



Department of
Environmental
Conservation

Whole Effluent Toxicity (WET) Testing

Nicole Wright, Toxicity Testing Unit

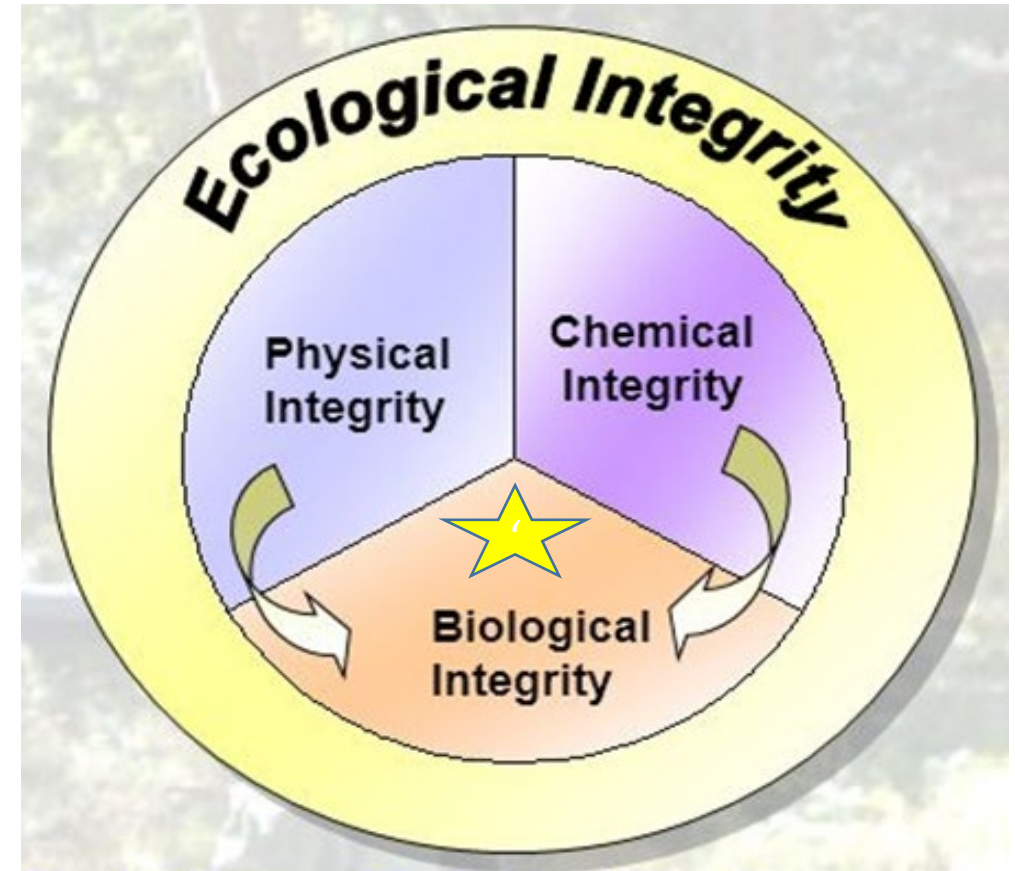
November 2022

Clean Water Act – 50th Year (1972)

- Restore & maintain the Nation's waters
 1. Fish protection & propagation
 - Goal
 2. Prohibits discharge of toxic pollutants in toxic amounts
 - Policy

EPA – Triad approach – WQ protection

WET defined Federal Register 1984 – 40 years in NYS



What is Whole Effluent Toxicity (WET)?



- Direct & aggregate measure of **all** toxic pollutants in a discharge to aquatic organisms
 - Surface waters – SPDES
 - 40 CFR Part 136
- Aquatic life method – protective of human health
 - Effects-based bioassays
- Representative freshwater & marine species
 - **Accurately predicts receiving water impacts**

Freshwater



Sheepshead Minnow



Opossum Shrimp

Marine



How is WET Conducted?



Control

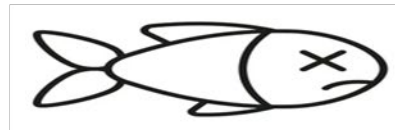
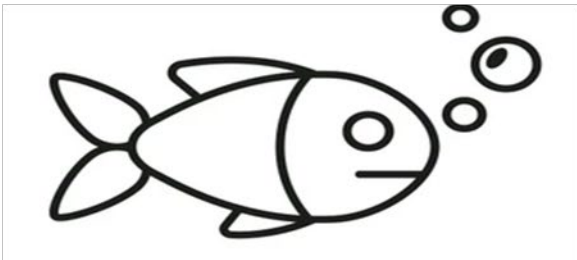
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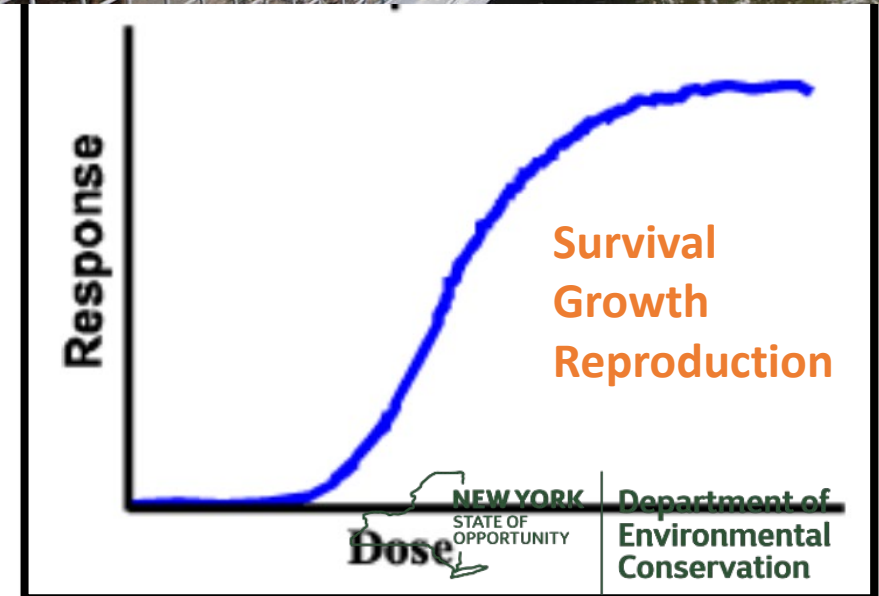
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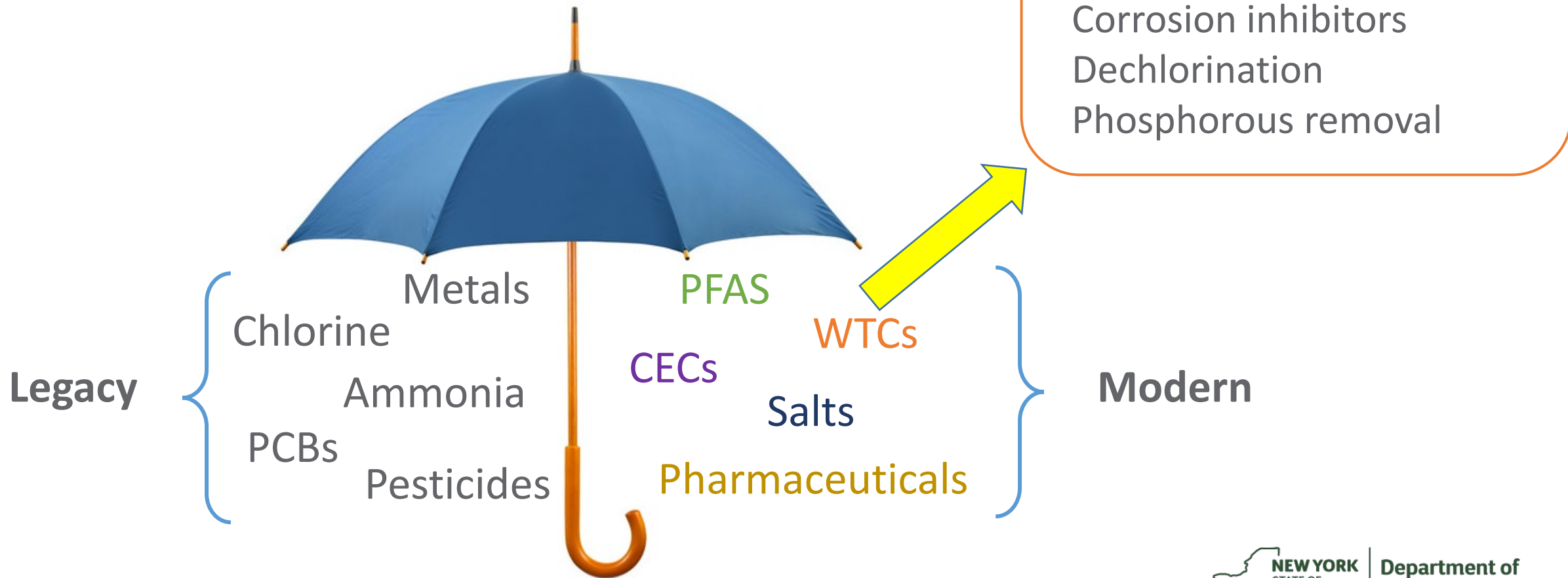


The dose makes the poison...



Total Toxics Umbrella

Single WET Test



Benefits of WET Testing – By Design



- 1. Complimentary to chemical-specific approach**
 - Regulate hundreds ➡ thousands used & discharged
 - ❖ Non-specificity of the method – timeless
- 2. Specialty is capturing synergistic/additive effects**
 - Post-treatment ➡ non-toxic discharge
 - ❖ Industrial processes, settling, dechlorination or P removal WTCs
- 3. Saves permittees \$ – overdosing WTCs**
 - Subsidizes \$4k - \$8k for WET testing
 - ❖ 100 lbs/day ➡ 1 lbs/day



WET Permitting

Logistics

Current TOGS 1.3.2 Criteria

- **WET RP: permit condition or application**

1. No ambient WQS/GVs – PFAS, WTCs or Chloride
2. Uncertainties in TMDLs, WLAs or WQBELs
3. WQBELs below analytical detectability
4. Complex or synergistic effects – # metals/organics/WTCs ≥ 5
5. Observed detrimental effects on receiving water biota
6. Toxicity testing by DEC or EPA indicates issues
7. “WWTP” flows >1.0 mgd or <1.0 mgd with PT (2007)



SPDES Permit – Pollutant Parameter Table

WHOLE EFFLUENT TOXICITY (WET) TESTING		Limit	Units	Action Level	Units	Sample Frequency	Sample Type	Inf.	Eff.	FN
WET - Acute Invertebrate	See footnote	-	-	1.8	TUa	Quarterly	See footnote		X	3, 7
WET - Acute Vertebrate	See footnote	-	-	1.8	TUa	Quarterly	See footnote		X	3, 7
WET - Chronic Invertebrate	See footnote	-	-	6.0	TUc	Quarterly	See footnote		X	3, 7
WET - Chronic Vertebrate	See footnote	-	-	6.0	TUc	Quarterly	See footnote		X	3, 7



SPDES Permit – WET Footnote

3. Whole Effluent Toxicity (WET) Testing:

Testing Requirements – Chronic WET testing is required, but report both the acute and chronic results. Testing shall be performed in accordance with 40 CFR Part 136 and TOGS 1.3.2 unless prior written approval has been obtained from the Department. The test species shall be *Ceriodaphnia dubia* (water flea - invertebrate) and *Pimephales promelas* (fathead minnow - vertebrate). Receiving water collected upstream from the discharge should be used for dilution. All tests conducted should be static-renewal (two 24-hr composite samples with one renewal for Acute tests and three 24-hr composite samples with two renewals for Chronic tests). The appropriate dilution series should be used to generate a definitive test endpoint, otherwise an immediate rerun of the test may be required. WET testing shall be coordinated with the monitoring of chemical and physical parameters limited by this permit so that the resulting analyses are also representative of the sample used for WET testing. The ratio of critical receiving water flow to discharge flow (i.e. dilution ratio) is 3.0:1 for acute, and 3.3:1 for chronic. Discharges which are disinfected using chlorine should be dechlorinated prior to WET testing or samples shall be taken immediately prior to the chlorination system.

Monitoring Period - WET testing shall be performed quarterly (calendar quarters) during calendar years ending in **2** and **7**.

Reporting - Toxicity Units shall be calculated and reported on the DMR as follows: $TU_a = (100)/(48\text{-hr LC50})$ [note that Acute data is generated by both Acute and Chronic testing] and $TU_c = (100)/(7\text{-day NOEC})$ or $(100)/(7\text{-day IC25})$ when Chronic testing has been performed or $TU_c = (TU_a) \times (10)$ when only Acute testing has been performed and is used to predict Chronic test results, where the 48-hr LC50, 7-day NOEC and/or IC25 are all expressed in % effluent. This must be done, including the Chronic prediction from the Acute data, for both species unless otherwise directed. For Chronic results, report the most sensitive endpoint (i.e. survival, growth and/or reproduction) corresponding to the lowest 7-day NOEC or IC25 and resulting highest TU_c . For Acute results, report a TU_a of 0.3 if there is no statistically significant mortality in 100% effluent as compared to the control. Report a TU_a of 1.0 if there is statistically significant mortality in 100% effluent as compared to the control, but insufficient mortality to generate a 48-hr LC50. Also, in the absence of a 48-hr LC50, use 1.0 TU_a for the Chronic prediction from the Acute data, and report a TU_c of 10.0.

The complete test report including all bench sheets, statistical analyses, reference toxicity data, daily average flow at the time of sampling and other appropriate supporting documentation, shall be submitted within 60 days following the end of each test period with your WET DMR and to the WET@dec.ny.gov email address. A summary page of the test results for the invertebrate and vertebrate species indicating TU_a , 48-hr LC50 for Acute tests and/or TU_c , NOEC, IC25, and most sensitive endpoints for Chronic tests, should also be included at the beginning of the test report.

WET Testing Action Level Exceedances - If an action level is exceeded then the Department may require the permittee to conduct additional WET testing including Acute and/or Chronic tests. Additionally, the permittee may be required to perform a Toxicity Identification/Reduction Evaluation (TI/RE) in accordance with Department guidance. Enforceable WET limits may also apply. The permittee shall be notified in writing by their Regional DEC office of additional requirements. The written notification shall include the reason(s) why such testing, TI/RE and/or limits are required.

Required Methods

- Test type
- Species
- # Composites
- Coordinated
- Dilution

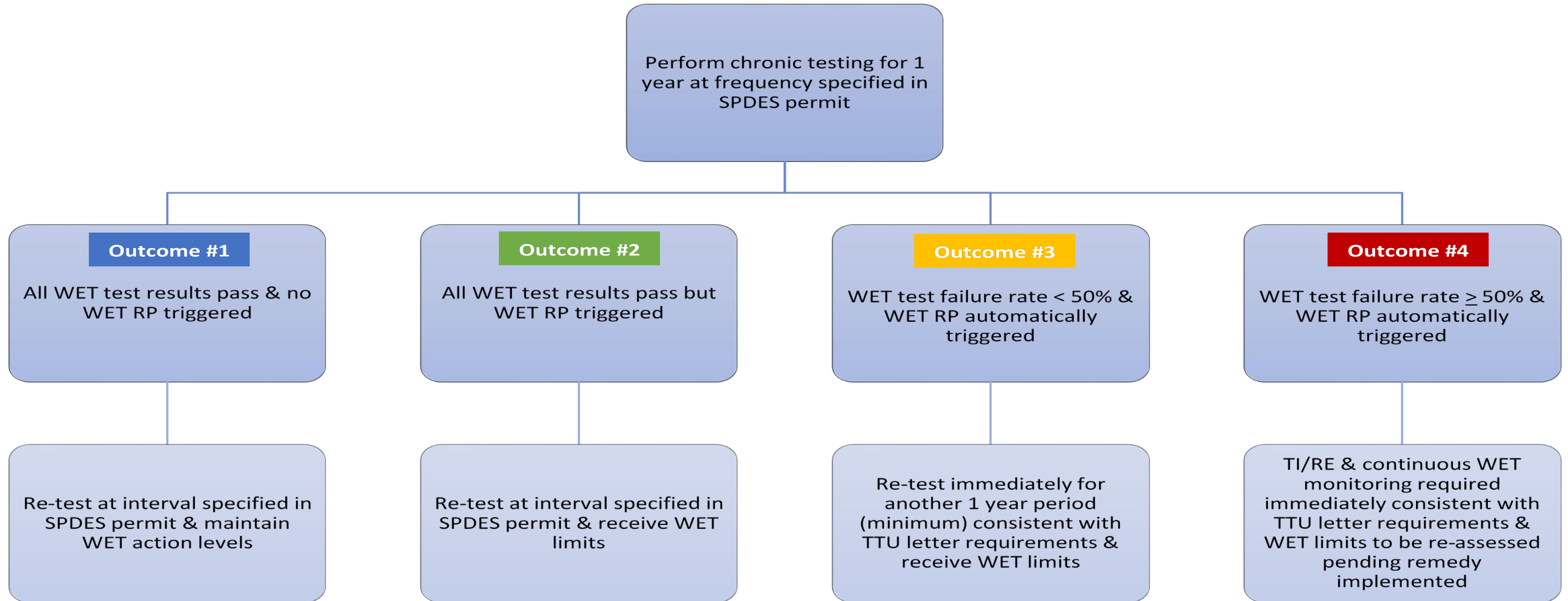
Required Schedule

Required Reporting

- TU_a & TU_c
- Statistically sig. lethality
- MSE Chronic
- Email & NetDMR

Add. Requirements

WET Testing Outcomes



Best



worst-case scenario



Department of
Environmental
Conservation

New for 2023 – WET ELAP Required (NYSDOH)



MakingWaves - Data Solicitation For Saline Waters; New WET Testing Requirement; DEC's Electric Boat; HABs Notifications; National Water Quality Month

The New York State Department of Environmental Conservation sent this bulletin on 07/29/2022 01:00 PM EDT

MakingWaves - News From the Division of Water

In This Issue:


- Data Solicitation for Potential Reclassification of Saline Waters
- **ELAP Certification Required for Labs Conducting Whole Effluent Toxicity Tests**
- DEC's First Electric Boat
- Harmful Algal Bloom (HAB) Notifications
- August is National Water Quality Month

SECTION 502

**Environmental laboratories; examinations;
certificates of approval**

Public Health (PBH) CHAPTER 45, ARTICLE 5, TITLE 1

Standard WET Report Form (SWRF) – nForm


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SWRF_Draft
Submission HPD-MZ68-VJR5P Revision 1 Form Version 1.0

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Section 1: General Facility & Laboratory

Section 2: Sample Collection

Section 3: Sample Chemistry

Section 4a: Test Methods – Fish Species

Section 4b: Test Methods – Invertebrate Species

Section 5: General Test QA/QC Conditions

Section 6: Test Acceptability Criteria – Control Performance

Section 7a: Test Results—Fish

Section 7b: Test Results—Invertebrate

Section 8: Notes & Reportable Values

Review

Section 1: General Facility & Laboratory

Enter facility information as required.

General Facility and Lab Information

FACILITY NAME	SPDES NUMBER	RECEIVING WATER(S)	OUTFALL TESTED	LAB USED	LAB ANALYSTS	LAB REPORT DATE
*	*	*	001	*		* mm/dd/yyyy

Combined Outfall
*

Report Upload

Upload all documents

Please be aware that files exceeding 10 MB in size are not recommended

Drop files here to upload
OR
CHOOSE FILE

Comment

NEXT SECTION
Section 2: Sample Collection



**Department of
Environmental
Conservation**

Thank You

Nicole Wright

Research Scientist 3

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