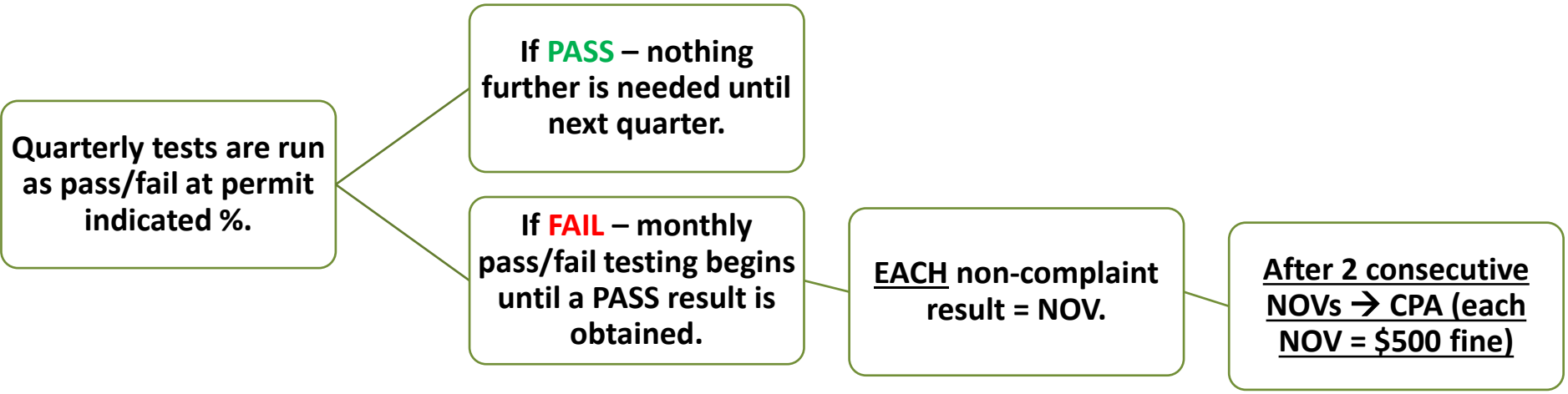
- **Current rules:** No compliance or enforcement through November 30th, 2024, for facilities within 25 counties designated in FEMA Disaster Declaration (9/29/25)
- ***Expect updates:*** Memo will likely be extended
- **Hurricane Helene Compliance Memo:** https://www.deq.nc.gov/about/divisions/water-resources/permitting/npdes-wastewater/npdes-compliance-and-enforcement



WET Enforcement Strategy

- All test results reported to ATB are reviewed, processed, and saved.
  - Note: Any tox test performed on a sample from the outfall must be reported.
- Non-compliant tests (fail or ChV below permit limit) result in Notices of Violation.
- The permit specified test (chronic or acute) determines what type of follow-up testing is required.
- The results of the follow-up testing are evaluated to determine if a Civil Penalty Assessment (CPA) will be issued.

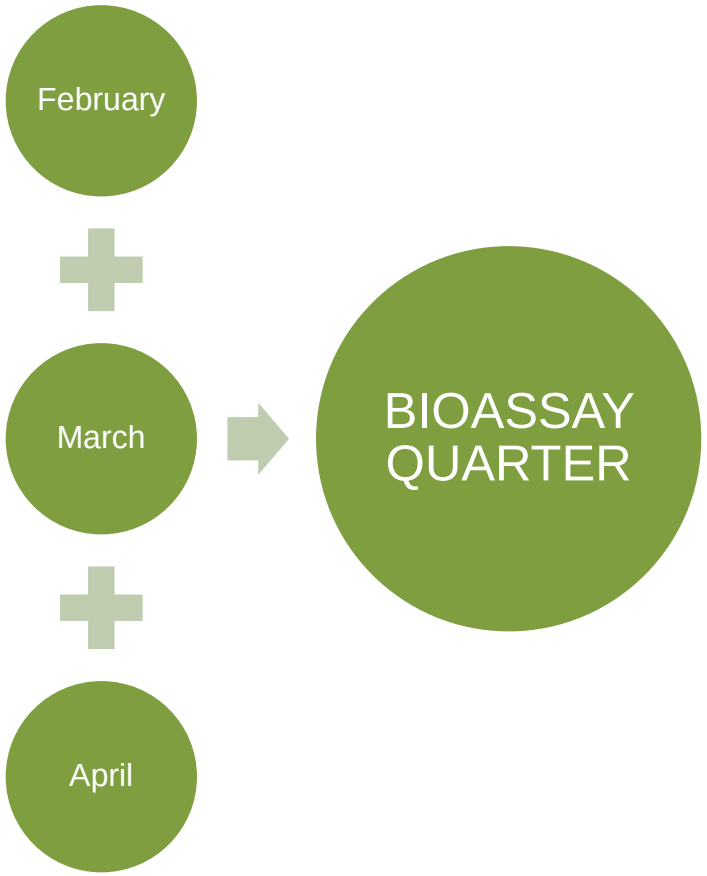
Acute Enforcement

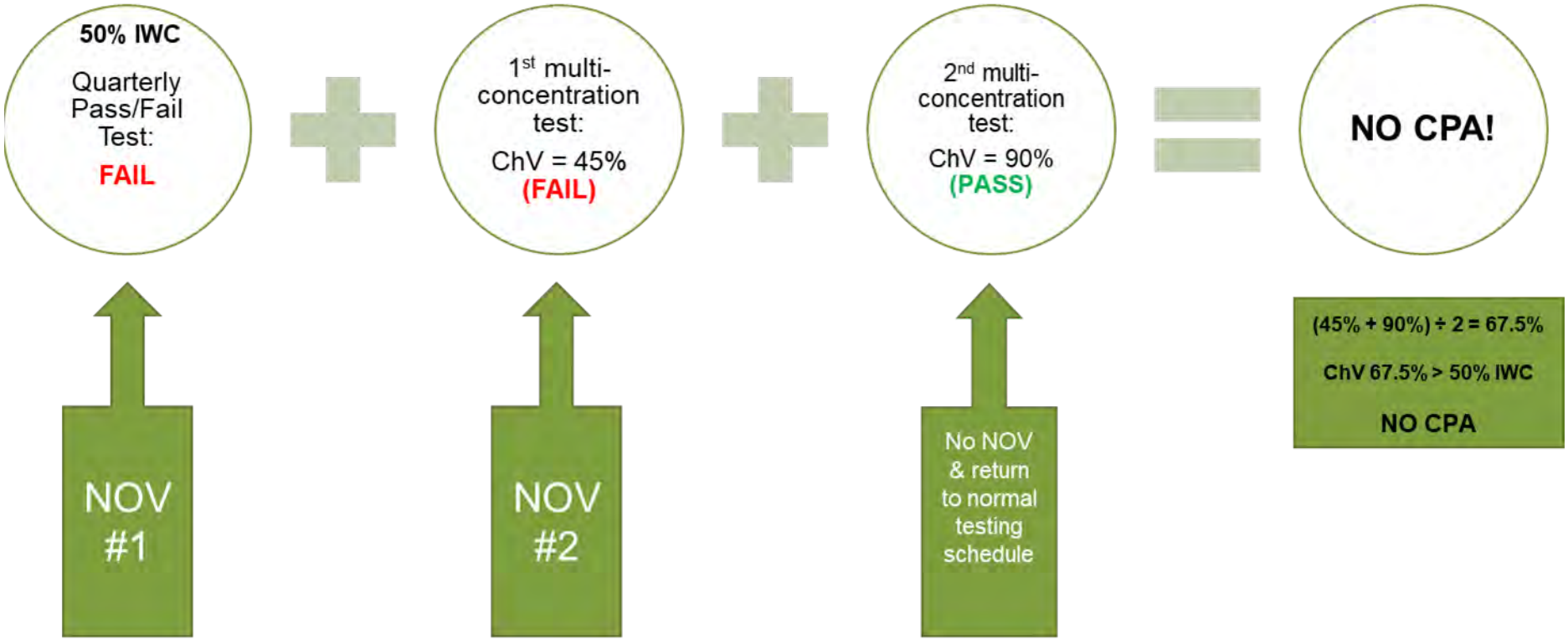


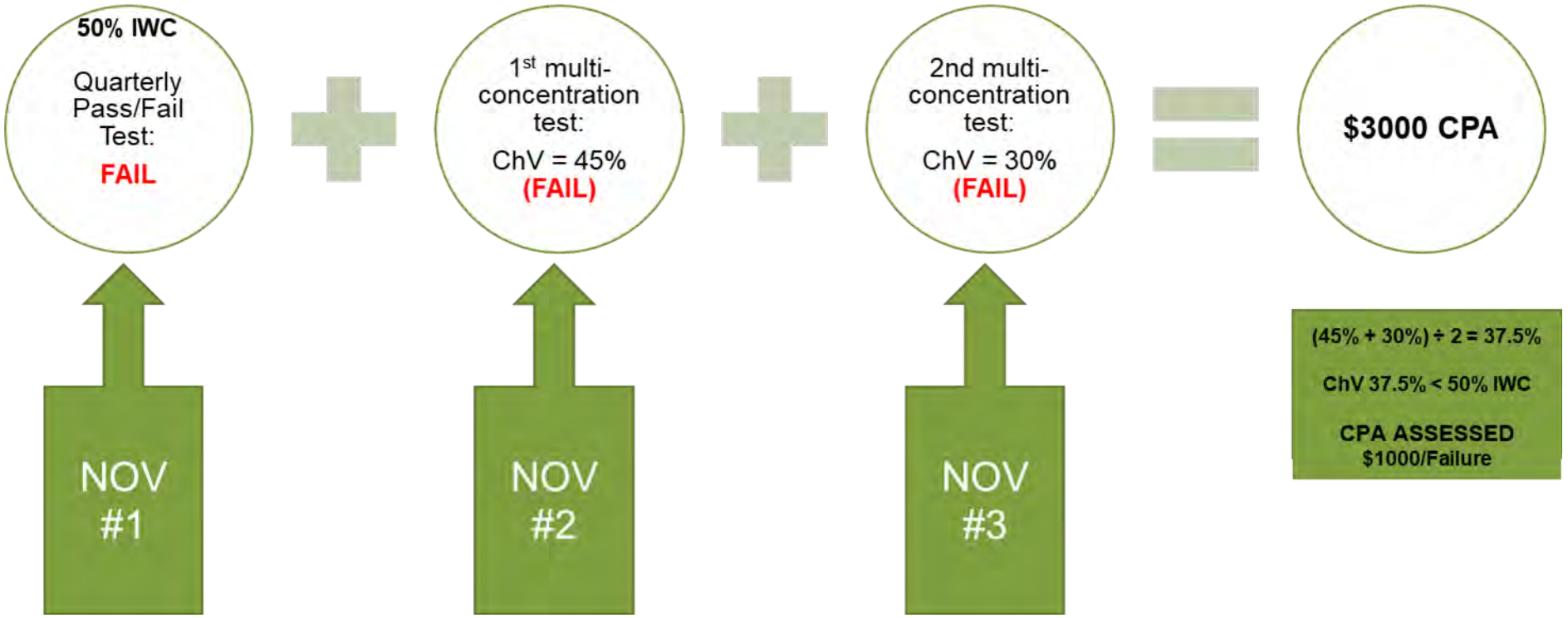
Chronic Enforcement

- Quarterly tests run as pass/fail at permit indicated %
- If **PASS** – nothing further is needed until next quarter
- If **FAIL** – 2 multi-concentration tests required (1 per month for 2 months)
- EACH non-complaint result = NOV
- Civil Penalty Assessment (CPA) is based off ChV average of the 2 follow-up tests
  - If ChV average is below the permit IWC, each NOV equates to $1000

If testing requirement is for February:




50% IWC
Quarterly Pass/Fail Test:
FAIL
1st multi-concentration test:
ChV = 45%
(FAIL)
2nd multi-concentration test:
ChV = 90%
(PASS)
NO CPA!
NOV #1
NOV #2
No NOV & return to normal testing schedule
(45% + 90%) ÷ 2 = 67.5%
ChV 67.5% > 50% IWC
NO CPA


50% IWC
Quarterly Pass/Fail Test:
FAIL
1st multi-concentration test:
ChV = 45%
(FAIL)
2nd multi-concentration test:
ChV = 30%
(FAIL)
$3000 CPA
NOV #1
NOV #2
NOV #3
(45% + 30%) ÷ 2 = 37.5%
ChV 37.5% < 50% IWC
CPA ASSESSED
$1000/Failure

Review

- The facility is responsible for following permit requirements, NOT the contract lab.

- Dual reporting requirement - Report on eDMR **and** submit signed AT-Form:

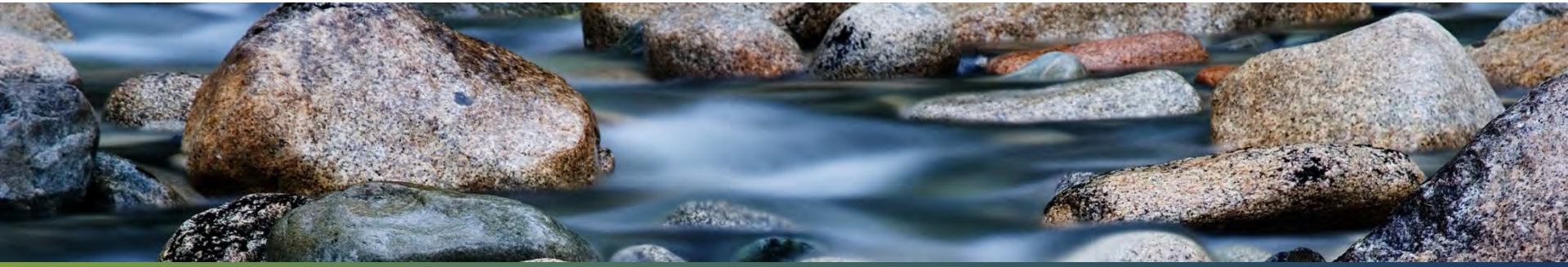
  ATForms.ATB@deq.nc.gov (we respond to confirm receipt)

  or 1621 MSC, Raleigh, NC 27699-1621

- AT forms must be signed by ORC or a delegated facility person.

- A blank AT form must be filled out and submitted for invalid/missed tests.

- The issues above, or any failure to follow permit, can result in a Notice of Violation or Civil Penalty.



Aquatic Toxicology Branch (ATB) Staff

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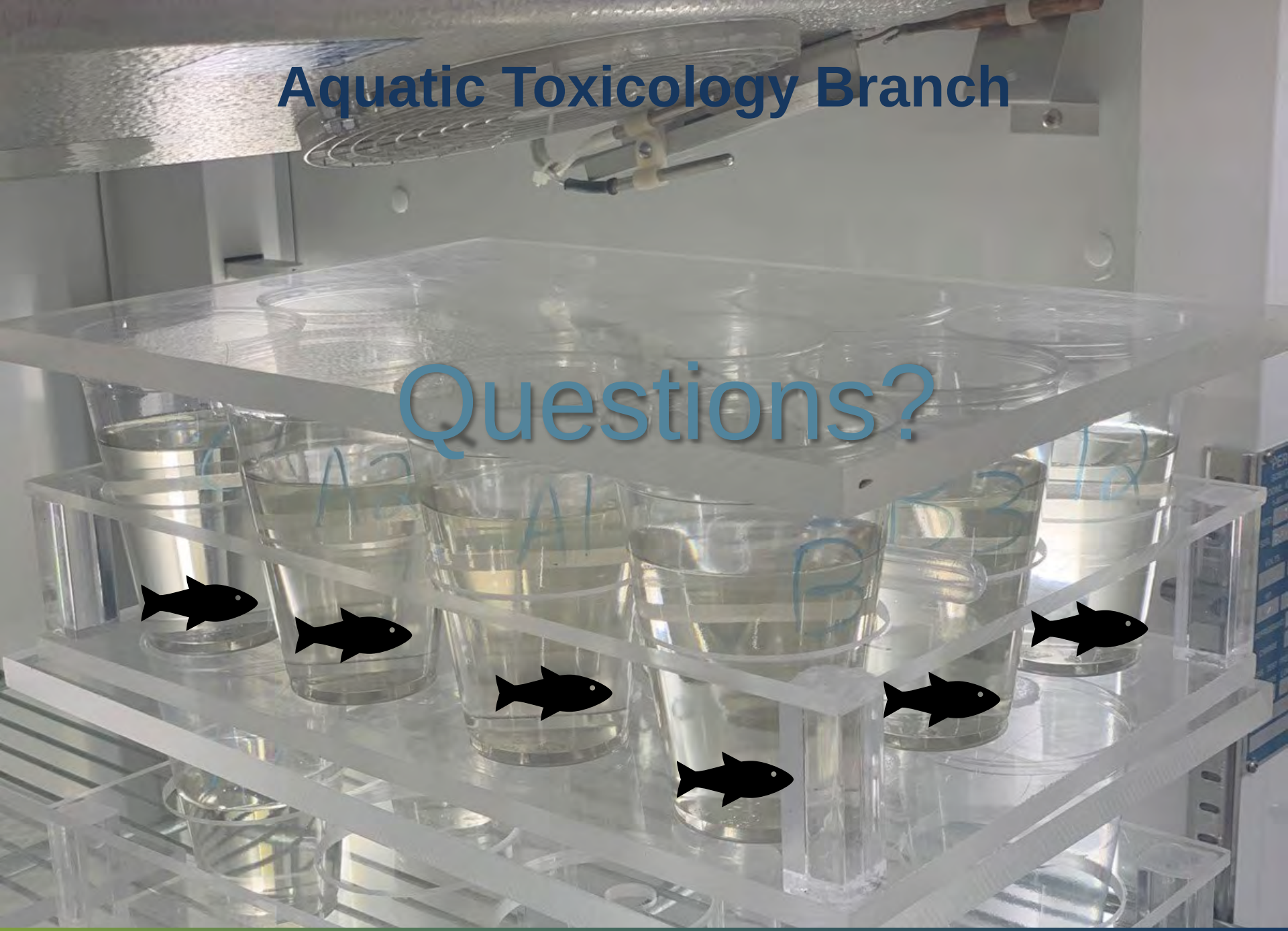
https://www.deq.nc.gov/about/divisions/water-resources/water-sciences/aquatic-toxicology-branch-atb

NORTH CAROLINA
Department of Environmental Quality

Aquatic Toxicology Branch

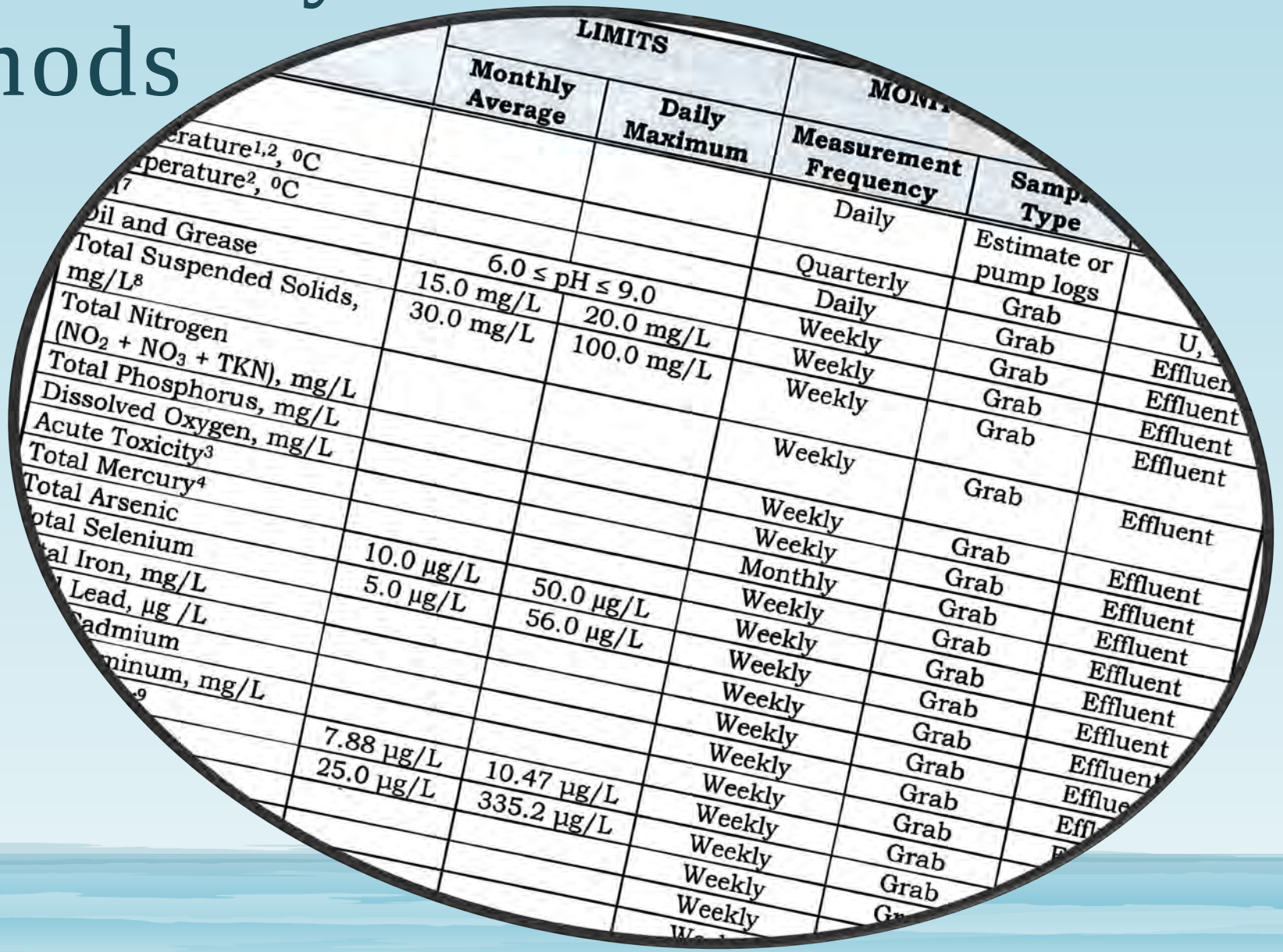


Introduction to Toxicity Testing

Jaydon Perez
Environmental Testing Solutions, Inc.

Whole Effluent Toxicity (WET) Methods

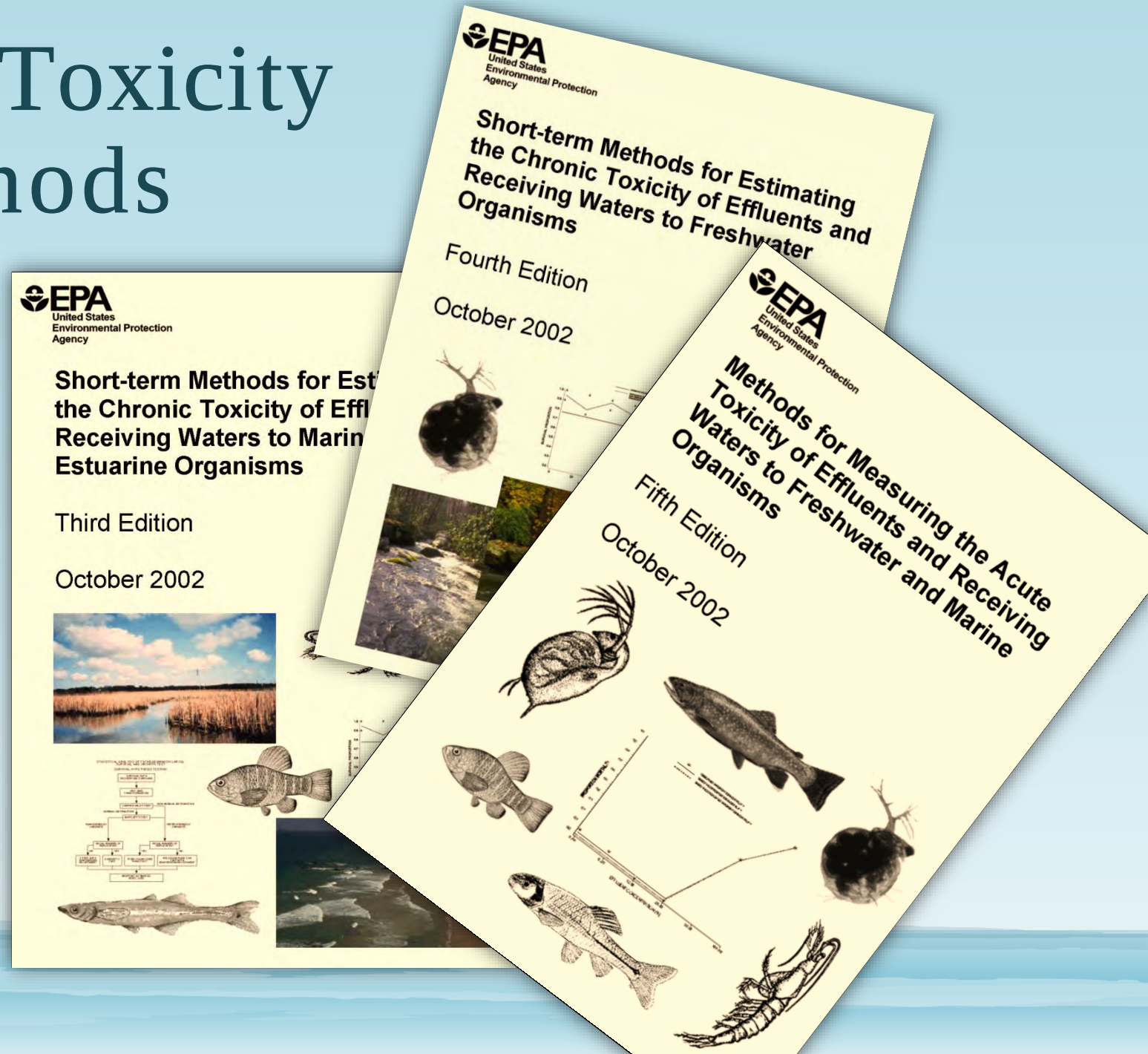
Determines the toxic effect from all pollutants contained in a facility's discharge to aquatic organisms



	LIMITS		MONI	
	Monthly Average	Daily Maximum	Measurement Frequency	Sampl Type
erature[1,2], °C			Daily	Estimate or pump logs
perature[2], °C				
[7]				
il and Grease			Quarterly	Grab
Total Suspended Solids, mg/L[8]	15.0 mg/L	20.0 mg/L	Daily	Grab
	30.0 mg/L	100.0 mg/L	Weekly	Grab
Total Nitrogen (NO_2 + NO_3 + TKN), mg/L			Weekly	Grab
Total Phosphorus, mg/L			Weekly	Grab
Dissolved Oxygen, mg/L				Grab
Acute Toxicity[3]			Weekly	
Total Mercury[4]				Grab
Total Arsenic			Weekly	
otal Selenium			Weekly	Grab
	10.0 µg/L	50.0 µg/L	Monthly	Grab
al Iron, mg/L	5.0 µg/L	56.0 µg/L	Weekly	Grab
Lead, µg /L			Weekly	Grab
admium			Weekly	Grab
minum, mg/L			Weekly	Grab
[9]			Weekly	Grab
	7.88 µg/L	10.47 µg/L	Weekly	Grab
	25.0 µg/L	335.2 µg/L	Weekly	Grab
			Weekly	Grab
			Weekly	Grab
			Weekly	Grab
			Weekly	Gr

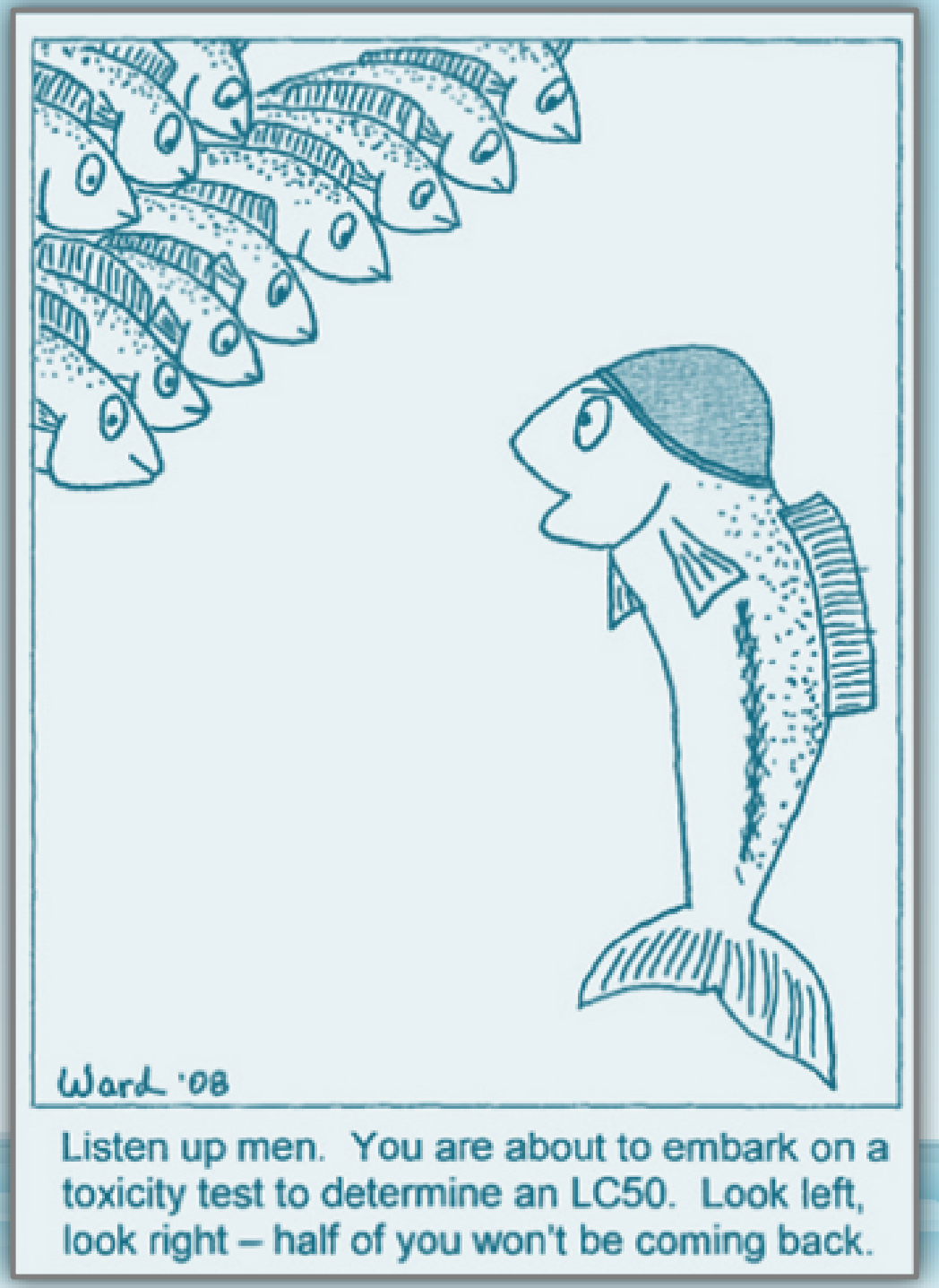
Whole Effluent Toxicity (WET) Methods

Methods measure
the ability
of an organism
to survive,
grow and reproduce



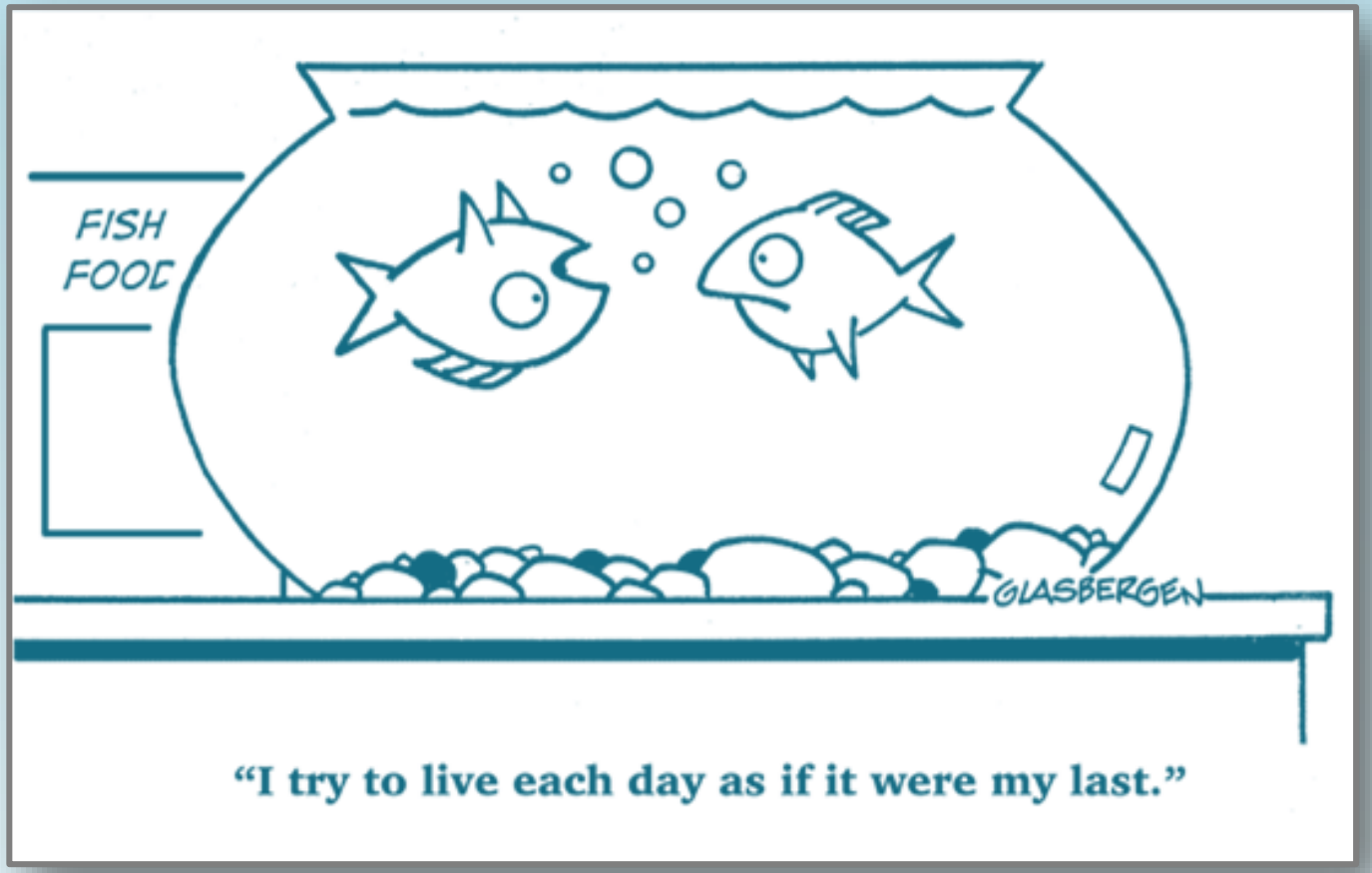
Acute Toxicity

- Short-term exposure
- 24 or 48 hours
- Evaluating 1 sample



Chronic Toxicity

- Long-term exposure
- 7 days
- Evaluating
  2 or 3 samples

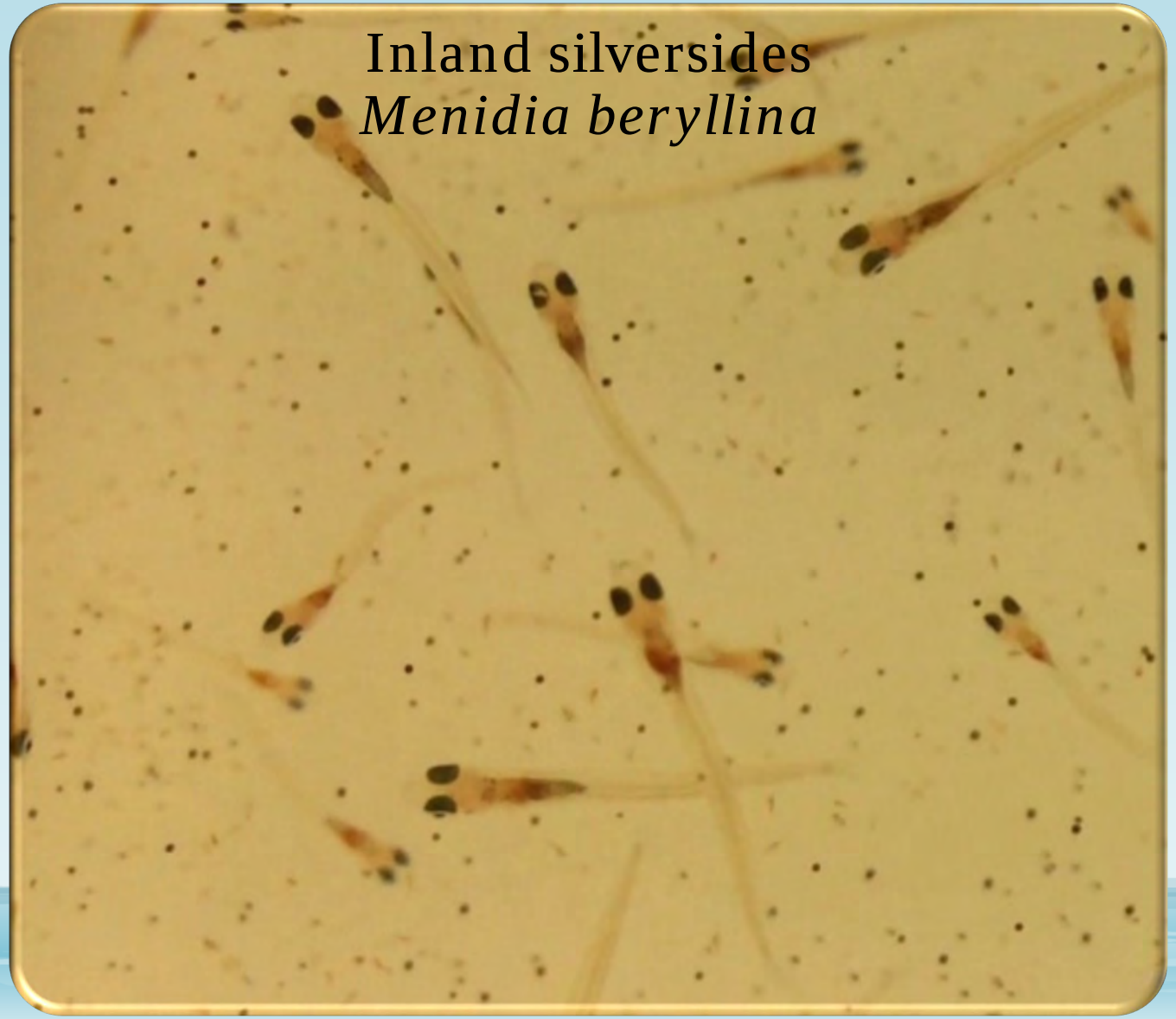


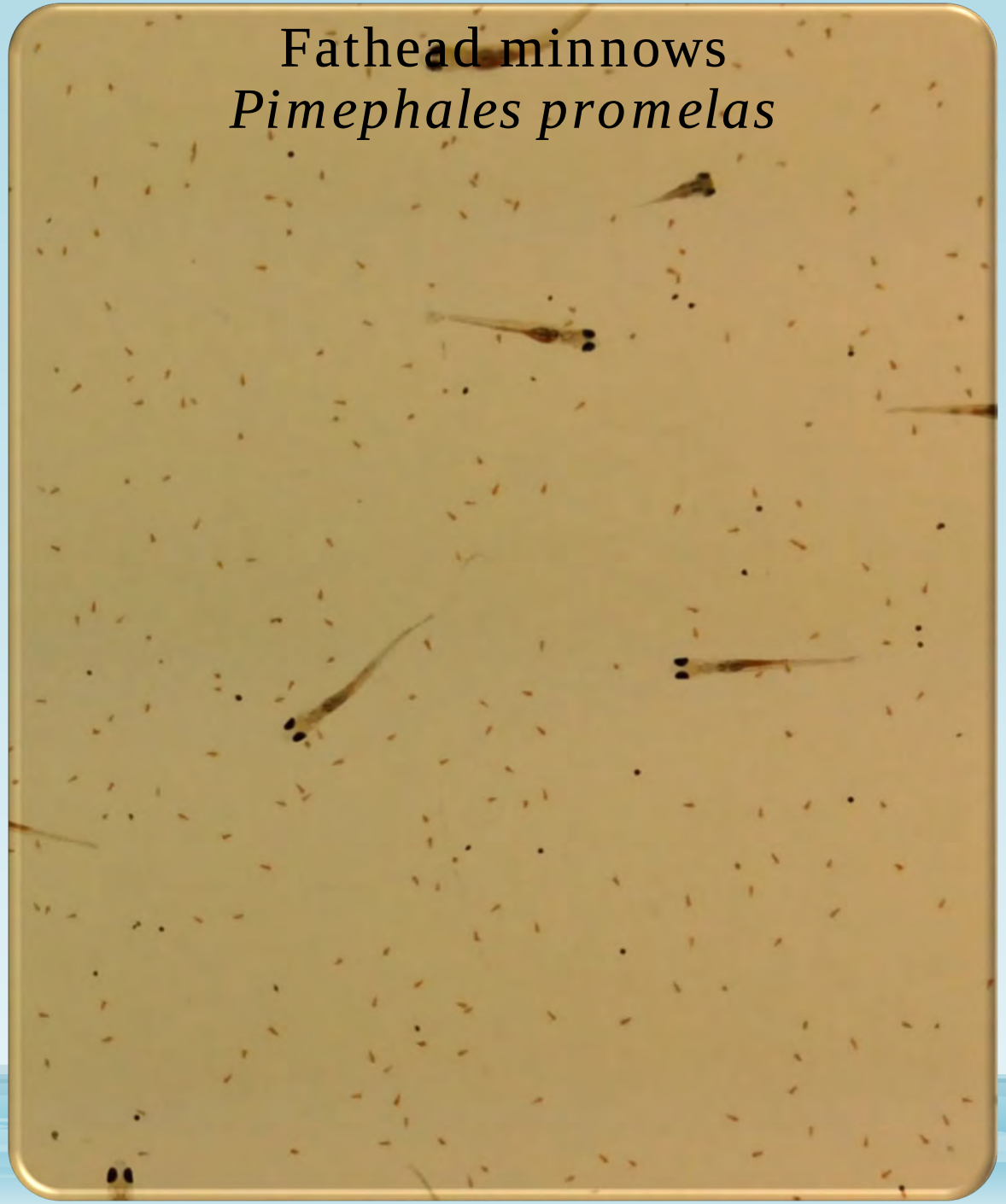
Invertebrates

Mysid shrimp
Americamysis bahia

Water flea
Ceriodaphnia dubia

Vertebrates

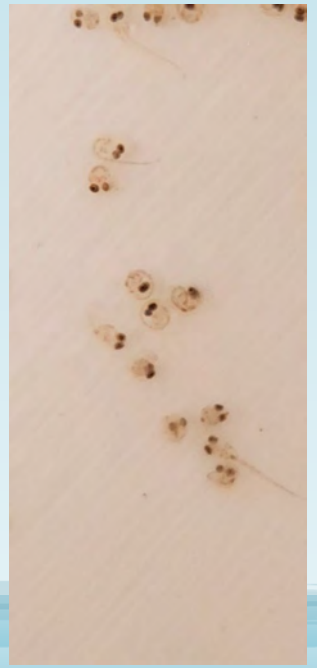


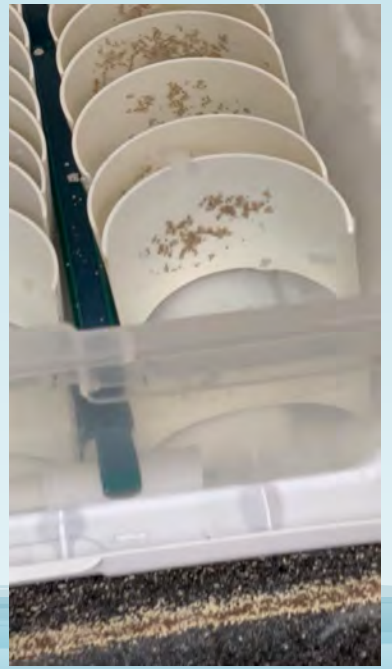


Pimephales Culture

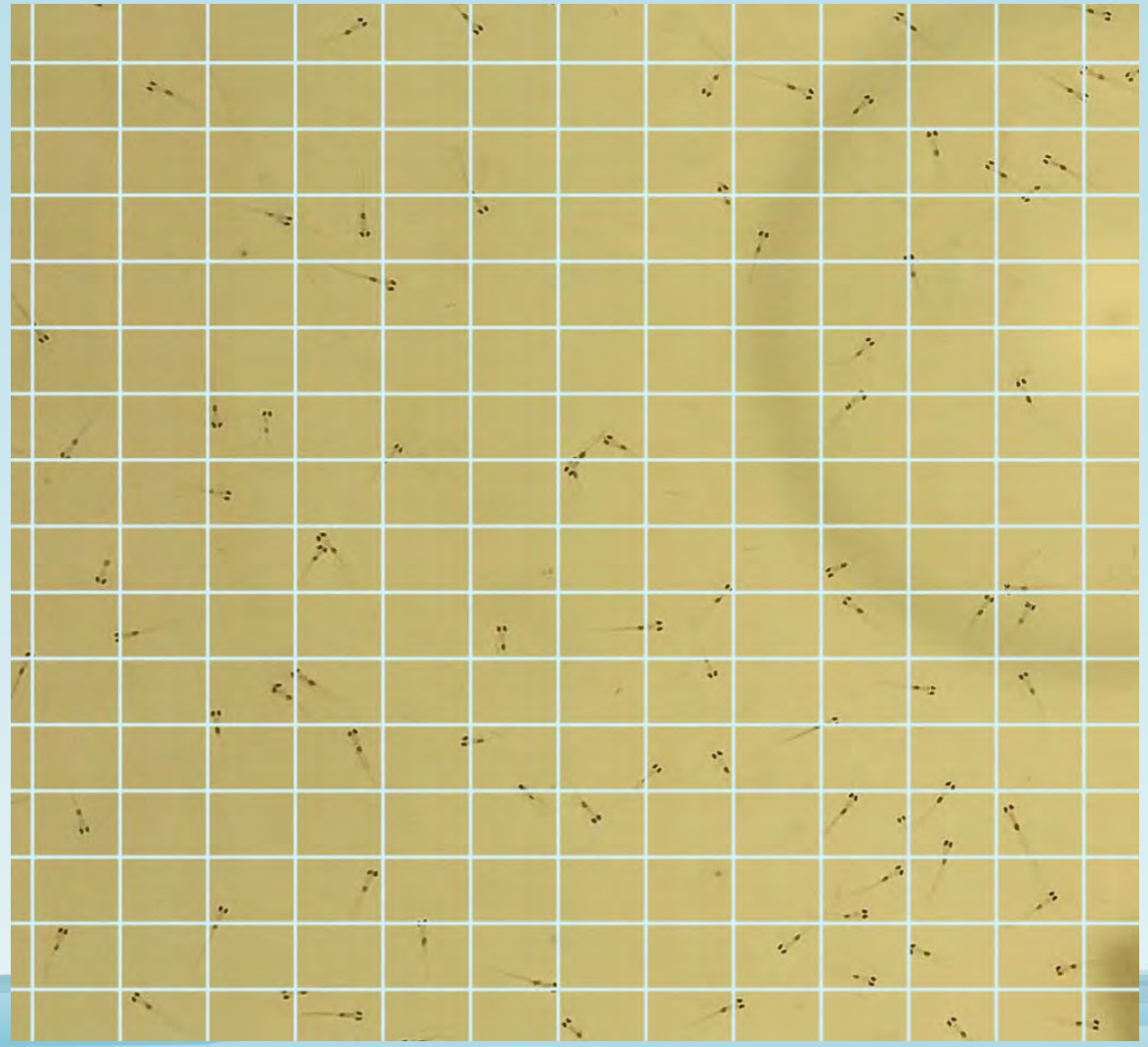
Pimephales Culture

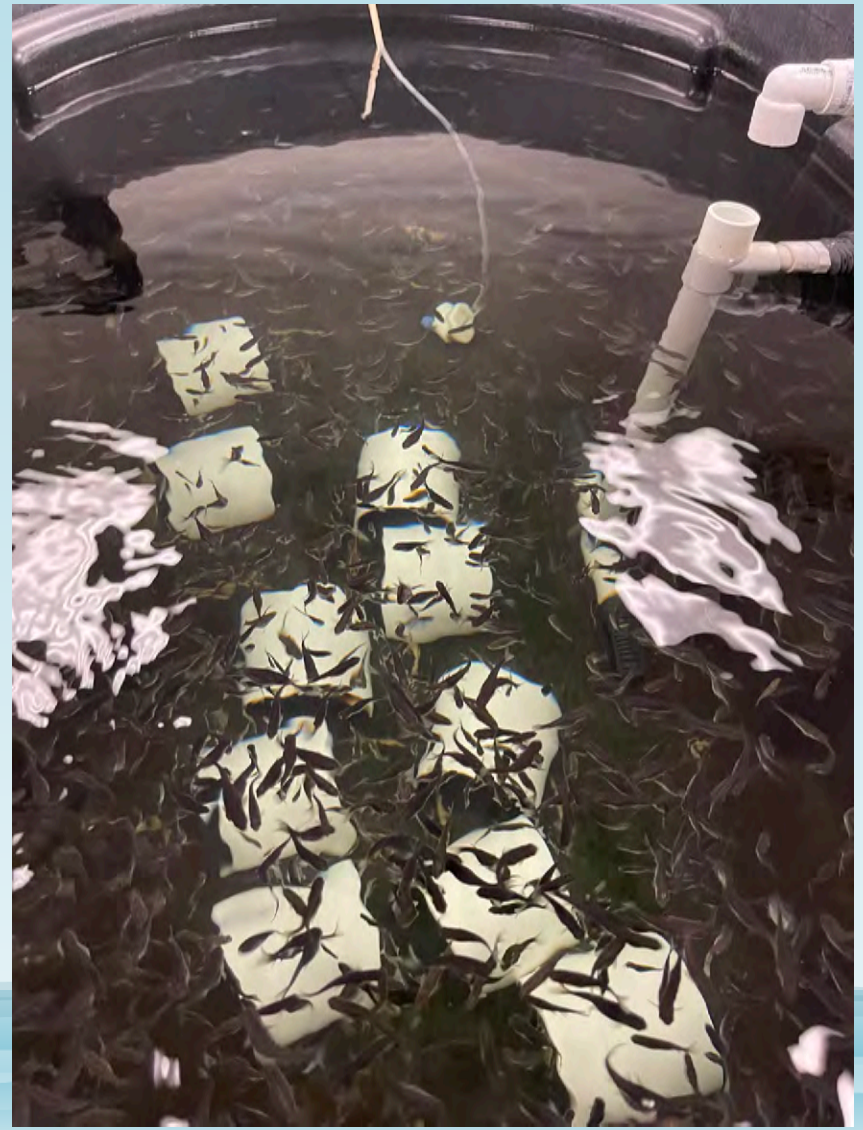
Egg Trays and Larvae





Pimephales Culture Genetic Diversity





Scheduling

Enough space / glassware for testing

Number of organisms needed

Salt water organisms are purchased and each batch needs to be QC checked

Research testing

Reporting deadlines

Sample Kits

Did you receive your kit?

When you get your kits, make sure you have everything you need!

In each cooler:

- Zip lock bag
- Instructions
- Chain-of-Custody
- Custody Seals
- Return Shipping Label
- Trash Bag
- Cubitainer(s)

Make sure the test information we have is correct!

If you have a permit change or new permit, send it to us!

ETS
Environmental Testing Solutions, Inc.

351 Depot Street
Asheville, NC 28801
Phone: (828) 350-9364
Fax: (828) 350-9368

Whole Effluent Toxicity Chain-of-Custody Form

Facility: **Beaufort County**
Chocowinity / Richland WTP
NPDES #: **NC0087491** Pipe #: **001** County: **Beaufort**
Purchase order:

Species: ***Americamysis (Mysidopsis) bahia***
Test type: **Pass/Fail Chronic**
Effluent dilution: **2.8%**
Parameter code: **TGP3E**

Sample information: (to be completed by sample collector)

Composite sample:

Start date: 3-4-19 Time: 11:08am
End date: 3-4-19 Time: 12:15pm
Number of samples per hour: 3
Chilled during collection? Yes
If chilled, specify temperature: 13°C

Sample location: Southside WTP
Volume collected for testing: 1 quart
Number of containers filled for testing: 1
Method of transport to laboratory: Fed Ex
Comments:

Triple rinse sample container with sample before filling. Completely fill the sample container with no air space.

Pack the sample container completely in ice. The sample must be < 6.0°C upon receipt at the laboratory.

You are certifying that these test requirements are correct!

Sample custody: (to be completed by sample collector and facility personnel)

BY SIGNING BELOW, I CERTIFY THAT THE PERMIT AND TEST REQUIREMENTS IDENTIFIED ON THIS FORM ARE ACCURATE

Sample collected by:

Print	Signature	Date and time
Michael Asby	Michael Asby	6-1-20 9:58am

Relinquished by:

Print	Signature	Date and time
Michael Asby	Michael Asby	6-1-20 11:30am

Received by:

Print	Signature	Date and time
FedEx		06.01.20

Relinquished by:

Print	Signature	Date and time

Received by:

Print	Signature	Date and time
		"

Sample receipt information: (to be completed by ETS personnel)

Relinquished to ETS by:

Print	Signature	Date and time
FedEx		06.02.20 1015

Received at ETS by:

Print	Signature	Date and time
KL	"	06.02.20 1015

Custody seals intact?: [✓] Yes [ ] No [ ] Not used

Samples received in good condition?: [✓] Yes [ ] No

Tracking number: 462235112020

Sample temperature upon receipt at ETS (°C): 2.9 C

Total residual chlorine upon receipt at ETS: [ ] Present [✓] Absent

(DPD Presence/Absense Indicator, MDL = 0.10 mg/L)

Project number: 15134 **Sample number:** 20060201

Comments:

Sample Preparation

- Sample warmed
- Sample salted
- Sample diluted to permit limit

Warming Samples

Aliquot warmed to 25.0 ± 1.0ºC

Salting Samples

Saltwater tests: salinity adjusted to 25.0 ± 1.0 ppt

Dilution Water

Deionized water
with salts added

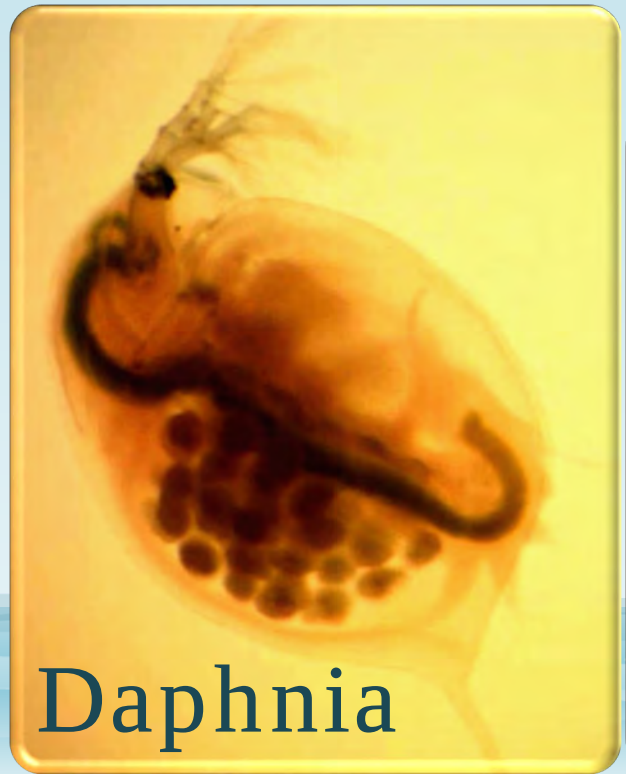
If Present, Other Organisms Removed

Competition for food

Confusion with testing organisms


Ostracod


Moina


Daphnia


Copepod

What freshwater invertebrate is used in NC permits?

A) *Pimephales promelas*
B) *Menidia beryllina*
C) *Ceriodaphnia dubia*
D) *Americamysis bahia*

Basic Chemical Analyses

pH

Dissolved Oxygen

Conductivity

Salinity

Total Residual Chlorine

Controlled Test Conditions

25.0 ± 1.0°C

16-hours light
8-hours dark

Light
50–100 ft-c

Randomized

Timer Verification Quarterly

Verify correct time and photoperiod

Luminosity Verified Quarterly

Verify light intensity on each shelf

Light meter verified against separate meter

Randomization Templates

All tests randomized to eliminate temperature/light artifacts

Templates created using a statistical program

Temperature

Min/Max thermometer recorded daily

Temperature recorded at two locations, twice a day

Thermometers verified quarterly against NIST

NIST thermometer verified annually by outside vendor

Organism Age

Varies to target either a specific developmental stage or sensitive time period

Ceriodaphnia
< 24-hours old

Mysid shrimp
Acute: 1-5 days old
Chronic: 7-days old

Fathead minnows
Acute: 1-14 days old
Chronic: < 24-hours old

Inland silversides
Acute: 9-14 days old
Chronic: 9-11 days old

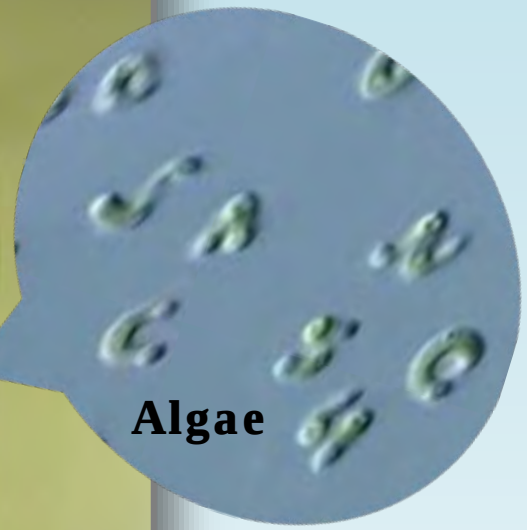
Test Conditions

Varies with each type of test to give the best statistical comparison

Ceriodaphnia Acute	Pass/Fail	Full-range
Concentrations tested	1	5
Replicates	4	4
Number of organisms per replicate	10	5
Minnow and Mysid Acute	**Pass/Fail**	**Full-range**
Concentrations tested	1	5
Replicates	4	2
Number of organisms per replicate	10	10
***Ceriodaphnia* Chronic**	**Pass/Fail**	**Full-range**
Concentrations tested	1	5
Replicates	12	10
Number of organisms per replicate	1	1
Minnow Chronic	**Pass/Fail**	**Full-range**
Concentrations tested	1	5
Replicates	4	4
Number of organisms per replicate	10	10
Mysid Chronic	**Pass/Fail**	**Full-range**
Concentrations tested	1	5
Replicates	8	8
Number of organisms per replicate	5	5

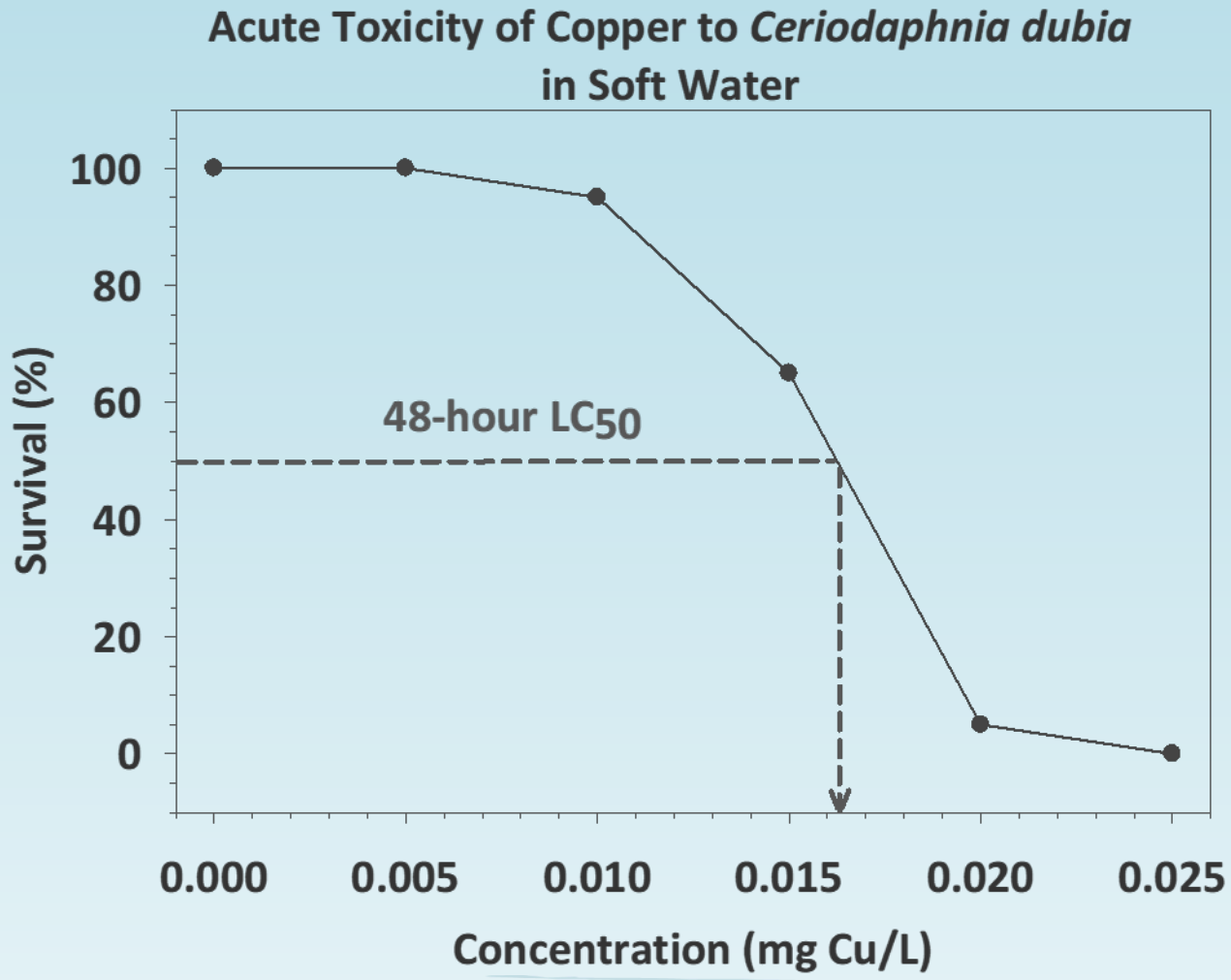
Feeding

Acute tests
are not fed



Chronic tests
are fed daily

Acute Tests: Pass/Fail or LC_{50}

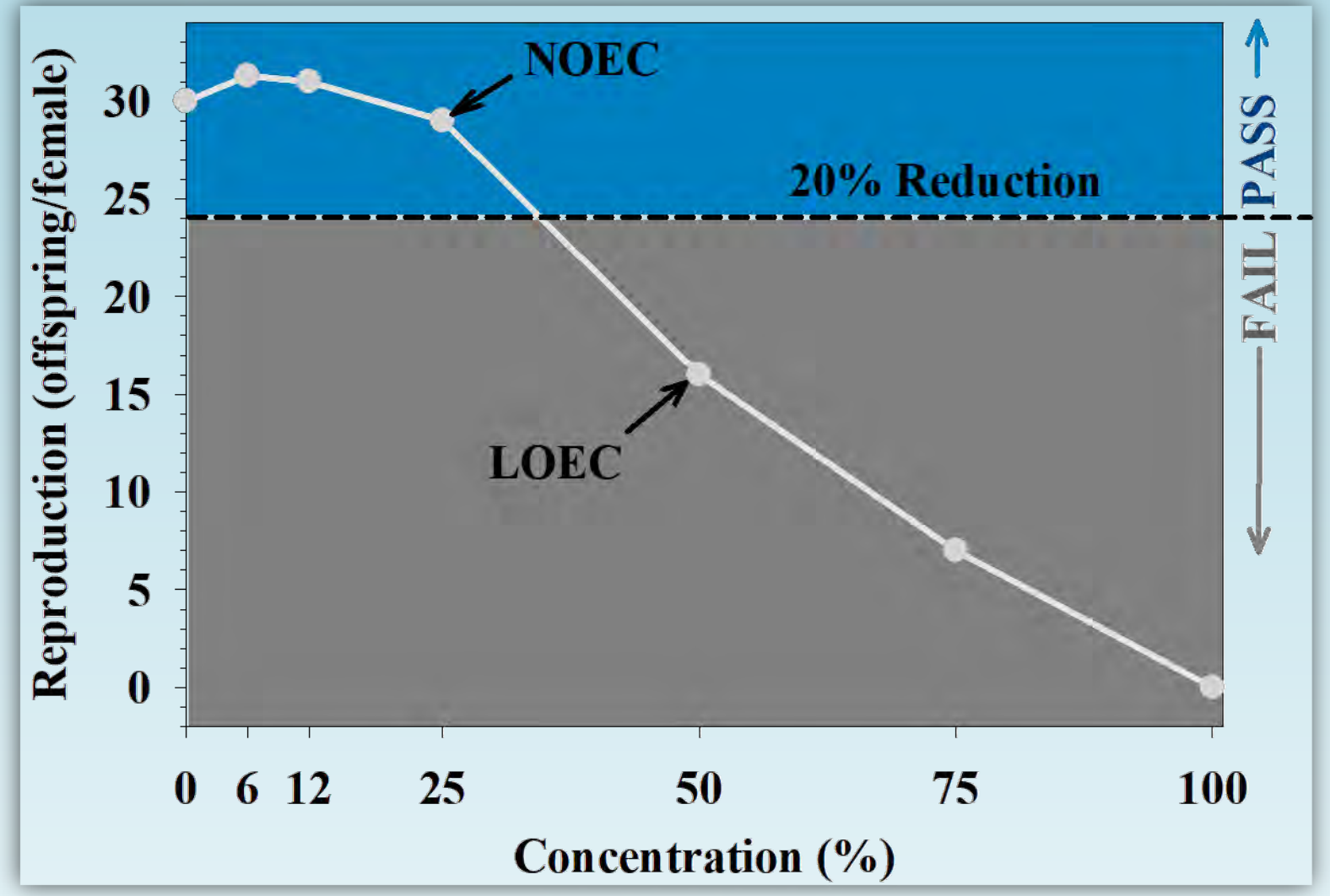


Chronic Tests: Pass/Fail or Chronic Value (ChV)

Minnow and Mysid Tests
Survival and Growth

Ceriodaphnia Tests
Survival and Reproduction

Chronic Tests: Pass/Fail or Chronic Value (ChV)



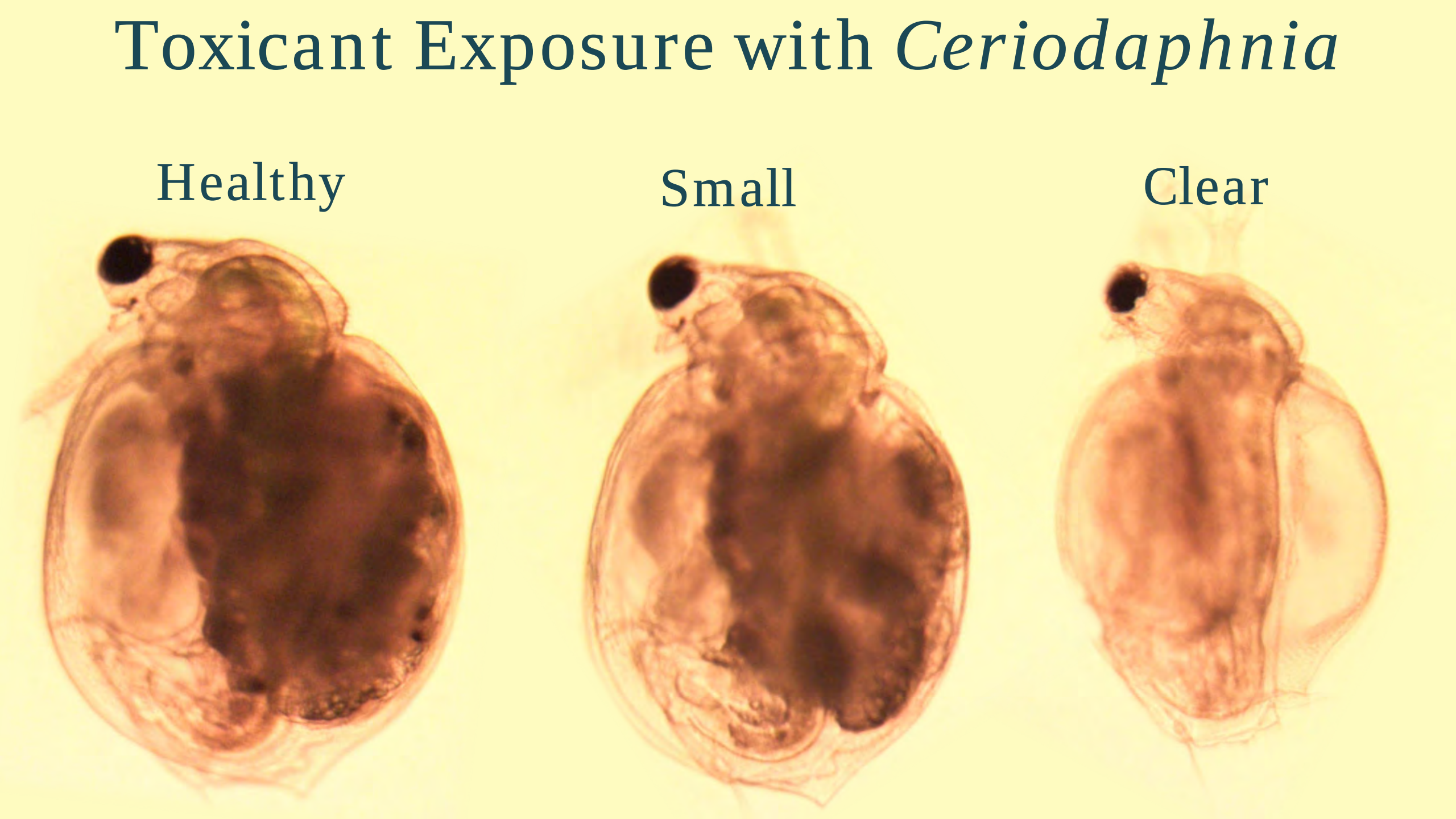
$$ChV = \sqrt{NOEC \times LOEC} = \sqrt{25 \times 50} = 35.4\%$$

Toxicant Exposure with *Ceriodaphnia*

Healthy

Small

Clear

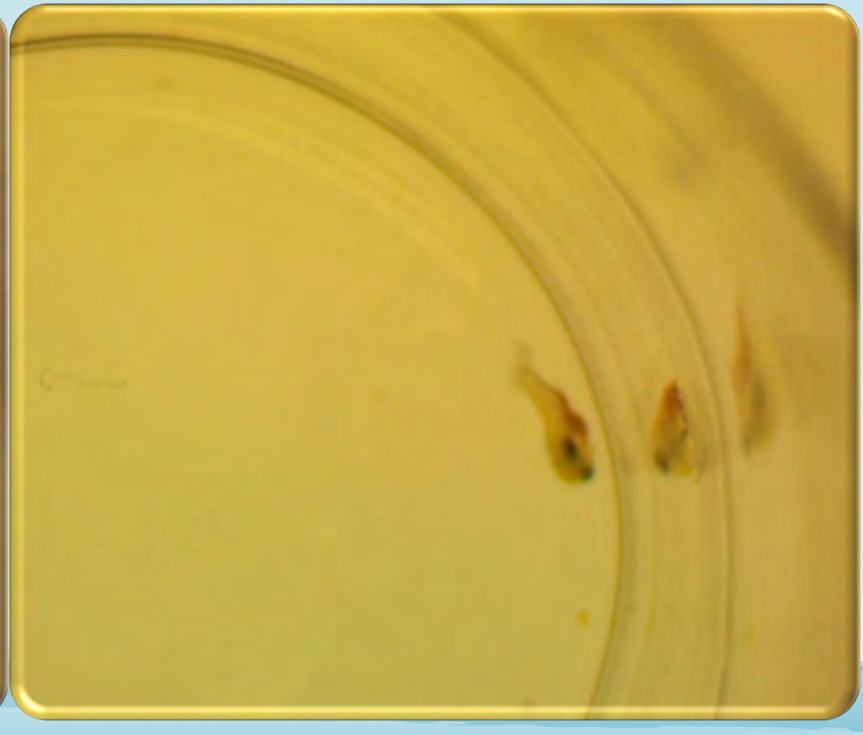


Toxicant Exposure with Minnows

Healthy

Small

Stressed



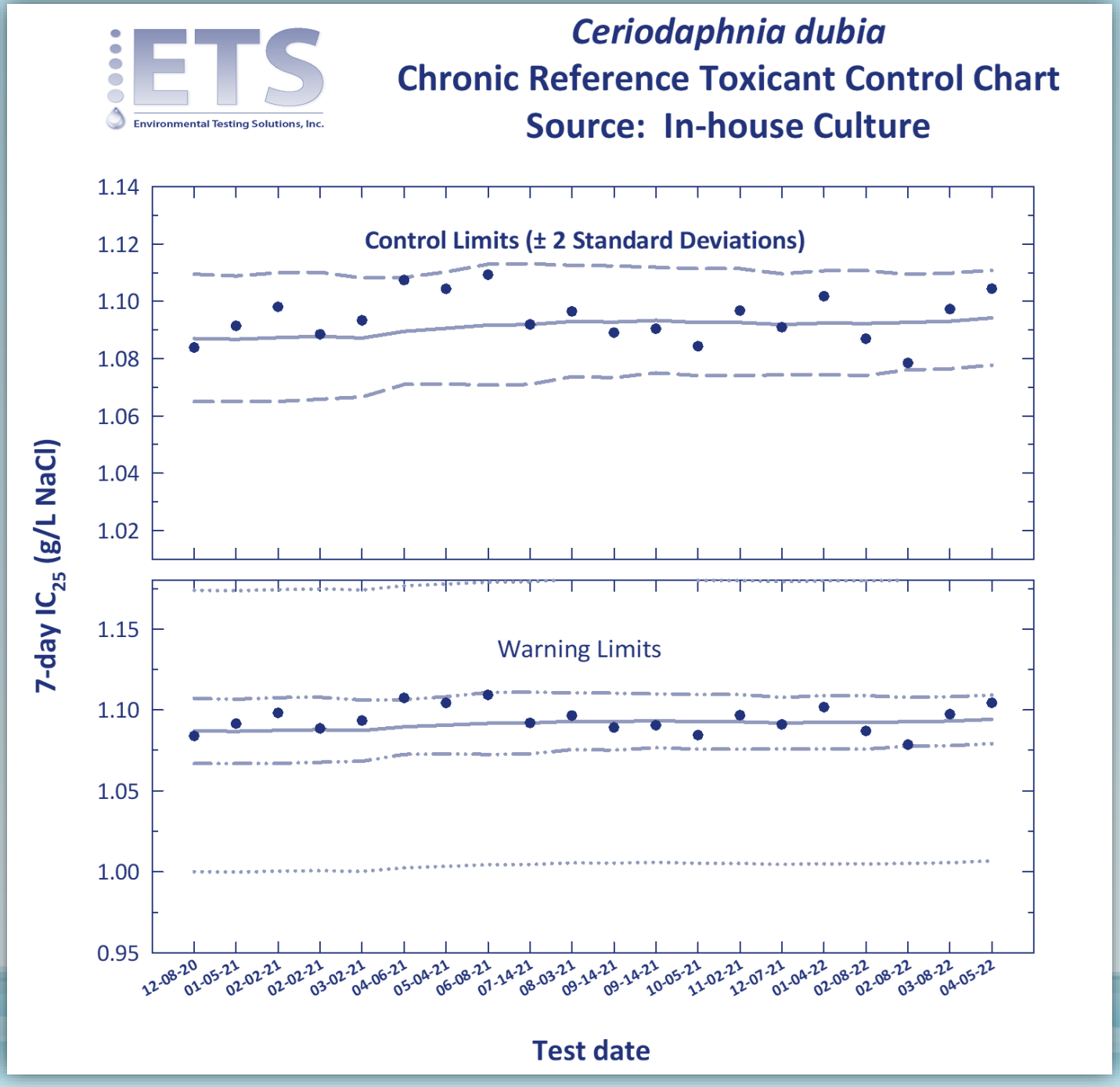
QA/QC Important Part of Toxicity Testing

Must follow the regulatory or government agency that has the most stringent requirement

Temperature, pH, Dissolved Oxygen, Conductivity, Salinity, Alkalinity, Hardness, Chlorine, Balances, Pipettes, Autoclave, Dish Washing Soap Checks.....

QC Documentation

- General lab QC
- Testing conditions
- Criteria for the quality of water and food
- Health and sensitivity of organisms
- Consumables
- Transfer volumes
- Multiple weigh studies
- Taxonomy
- PE studies



Questions?

Hurricane Helene, September 27

September 27

Began sweeping water into sumps in the basement

Started living at the laboratory

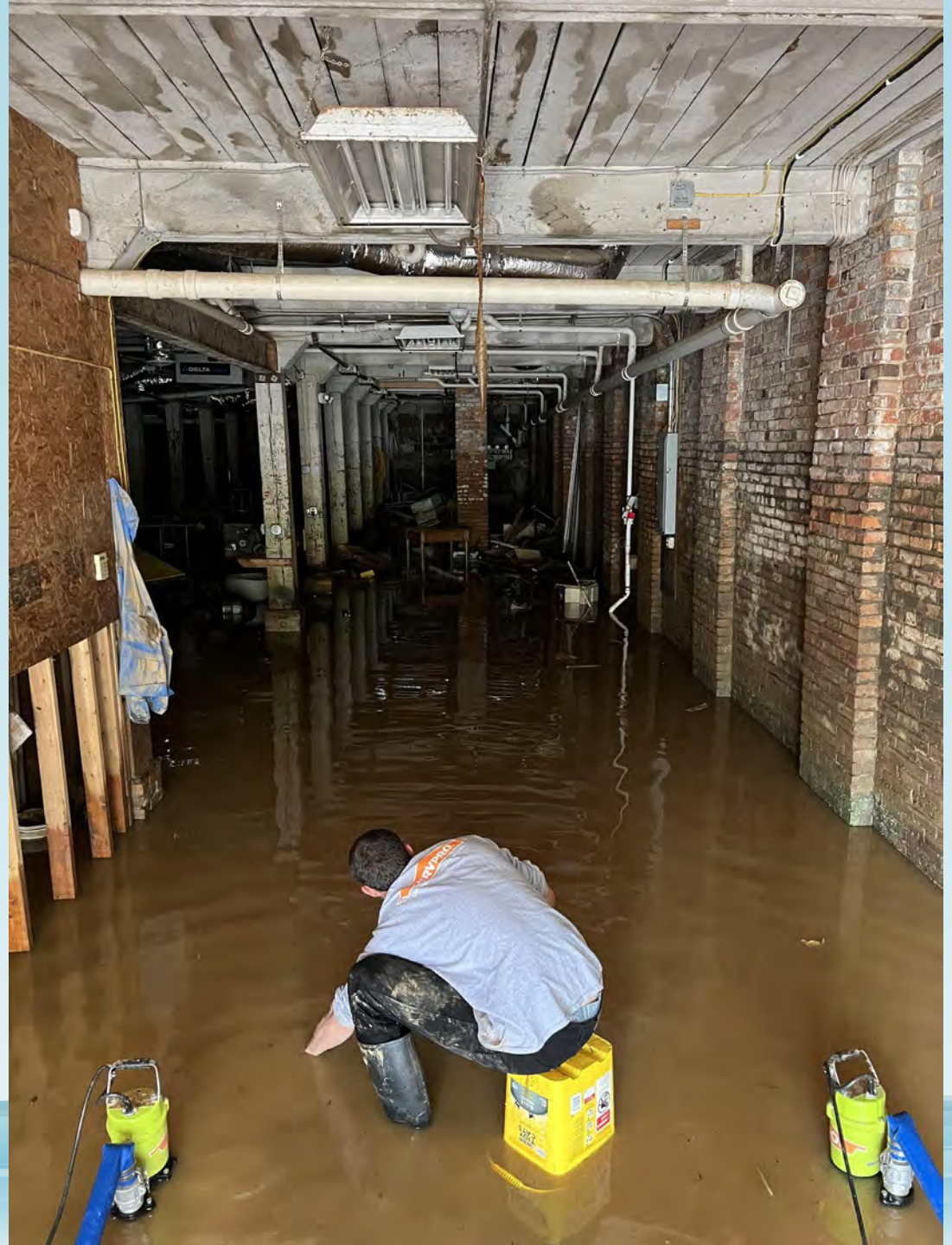
Day 1, September 28

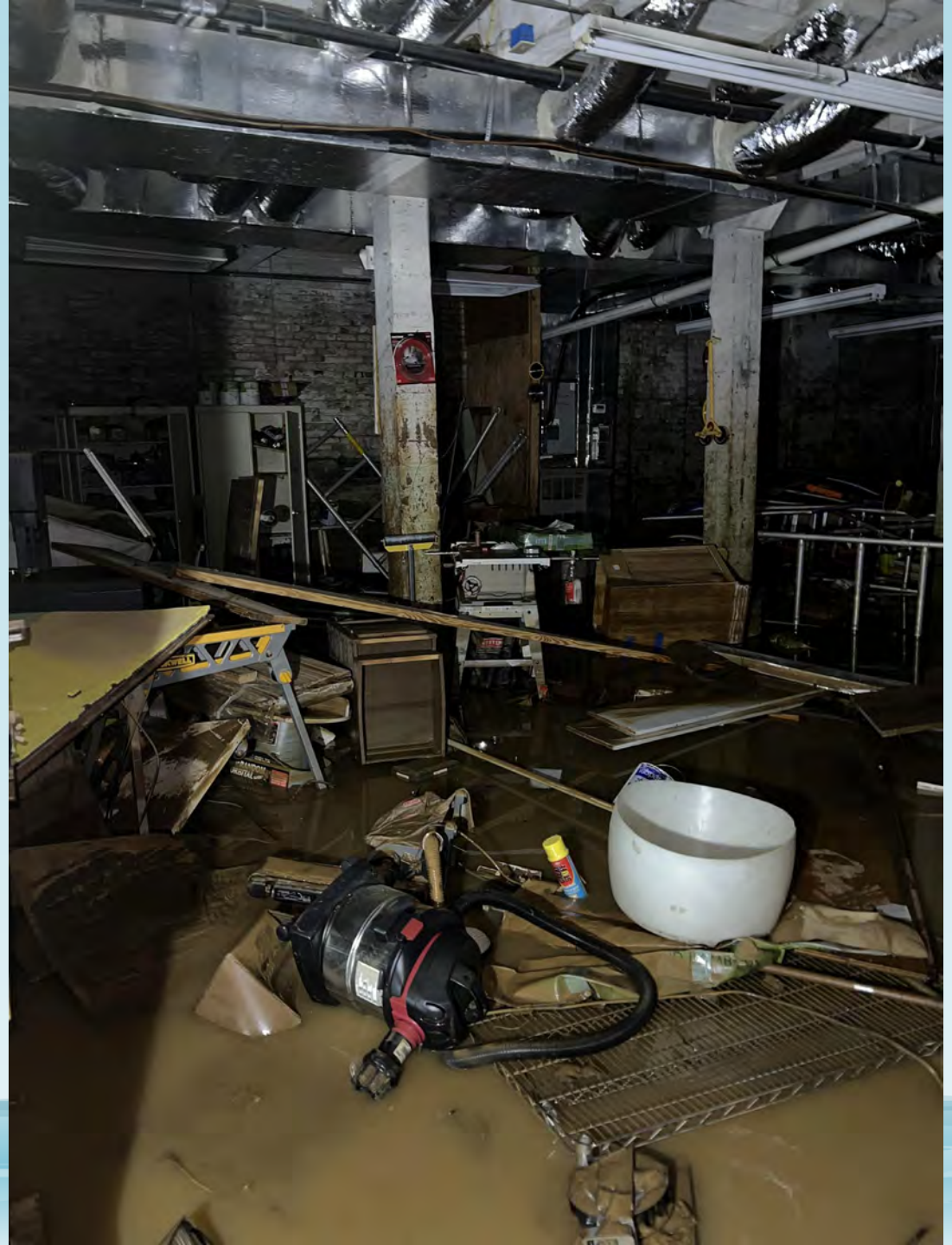

ETS

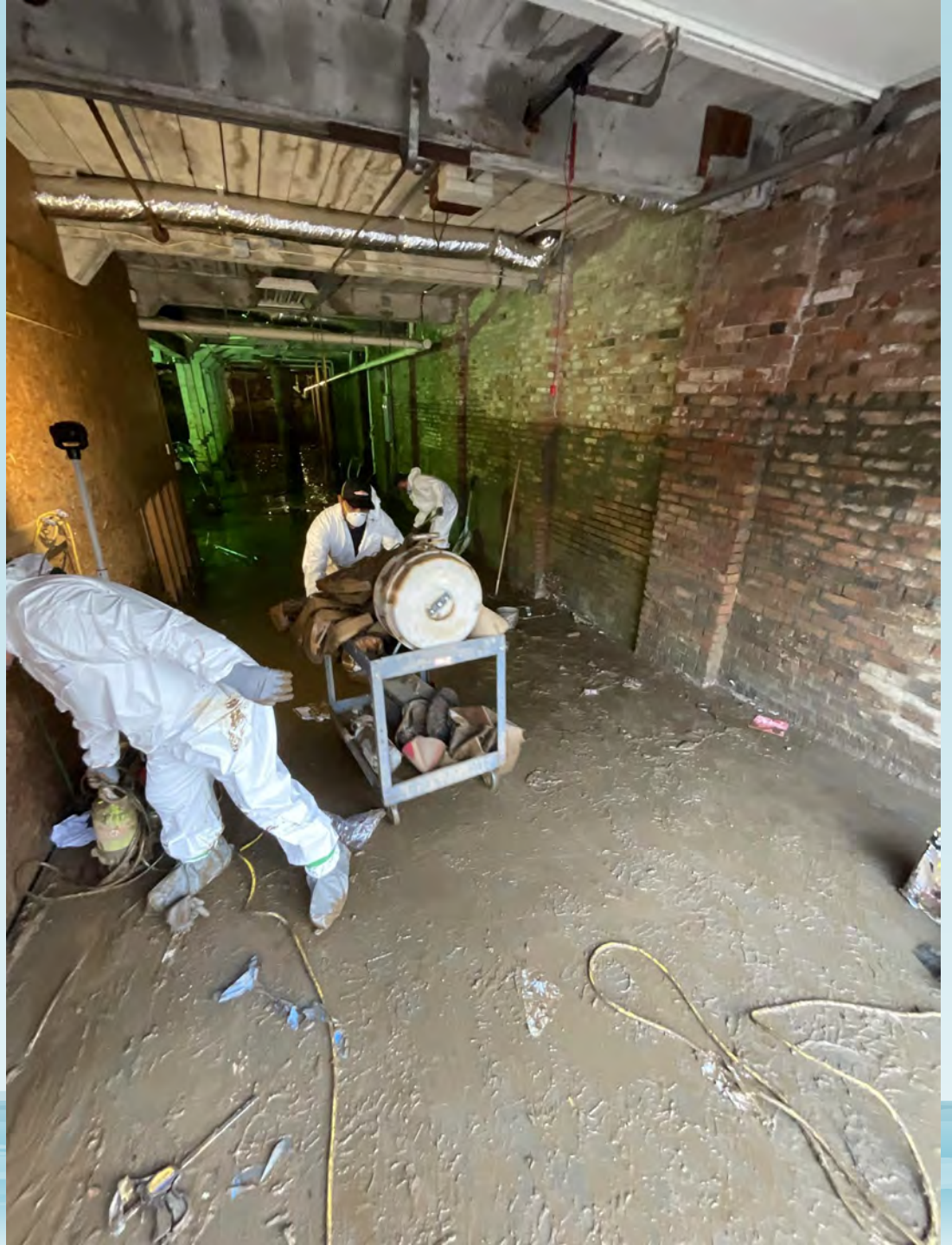
Day 2, September 29: EnviroChem brought Food/Supplies, Gas, Generators

Day 3,
September 30:

SERVPRO







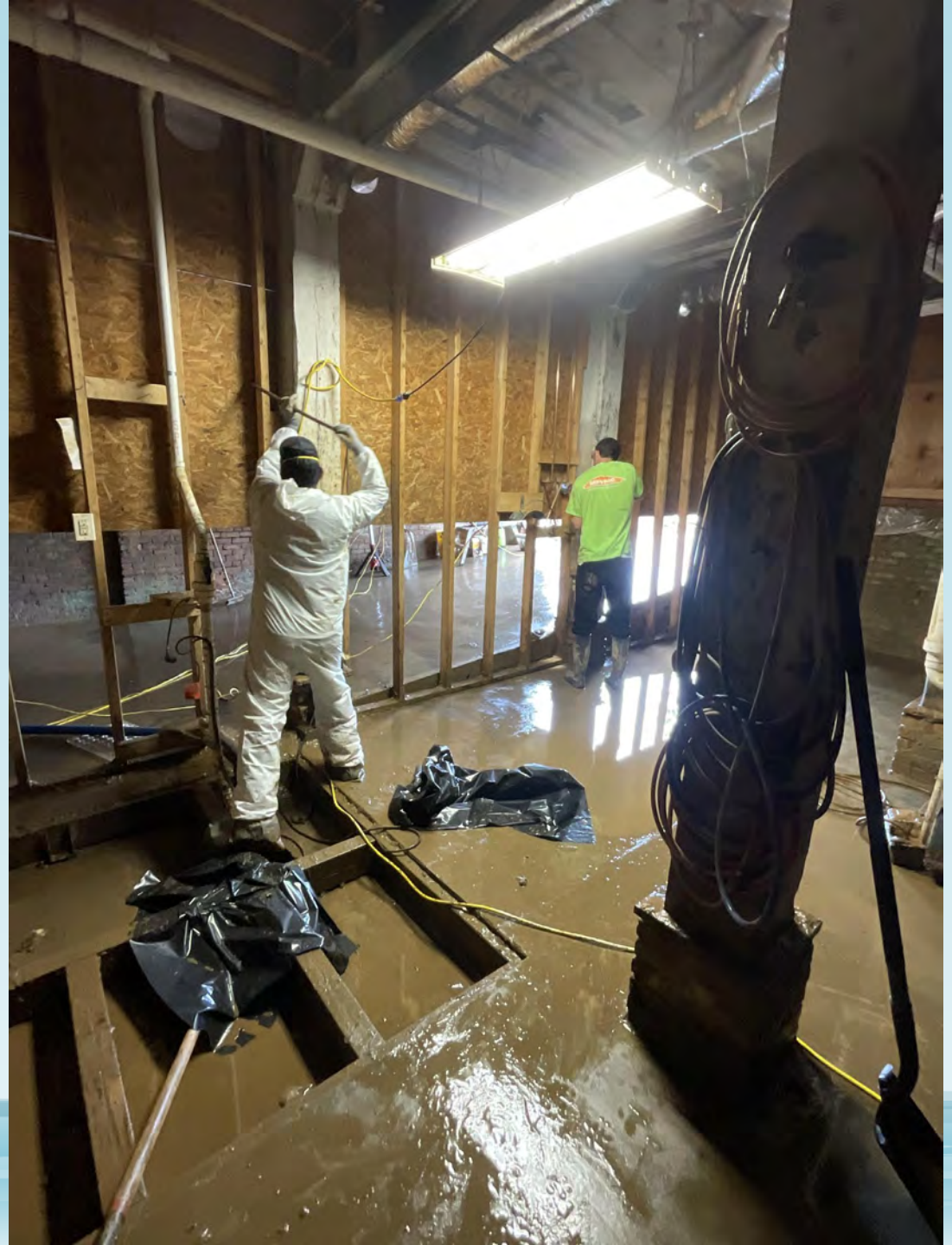

PRIVATE
PROPERTY
NO TRESPASSING

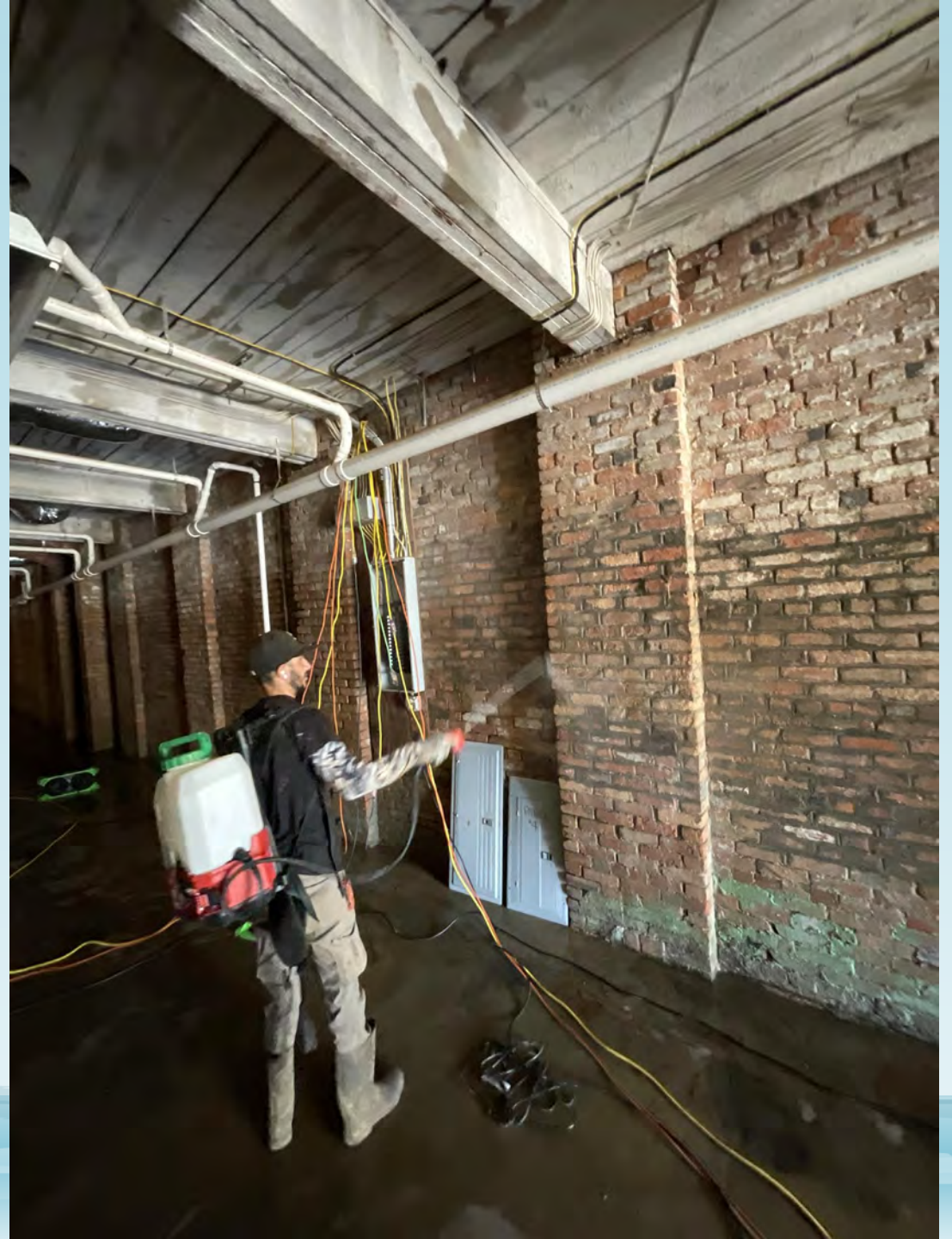

DELTA

Day 7, October 03: Eastman Chemical delivered supplies and 1100 gallons of DI water

Day 8,
October 04

SERVPRO

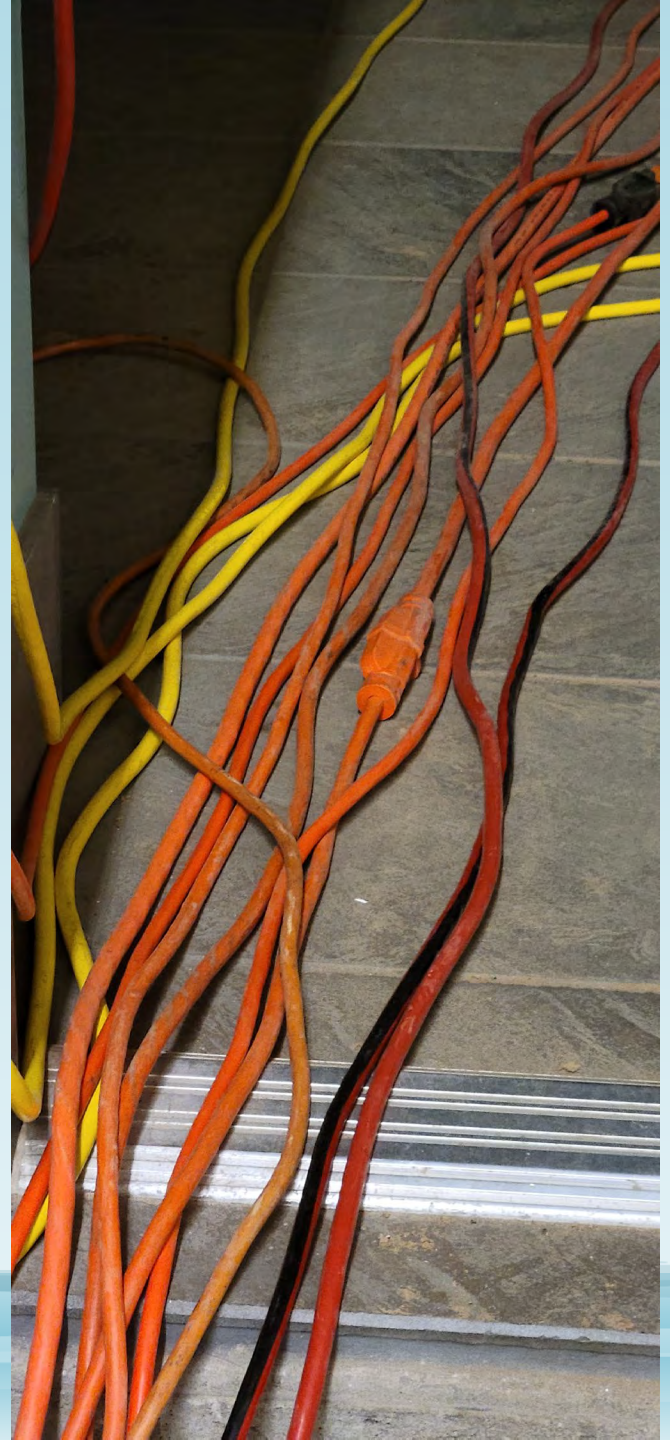




Day 08,
October 04
Power restored to metal building: fish laboratory

Day 10,
October 06
Drinking water testing started to remove boil water notices

Day 11,
October 07
Jaydon started back to work



Day 11, October 07: SERVPRO Complete, electrical work began

October 11
Duct to heat/air units cleaned
October 14
Replaced heat pump

October 15
Replaced hot water heater

<u>Day 18</u>, October 14

All other employees back to work

Resumed all wastewater and drinking water testing

***Ceriodaphnia* and Mysid acute/chronic tests**

Began collecting eggs from minnow culture

Water restored!!

Internet/phone partially restored

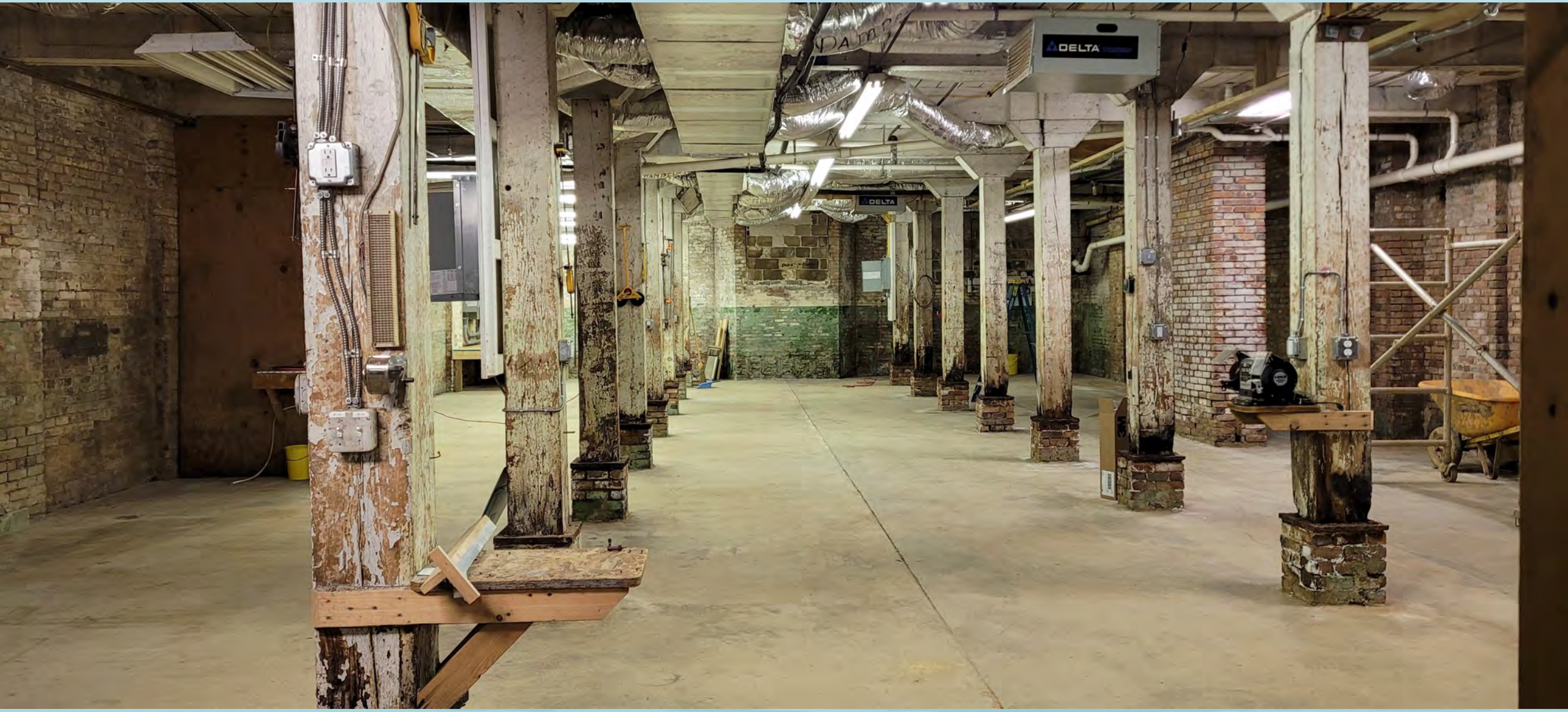
Day 24, October 20
Generator panel replaced, but could not turn on power
Day 25, October 21
Ceriodaphnia and minnow acute/chronic tests
Day 28, October 24
Power restored to main laboratory
Day 29, October 25
Security system restored

Day 31, October 27
Kelley and Jim went home!!

November 06
Eastman Chemical delivered another 550 gallons of DI water
January 08
Debris removed from back of building
January 16
Trailer returned to Eastman Chemical,
transition complete to our DI water
March 18
Generator restarted

October 24
Power restored to main laboratory

November 04
2nd heat pump replaced

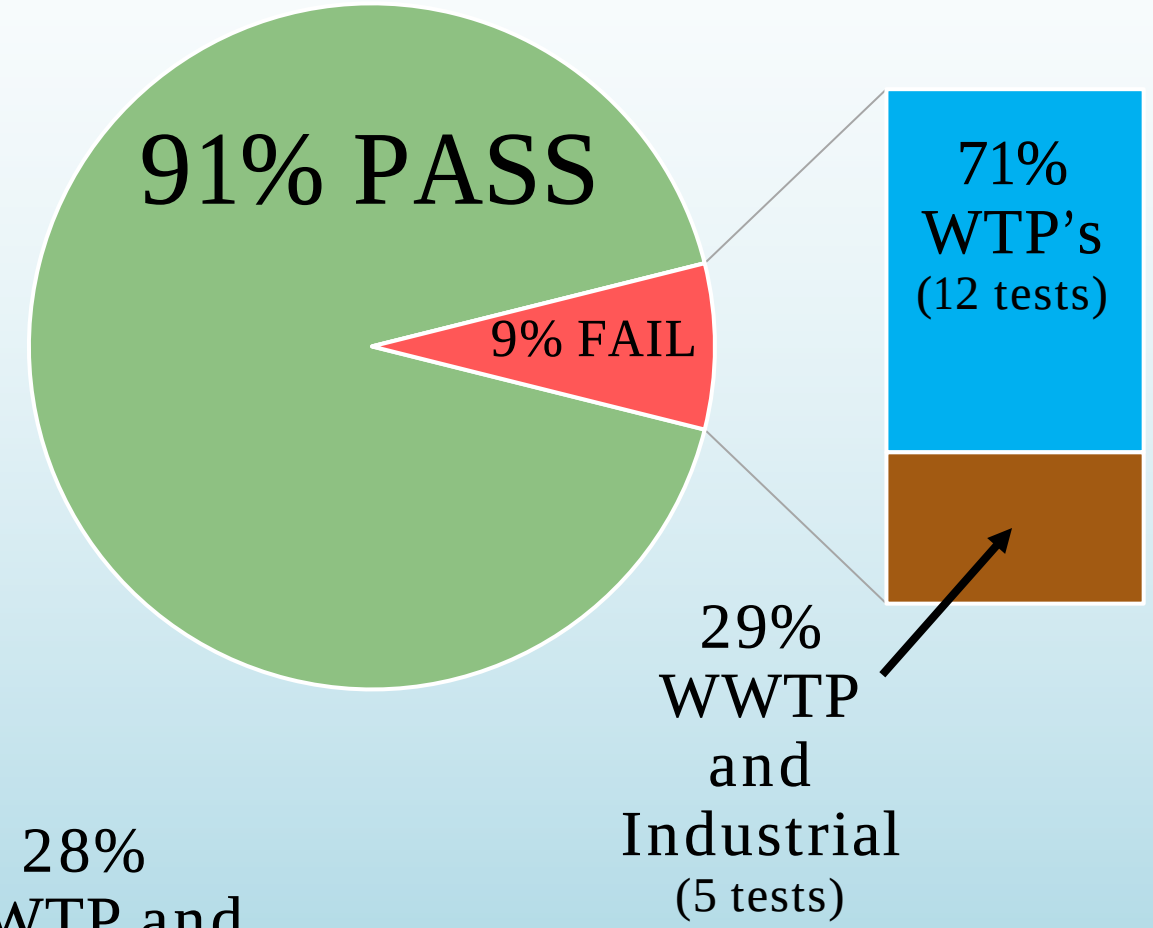

DELTA
DELTA

Test Failures

2024 Test Failures

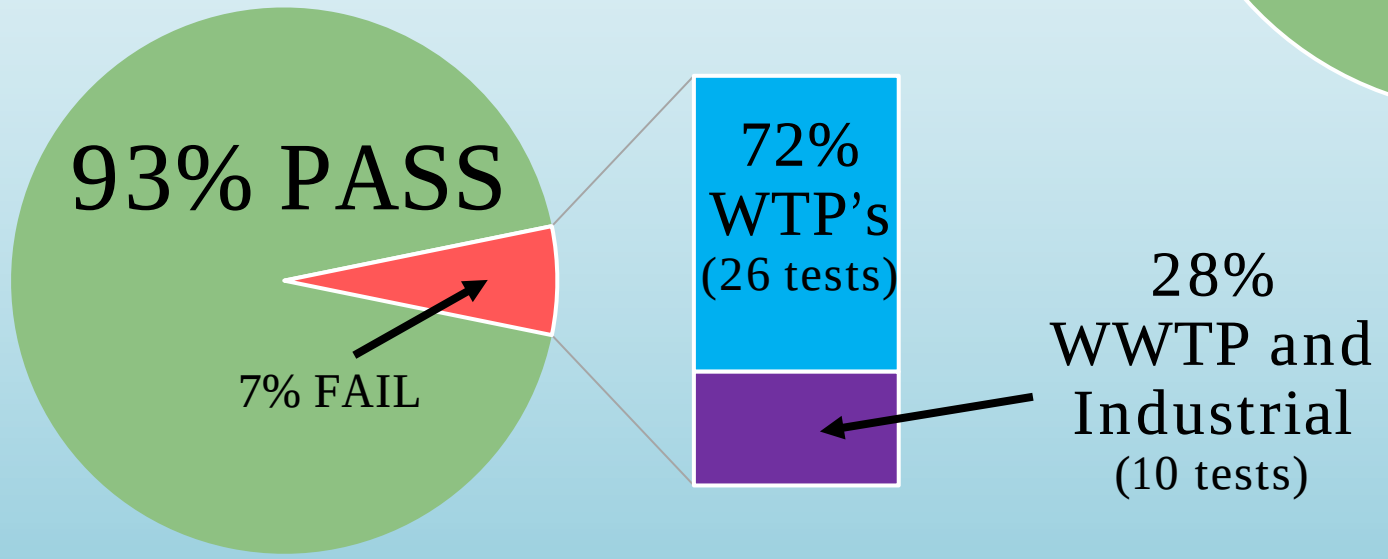
Pass/Fail Acute

(201 tests)



Ceriodaphnia Pass/Fail Chronic

(527 tests)



Conventional WTP's

Coagulation, flocculation and sedimentation followed by filtration and disinfection

Primary concerns:

- Chlorine (chloramine)
- Dechlorination
- Metals
- Polymers

Chlorine

Total residual chlorine < 100 ppb

Chloramine 12 ppb

Chemical Analyses:

Concentration	Analyst	Initial	Final
Control SSW	pH (S.U.)	7.75	7.43
	Dissolved oxygen (mg/L)	8.1	8.1
	Conductivity (µmhos/cm)	152	
	*Alkalinity (mg/L $CaCO_3$)	35	
	*Hardness (mg/L $CaCO_3$)	42	
	*Temperature (°C)	24.F	24.9
Test Concentration	pH (S.U.)	7.82	7.97
	Dissolved oxygen (mg/L)	7.8	8.1
	Conductivity (µmhos/cm)	4186	
	*Temperature (°C)	24.9	24.9
100%	pH (S.U.)	7.80	
	Dissolved oxygen (mg/L)	7.8	
	Conductivity (µmhos/cm)	530	
	*Total residual chlorine (mg/L)	0.621	

Test Organism Information:

Organism Source:	Aquatox, Inc.
Batch (ATOX Batch Pp):	07-07-14
Age (1 to 14 days old):	2 DAYS OLD
Date and time organisms were born between:	07-07-14 1600-1700
Average transfer volume:	0.2542 mL
Transfer bowl information:	pH (S.U.): 7.85
	Temperature (°C): 25.1

EPA loading requirement for freshwater species of < 0.40 g/L at 25.0°C has been documented by ETS to never be exceeded using 1 to 14 day old *P. promelas*.

*Analyst identified for each day, performed pH, dissolved oxygen and conductivity measurements only. Temperatures performed at the time of test initiation or termination by the analyst performing the toxicity test. Alkalinity, hardness and total residual chlorine performed by the analysts identified on the test specific bench sheets and transcribed to this bench sheet.

Survival Data **(number of living organisms):**

Hours	Control				Test Concentration			
	Replicate				Replicate			
	A	B	C	D	E	F	G	H
0 Initiation	10	10	10	10	10	10	10	10
24 Termination	10	10	10	10	0 10d	0 10d	0 10d	0 10d
	Mean survival: 100%				Mean survival: 0%			

Comment codes: d = dead, u = unhealthy, bs = bent spines, s = stressed

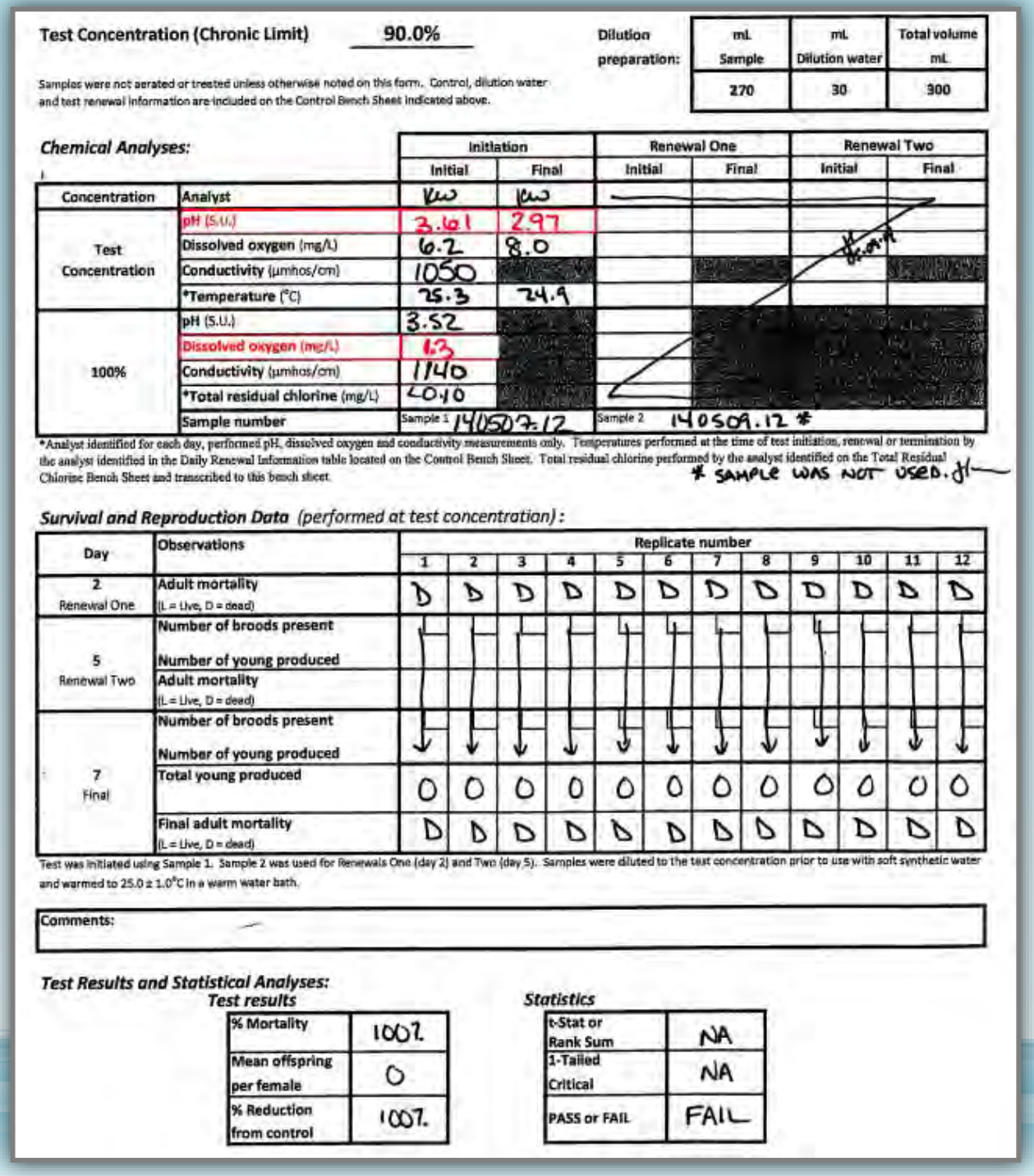
Statistics:

Method	VISUAL INSP
t-Stat or Rank Sum	NC
1-Tailed Critical	NC
PASS or FAIL	FAIL

Dechlorination

Dissolved oxygen
> 5.0 mg/L

Significant pH drop
6.0 – 9.0 S.U.



Test Concentration (Chronic Limit) 90.0%

Samples were not aerated or treated unless otherwise noted on this form. Control, dilution water and test renewal information are included on the Control Bench Sheet indicated above.

Dilution preparation:

mL Sample	mL Dilution water	Total volume mL
270	30	300

Chemical Analyses:

		Initiation		Renewal One		Renewal Two	
		Initial	Final	Initial	Final	Initial	Final
Concentration	Analyst	KW	KW				
Test Concentration	pH (S.U.)	3.61	2.97				
	Dissolved oxygen (mg/L)	6.2	8.0				
	Conductivity (µmhos/cm)	1050					
	*Temperature (°C)	25.3	24.9				
100%	pH (S.U.)	3.52					
	Dissolved oxygen (mg/L)	1.3					
	Conductivity (µmhos/cm)	1140					
	*Total residual chlorine (mg/L)	<0.10					
	Sample number	Sample 1 140507.12		Sample 2 140509.12 *			

*Analyst identified for each day, performed pH, dissolved oxygen and conductivity measurements only. Temperatures performed at the time of test initiation, renewal or termination by the analyst identified in the Daily Renewal Information table located on the Control Bench Sheet. Total residual chlorine performed by the analyst identified on the Total Residual Chlorine Bench Sheet and transcribed to this bench sheet.

* SAMPLE WAS NOT USED. JH

***Survival and Reproduction Data** (performed at test concentration):*

Day	Observations	Replicate number											
		1	2	3	4	5	6	7	8	9	10	11	12
2 Renewal One	Adult mortality (L = Live, D = dead)	D	D	D	D	D	D	D	D	D	D	D	D
5 Renewal Two	Number of broods present	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Number of young produced	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Adult mortality (L = Live, D = dead)	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
7 Final	Number of broods present	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Number of young produced	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
	Total young produced	0	0	0	0	0	0	0	0	0	0	0	0
	Final adult mortality (L = Live, D = dead)	D	D	D	D	D	D	D	D	D	D	D	D

Test was initiated using Sample 1. Sample 2 was used for Renewals One (day 2) and Two (day 5). Samples were diluted to the test concentration prior to use with soft synthetic water and warmed to 25.0 ± 1.0°C in a warm water bath.

Comments:

Test Results and Statistical Analyses:

Test results

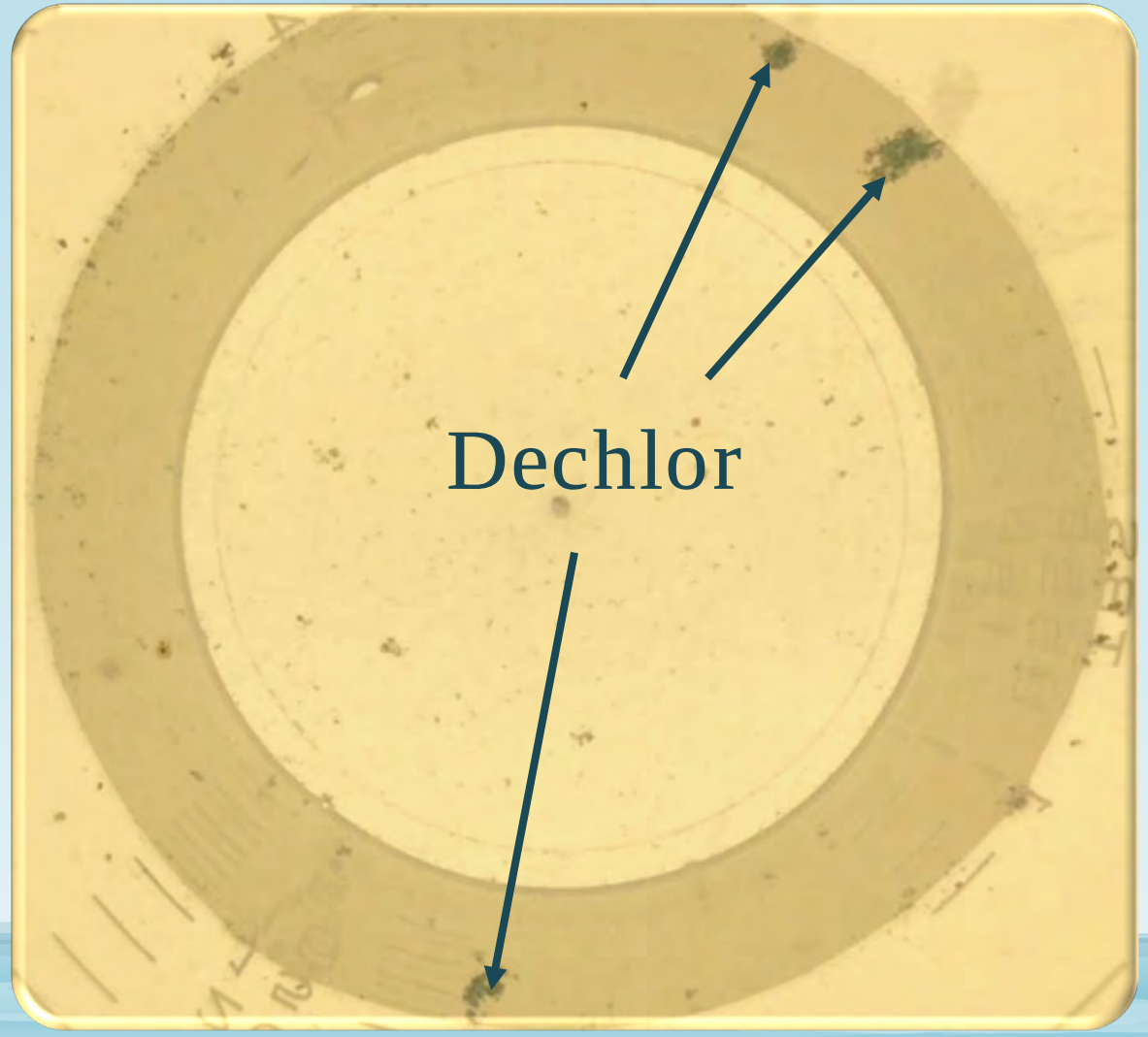
% Mortality	100%
Mean offspring per female	0
% Reduction from control	100%

Statistics

t-Stat or Rank Sum	NA
1-Tailed Critical	NA
PASS or FAIL	FAIL

Balance Chlorine to Dechlorination

Total Residual Chlorine (ppb)	Dechlor (ppb)
50	22
100	41
250	92
500	172
1000	302
1200	341



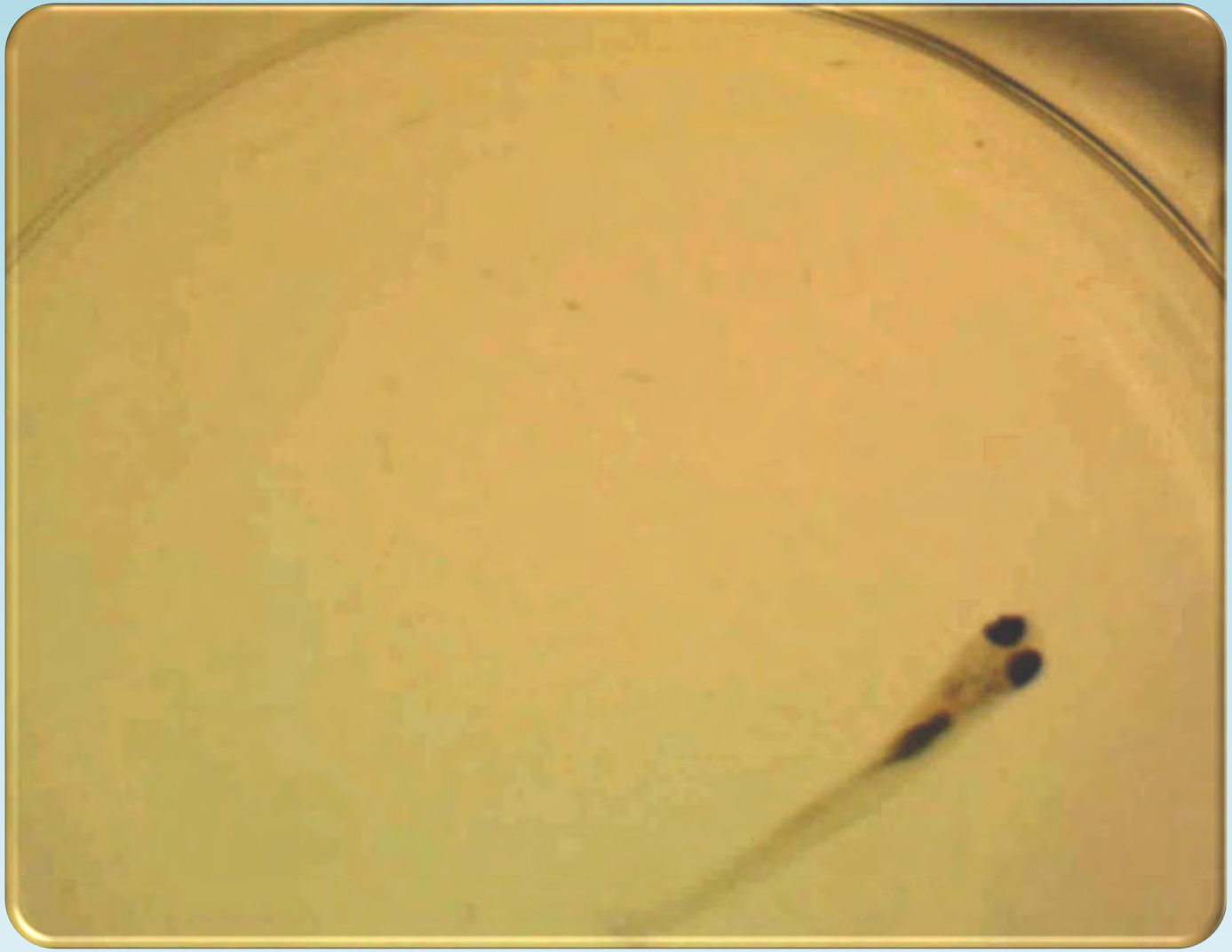
Metals

Sources:

Corrosion inhibitors from drinking water, cooling towers

Runoff from galvanized fences, metal roofs, painted surfaces

Pre-treatment dischargers to WWTP's



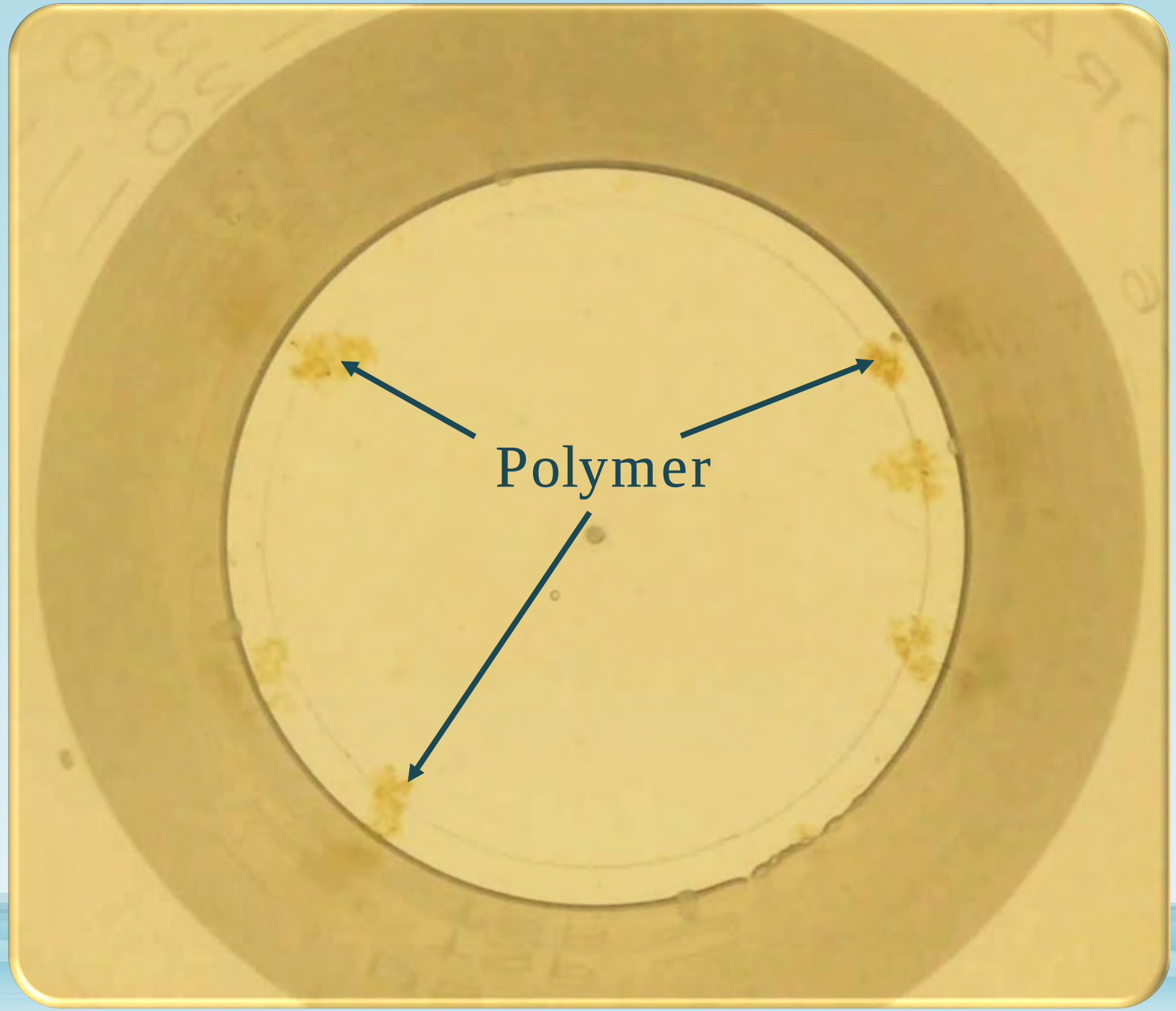
Bent spines in minnows indicates metal exposure

Polymers Differ Greatly

Effectiveness
in binding solids

Toxicity
at application rate

Unbound polymer
will precipitate
food in test cups



Ion Exchange and Membrane Technology WTP's

Ion Exchange: water softener technology
Membrane Technology: reverse osmosis and nanofiltration

Primary concerns:

- Ionic imbalances
- Chlorine
- Dechlorination

Ionic Imbalances with Mysid Shrimp

Effluent discharge differs in the composition of salts in comparison to sea water

Difference does not support the survival of Mysid shrimp

Can be determined by balancing major ions to concentrations found in sea water

Wastewater Treatment Plants

Primary concerns:

- Housekeeping
- Communication
- Industrial waste streams
- Chemical usage
- Other potential issues

Housekeeping / Communication

Know what your employees are doing!

What cleaners are they using?

Use of pesticides / herbicides around the treatment plant

Biocides for root control

External Impacts

Communicate with your town officials

Road deicing – what type?
How will elevated
chloride concentrations impact your
treatment plant?

What chemicals are the local WTP using?
Peroxides, amines, polymers,
corrosion inhibitors

Industrial Waste Streams

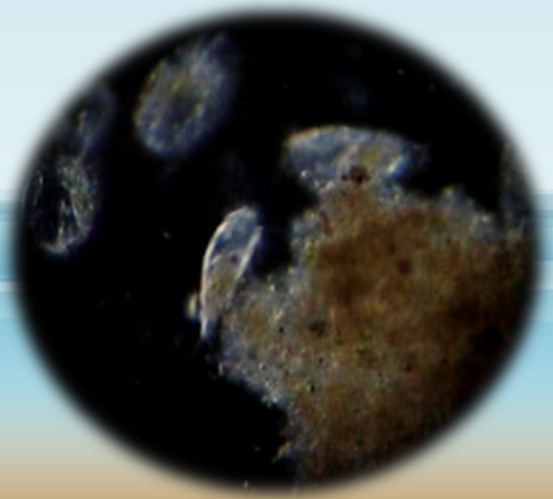
Visit pre-treatment facilities on a regular basis:

- Identify new processes
- Chemical usage and changes
- Potential contaminants in their waste stream

Enforce pre-treatment permit!

Benchtop Testing

Use benchtop tests to screen new industries or waste streams
- Change the abundance of organisms in sludge?
- Cause toxicity?
- Set limits on contaminants through pre-treatment program



Chemical Usage

Change in source or vendor may change the chemical form of the same product

Volume measurement must be adjusted

The lowest bidder may not be the best option

Purity, contamination, percent active ingredients?

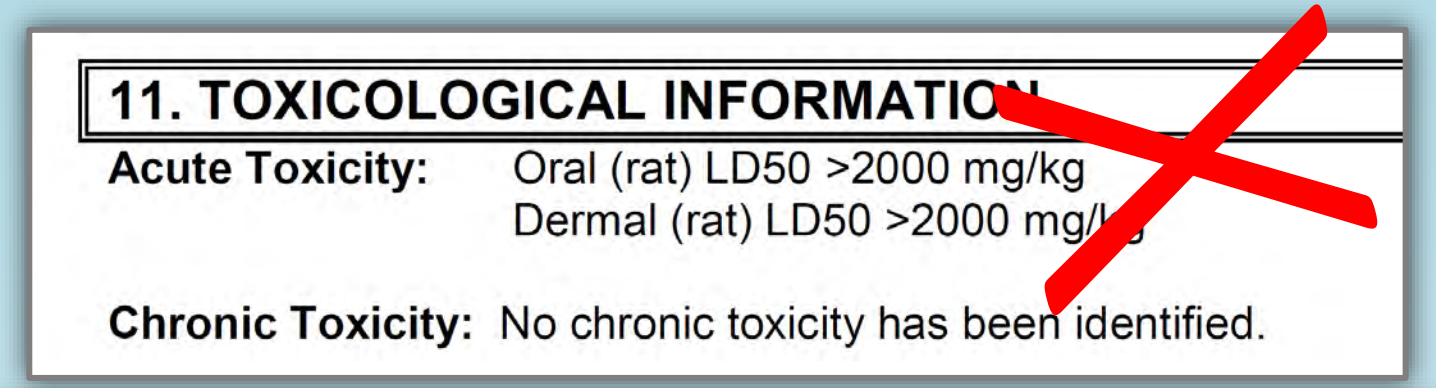
3. COMPOSITION/INFORMATION ON INGREDIENTS		
Synonyms	Polyaluminum chloride, solution	
Chemical Name	**CAS No**	**Weight-%**
Water	7732-18-5	55-85
Aluminum Chloride Hydroxide Sulfate	39290-78-3	15-45

Safety Data Sheets (SDS)

How much product can I use?

What section do I look at?

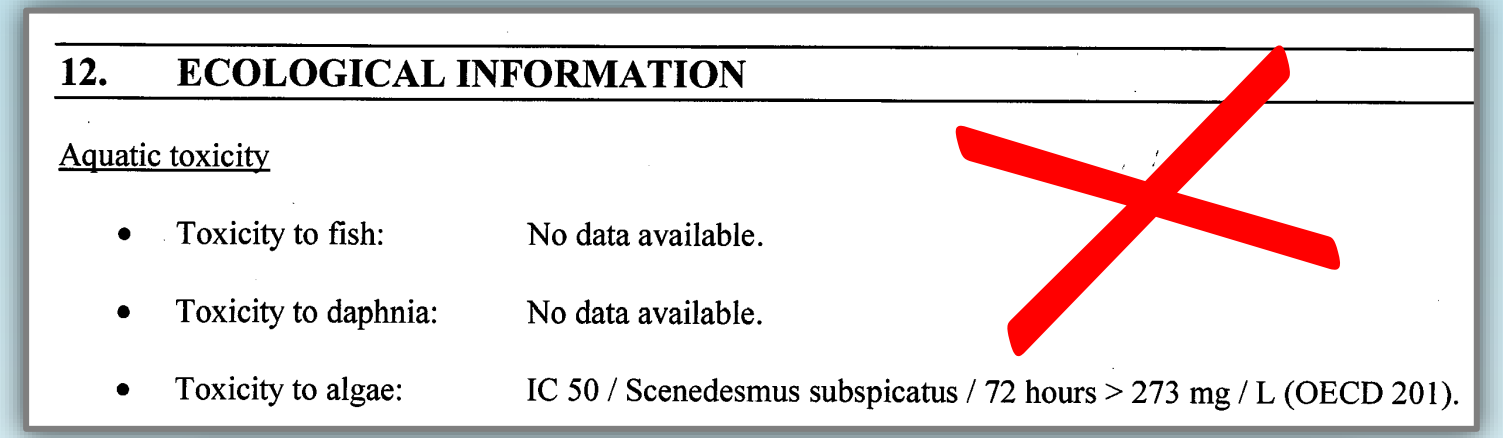
If there is no toxicity data, what do I do?



11. TOXICOLOGICAL INFORMATION

Acute Toxicity: Oral (rat) LD50 >2000 mg/kg
Dermal (rat) LD50 >2000 mg/kg

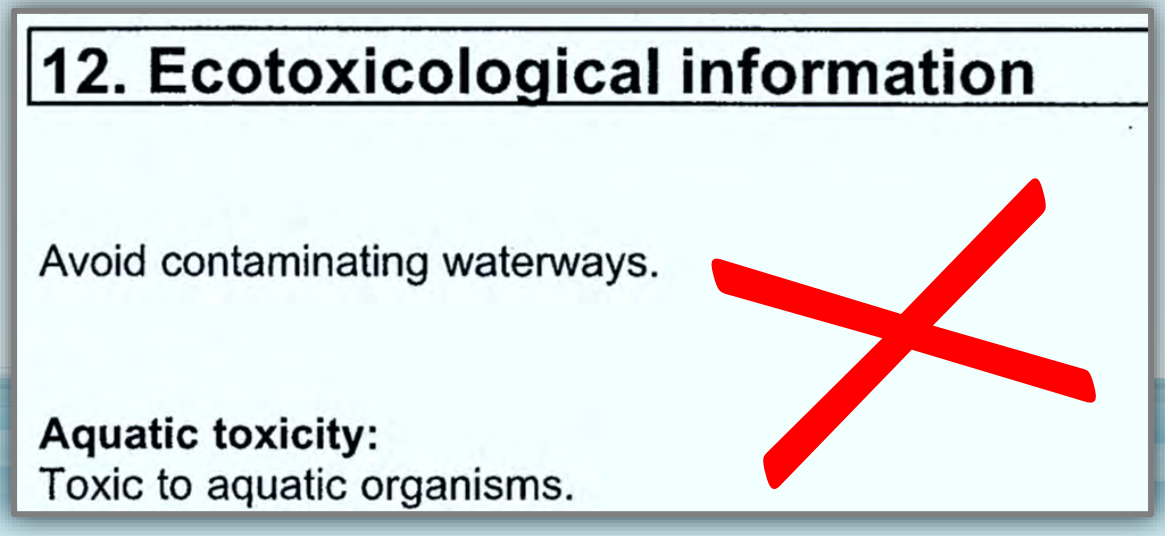
Chronic Toxicity: No chronic toxicity has been identified.



12. ECOLOGICAL INFORMATION

Aquatic toxicity

- Toxicity to fish: No data available.
- Toxicity to daphnia: No data available.
- Toxicity to algae: IC 50 / Scenedesmus subspicatus / 72 hours > 273 mg / L (OECD 201).



12. Ecotoxicological information

Avoid contaminating waterways.

Aquatic toxicity:
Toxic to aquatic organisms.

Safety Data Sheets (SDS)

12. ECOLOGICAL INFORMATION

Ecological Assessment
The ecological properties of this material have not been fully investigated.
All ecological information provided was conducted on a structurally similar product.

Duration: 48 hr. **Procedure:** Static.
Species: Fathead Minnow (Pimephales promelas)
354 ppm LC50

Duration: 96 hr
Species: Zebra Fish (Brachydanio rerio)
>1000 mg/l LC50

Duration: 24hr
Species: Coho Salmon (Oncorhynchus kisutch)
10 mg/l LC50

Duration: 48 hr **Procedure:** Static
Species: Water Flea (Ceriodaphnia dubia)
83 ppm LC50

Duration: 48 hr
Species: Water Flea (Daphnia magna)
98 mg/l EC50

12 Ecological information

AQUATIC TOXICOLOGY

Daphnia magna 48 Hour Static Acute Bioassay
LC50= 352; No Effect Level= 135 mg/L
Fathead Minnow 96 Hour Static Acute Bioassay
LC50= 465; No Effect Level= 100 mg/L

BIODEGRADATION

COD (mg/g): 1120
TOC (mg/g): 450

Other Potential Issues

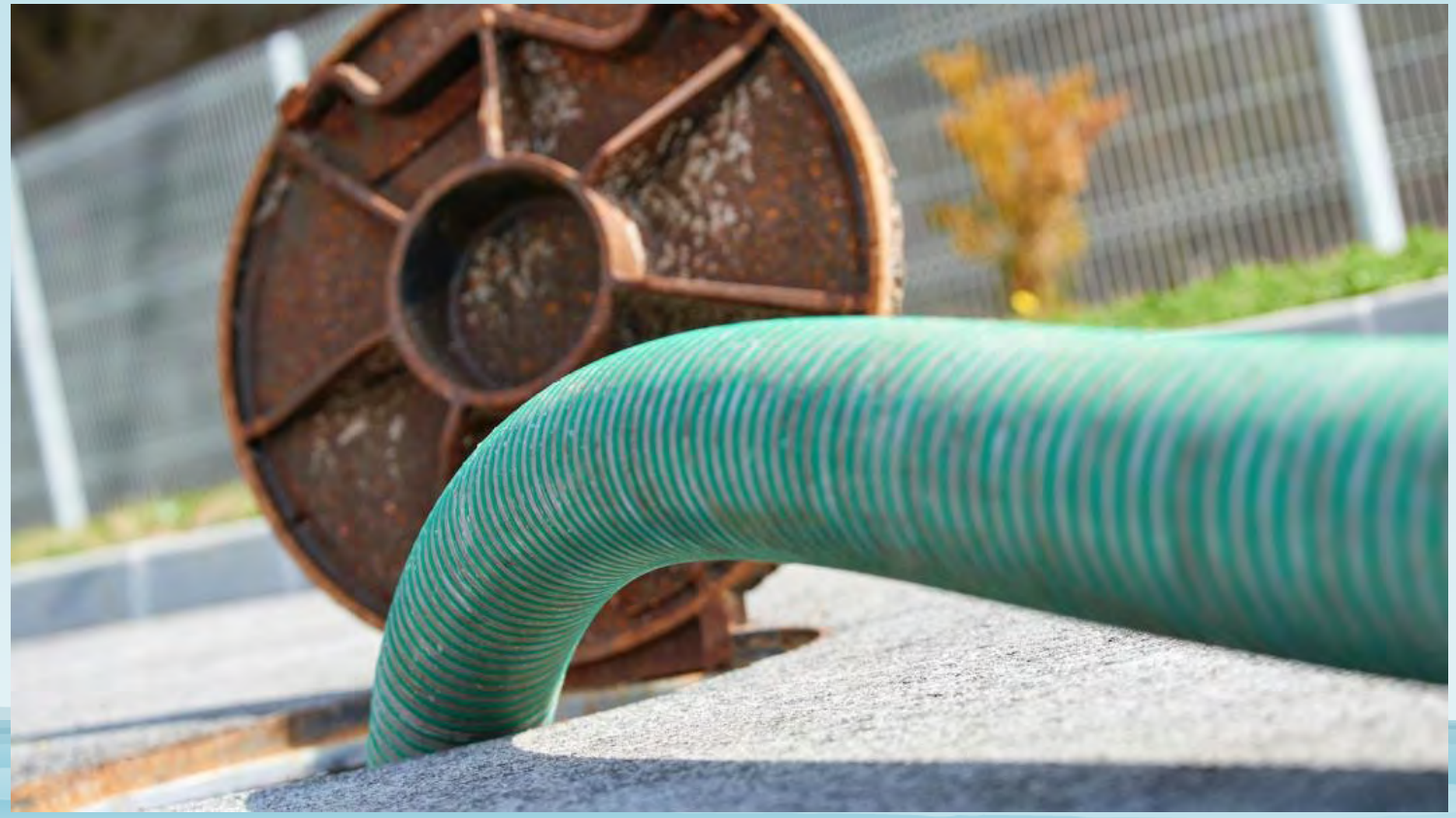
Industry closures: what are they dumping down the drains?

Waste haulers: screen the types of waste you receive

Illegal dumping

Meth Labs

Pass-through toxicity from amine compounds



Check your permit!

A. (4) TOXICITY IDENTIFICATION EVALUATION (TIE)
[15A NCAC 02B.0200]

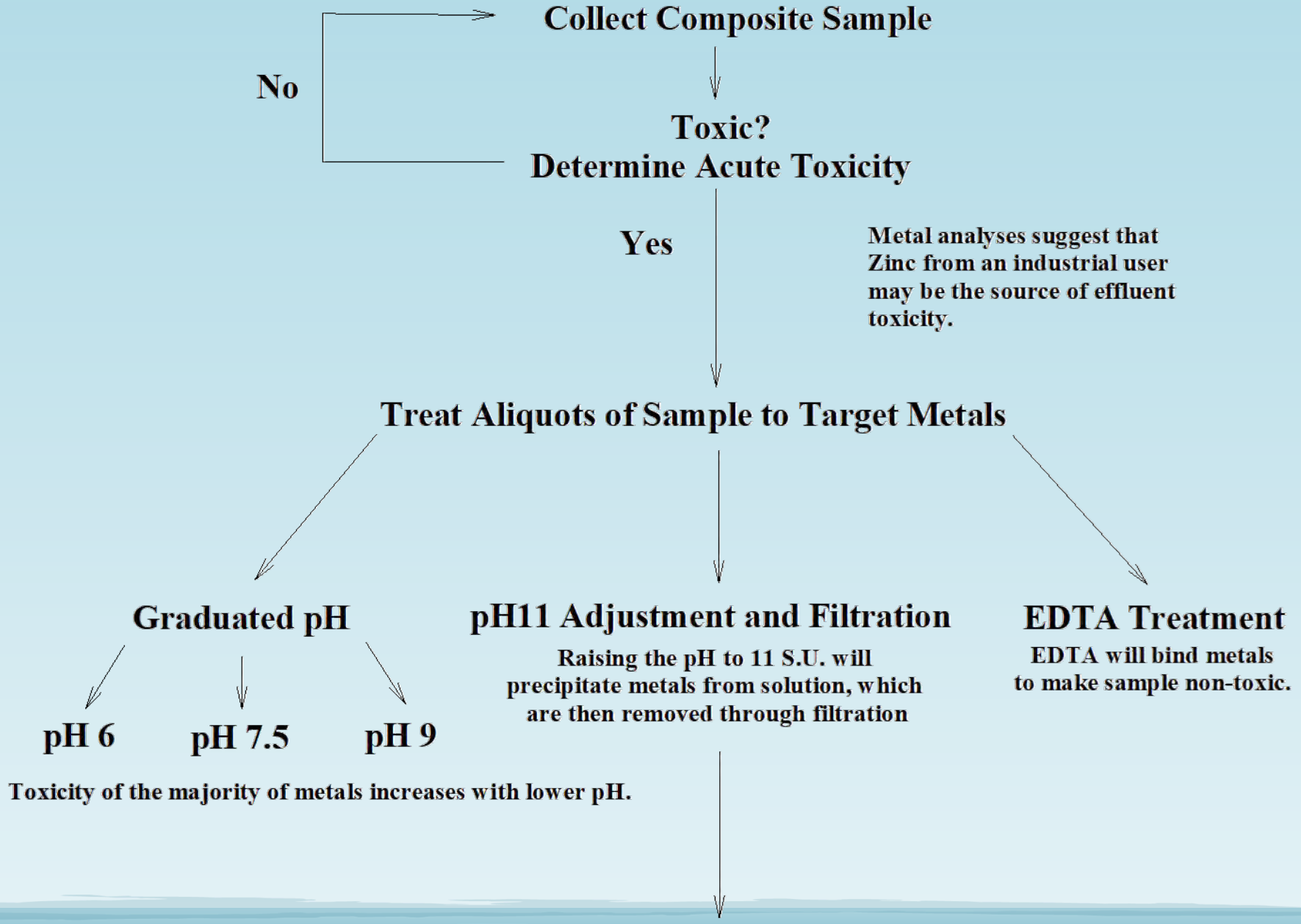
Should any whole effluent toxicity test produce a chronic value less than 12%, the permittee will undertake toxicity identification evaluations (TIEs) using the procedures described in *Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I*, EPA/600/6-91/005F, May 1992 or similar methods. A final report will be generated and submitted to the address below no later than 60 days following the initial test producing a chronic value less than 12%. The primary objective of the TIE activity will be to confirm or rule out polymer as the source of toxicity. The report detailing findings of the TIE is to be sent to the following address:

Attention: North Carolina Division of Water Resources
Water Sciences Section/Aquatic Toxicology Branch
1621 Mail Service Center
Raleigh, NC 27699-1621

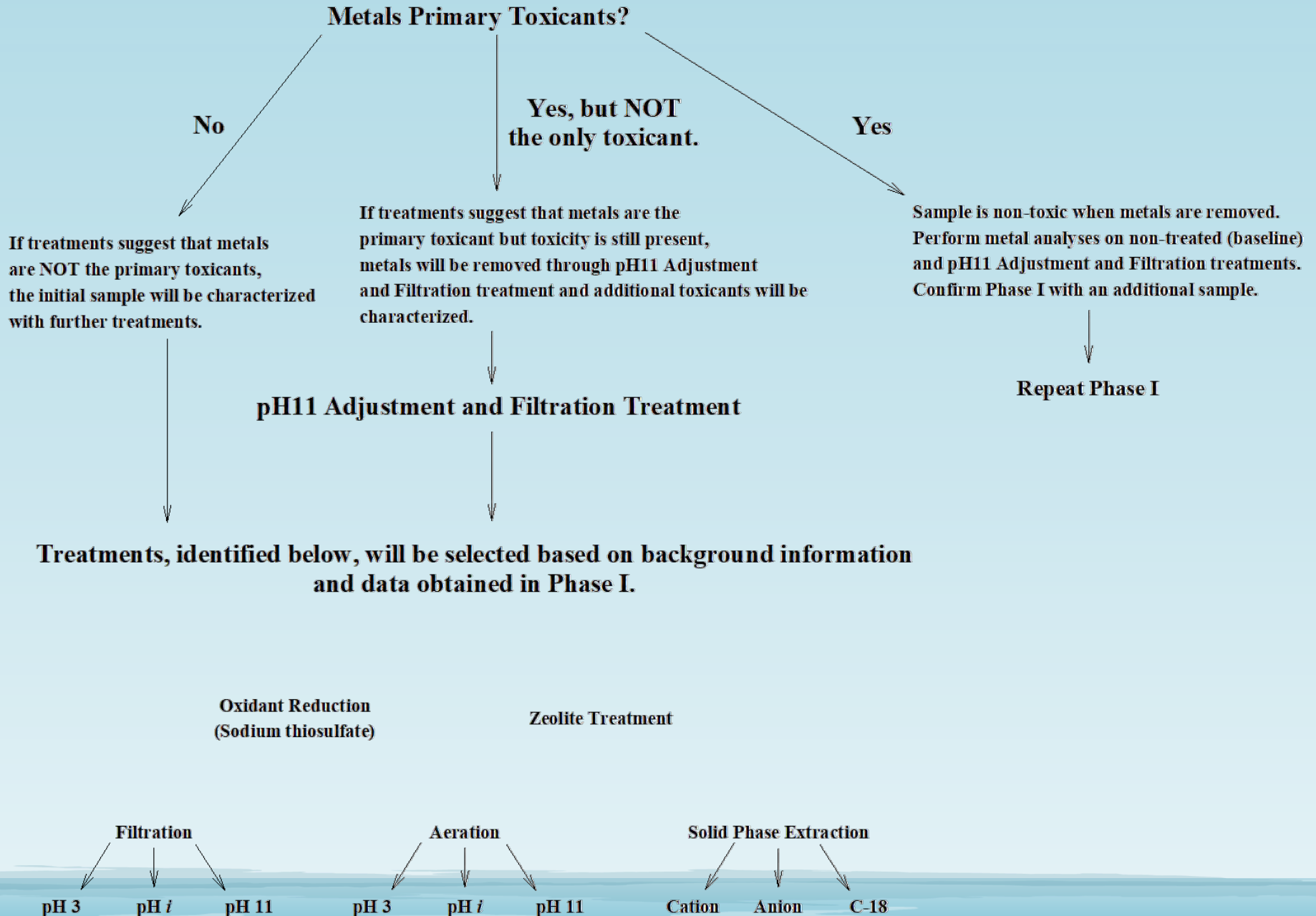
Treatments Designed to Target Suspected Toxicant

Test	Class of Compound Targeted
Baseline (Non-treated)	Determines the toxicity of a non-manipulated sample. This test is used for a comparison to the treatment tests.
Activated Carbon Absorption	Removal of metals and organic compounds.
Sodium Thiosulfate or Sodium Hydrosulfite	Reduces oxidant compounds. Chlorine, ozone, chlorine dioxide, mono- and di-chloramines, bromine, and iodine are highly neutralized by this treatment.
EDTA	Chelates dissolved metal compounds. (i.e. Aluminum, Barium, Cadmium, Cobalt, Copper, Iron, Lead, Manganese, Nickel, Zinc, Arsenic, Mercury, Silver, Magnesium, Strontium, Thallium)
Ion Exchange	Removal of cations or anions from solution.
Graduated pH	Alters the speciation of dissolved, ionic compounds. Ammonia, hydrogen sulfide, and metals are highly susceptible to changes in toxicity by this treatment.
Aeration	Removal or volatile or semi-volatile compounds from solution. This treatment also oxidizes reduced compounds through the increase of the dissolved oxygen concentration of the sample.
Filtration	Removal of colloidal and particulate material. Altering the pH to 11 S.U. will precipitate most metal compounds from solution, which can then be removed by filtration.
C18 Solid Phase Extraction	Removal of nonionic, hydrophobic organic compounds.
Silica Gel	Removal of polar organic compounds.

Phase I


Collect Composite Sample
No
Toxic?
Determine Acute Toxicity
Yes
Metal analyses suggest that Zinc from an industrial user may be the source of effluent toxicity.
Treat Aliquots of Sample to Target Metals
Graduated pH
pH 6
pH 7.5
pH 9
Toxicity of the majority of metals increases with lower pH.
pH11 Adjustment and Filtration
Raising the pH to 11 S.U. will precipitate metals from solution, which are then removed through filtration
EDTA Treatment
EDTA will bind metals to make sample non-toxic.
Phase II

Phase II


Metals Primary Toxicants?
No
Yes, but NOT the only toxicant.
Yes
If treatments suggest that metals are NOT the primary toxicants, the initial sample will be characterized with further treatments.
If treatments suggest that metals are the primary toxicant but toxicity is still present, metals will be removed through pH11 Adjustment and Filtration treatment and additional toxicants will be characterized.
Sample is non-toxic when metals are removed. Perform metal analyses on non-treated (baseline) and pH11 Adjustment and Filtration treatments. Confirm Phase I with an additional sample.
Repeat Phase I
pH11 Adjustment and Filtration Treatment
Treatments, identified below, will be selected based on background information and data obtained in Phase I.
Oxidant Reduction (Sodium thiosulfate)
Zeolite Treatment
Filtration
pH 3
pH i
pH 11
Aeration
pH 3
pH i
pH 11
Solid Phase Extraction
Cation
Anion
C-18

Questions?

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