

WET Testing



Basics

What is WET testing?

Whole Effluent Toxicity testing measures the effects of wastewater on specific test organisms' ability to survive, grow and reproduce.

WET testing is an especially effective means of measuring the toxic effects of complex waste streams by accounting for the effluent as a whole including unidentified parameters and combination effects.

Basics

Why do I have to do WET testing?

WET testing can provide a measure of compliance for narrative water quality standards such as specific conductance. This is how it is used in the coal general permits.

Basics

How do I submit WET testing?

Entire WET test reports are to be uploaded to the DOW portal at:

<https://dep.gateway.ky.gov/eportal/default.aspx>

(The same place you upload IP applications)

The first time you open the portal you will need to request an account. Thereafter, upload the document and choose “[Whole Effluent Toxicity \(WET\) Document](#)” as the document type.

Most facilities have their lab upload the report directly.



Chronic vs. Acute WET Testing

What's the difference?

Acute WET testing provides a measure of the toxic effects of effluent for a period of short duration. The test provides an estimate of the percent effluent concentration that is lethal to 50% of the test organisms in the time period prescribed by the test. The time period can be up to 96 hours, but KY DOW uses a 48-hour test. We refer to this lethal concentration as the LC_{50} value.

Chronic toxicity testing provides a measure of the toxic effects of effluent for a period of longer duration. The test provides an estimate of the percent effluent concentration that would cause a 25% reduction in growth or survival of the test organisms as compared to a control group of organisms. We refer to this inhibition concentration as the IC_{25} value.



Acute WET Testing

What are the sampling requirements for an Acute test?

- 2 grab samples collected at least 2 hours apart but no more than 48 hours apart
- If unable to collect the required samples due to cessation of discharge or no discharge, report No Discharge (NODI) code F (“insufficient flow for sampling”) on the quarterly DMR. Submit a copy of DMR with cover letter in place of WET report.

Acute WET Testing

How is an acute test conducted?

- Two species of Organisms: Pimephales promelas (fathead minnow) and one of Ceriodaphina dubia, Daphnia magna, Daphnia pulex (water fleas)
- Test to be conducted in accordance with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (5th edition), EPA-821-R02-012

Acute WET Testing

Basics of a Valid Acute Test:

- Samples collected per permit requirements
- Samples kept at ≤ 6 °C
- Testing begun within 36 hours of sample collection
- Definitive test with 5 effluent concentrations and a control (0% effluent)
- At least 20 organisms per concentration
- Control survival $\geq 90\%$
- Reference toxicant test within 30 days prior

Invalid tests to be repeated as soon as practicable **within** the monitoring period.



Chronic WET Testing

What are the sampling requirements for a Chronic test?

- 3 sets of 2 grab samples collected and composited on days 1, 3, and 5 of the discharge.
- Each set of 2 samples to be between 2 and 48 hours apart
- If unable to collect the required samples due to cessation of discharge or no discharge, report No Discharge (NODI) code F (“insufficient flow for sampling”) on the quarterly DMR. Submit a copy of DMR with cover letter in place of WET report.

Chronic WET Testing

How is a Chronic test conducted?

- Two species of Organisms: Pimephales promelas (fathead Minnow) and Ceriodaphnia dubia (water flea)
- Typically takes 7-8 days
- Test water is renewed daily using additional effluent collected.
- Test to be conducted in accordance with Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (4th Edition), EPA-821-R-02-013.

Chronic WET Testing

Basics of a Valid Chronic Water Test

- Samples collected per permit requirements
- Samples kept at ≤ 6 °C
- Testing begun within 36 hours of sample collection
- Definitive test with 5 effluent concentrations and a control (0% effluent)
- At least 10 organisms per concentration
- Control survival $\geq 80\%$
- 60% of control fleas have 3 broods with an average of 15 young per female
- Average dry weight of control minnows ≥ 0.25 mg with coefficient of variance $\leq .40$
- Reference toxicant test within 30 days prior

Invalid tests to be repeated as soon as practicable **within** the monitoring period.



Sampling

Can I do my own sampling?

Yes, as long as permit requirements, temperature and holding times are followed.

This is not recommended; most facilities schedule sampling with their labs.



Sampling

What outfalls do I have to sample?

Your coverage letter will indicate which sampling tables apply to your outfalls:

- Western Coal GP – Table 1 - Acute
 - Active Surface Mining
 - Prep Plants and Underground
- Eastern Coal GP – Table 1 – Acute
 - Active & Post Mining Prep Plants and Underground
- Eastern Coal GP – Table 2 – Chronic
 - In-Stream Pond and/or Continuous Discharge

Testing Facilities

Can my company do the testing?

Only if you have a lab that has received Kentucky wastewater lab certification for WET testing.



Testing Facilities

Does DOW have a list of laboratories certified to perform WET testing?

Yes, the list is available on DOWs WET webpage at:

<http://water.ky.gov/permitting/Page/WholeEffluentToxicity/Test.aspx>

This site currently has many labs listed as approved. That approval was under previous requirements and will change as of January 1, 2015 to list only certified labs. As of September only about a dozen labs had been certified for WET testing, although others have applied. The list will be updated by the end November.



WET test Failures

What is a failing test result?

A test is considered failing if it exceeds the permitted limit of 1.00 toxicity unit

TUa (acute) or TUc (Chronic)

Getting from effluent percentages to the toxicity units in the permit:

$$\text{TUa} = 100 / \text{LC}_{50}$$

$$\text{TUc} = 100 / \text{IC}_{25}$$



WET test Failures

What if I fail a WET test?

- Notify DOW within 5 days of test completion
- Repeat the test using new samples to determine persistence of toxicity
 - Acute – 2 new grab samples
 - Initiate sampling within 10 days of completing failed test
 - Chronic – 3 new composite samples
 - Initiate sampling within 15 days of completing failed test

WET test Failures

If the retest is passing do I have to continue to do extra sampling?

No, you may return to the sampling frequency required by the permit.

WET test Failures

What if I also fail the retest?

Perform accelerated testing - 4 additional rounds of testing within 60 days of completion of the retest for a total of 6 tests.

If any 2 of the 6 tests are significantly failing (1.2 times the permit limit) or any 4 of the 6 tests are failing – Toxicity is considered to be persistent

Notify DOW within 5 days of completion

Develop and implement a TRE



WET test Failures

If I fail the retest is accelerated testing always required?

Yes, unless both the initial test and retest were significant failures (result is $1.2 * \text{permit limit}$). Toxicity is considered persistent without the accelerated testing. Develop and implement a toxicity reduction evaluation (TRE)

WET test Failures

What if I fail the retest but after accelerated testing toxicity is considered to not be persistent?

Notify DOW of the result within 5 days of completing accelerated testing.

If a future WET test results in a significant failure within 12 months of the initial failure a TRE shall be required.

TRE

What is a Toxicity Reduction Evaluation (TRE)?

A TRE is a plan to identify toxicant(s), determine the source and select actions to eliminate or greatly reduce toxicity. It includes an examination of chemicals, current practices and processes, toxicity identification evaluation (TIE), investigation and schedules. A TRE has a duration of 6 – 24 months and requires quarterly progress reports to DOW. Upon completion, the permittee shall submit a final report detailing findings, corrective measures, and an implementation schedule not to exceed and additional 180 days.

WET Testing Reductions

How can I reduce testing to a single species?

After passing 6 consecutive WET tests using both the water flea and fathead minnow, a request to perform subsequent testing using only the most sensitive species may be considered. Submit your request in writing to the DOW WET coordinator. This request may be submitted via the portal, the mail or e-mail.

A subsequent failure or non-submittal may result in a return to testing using both species.



WET Testing Reductions

How can I reduce test frequency?

A request to reduce the frequency of WET testing from quarterly to annual may be requested upon demonstration that no test failures, incomplete tests, or invalid tests occurred during:

- 4 consecutive quarters for existing facilities
- 8 consecutive quarters for new or expanded facilities

A subsequent failure or non-submittal may result in a return to quarterly testing.



Contact Information

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