



BUREAUS OF WATER QUALITY & WATERSHED

Program Guidance

Wastewater Policy & Management Team
Runoff Management Policy & Management Team

**Water Quality Review Procedures
For Additives**

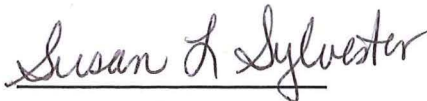
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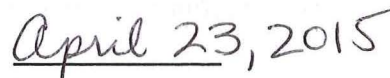
Wisconsin Department of Natural Resources

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1. INTRODUCTION

The approach described in this guidance is intended for **both water-applied and land-applied products**. This guidance document describes the procedures for deriving secondary acute and secondary chronic values for an additive, which are the concentrations in surface water that protect aquatic life from adverse short-term and long-term effects. Because the procedures for determining secondary values are the same regardless of the purpose of the additive, this document applies to both water-applied and land-applied additives. The secondary value is converted to an allowable usage rate using the appropriate procedures for the given application.

The methods and procedures in this guidance document supersede those outlined in previous versions of this and related guidance including

- WET Guidance Document, Chapter 1.7 “Discharges with Water Quality Additives” (July 1, 2008),
- “Water Quality Review Procedures for Water Applied Biocides, Additives, Polymers & Erosion Control Products” Interim Final Guidance (December 4, 2006), and
- “Water Quality Review Procedures for Land Applied Erosion Control Products” Interim Final Guidance (November 7, 2006).

An additive review is necessary for substances that may enter surface water without receiving treatment or substances that are used in a treatment process, but are not expected to be removed by wastewater treatment and may contribute to effluent toxicity.

The procedures described in this guidance document apply to any new or modified product formulations and/or changed uses of a product. Products for which an additive review has been previously conducted and/or for which the same application, product formulation, and usage conditions apply do not need to be re-evaluated unless or until application, product formulation or usage practices change.

Examples of additives include biocides, boiler water treatments, clarifying agents, corrosion inhibitors, industrial process polymers, pH control, scale control, settling flocculent logs, soil stabilizers, erosion control products, and stormwater and frac sand process water clarification products.

Additives are used in a number of applications and come in a variety of chemical formulations including, but not limited to, chemical salts, polymers, acids and bases, and organic chemicals. The federal Clean Water Act (CWA) requires states to develop water quality criteria for substances that may adversely impact the environment. Many additives have not undergone rigorous toxicological testing required to develop water quality criteria for the protection of aquatic life (i.e., Acute Toxicity Criterion and Chronic Toxicity Criterion). Instead, secondary acute and chronic values are

derived following the methods in s. NR 105.05 and s. 105.06, Wis. Adm. Code. A Secondary value is defined in s. NR 105.03, Wis. Adm. Code, as a temporary value that represents the concentration of a substance which ensures adequate protection of sensitive species of aquatic life.” Secondary values are based on the available data and account for the uncertainty of the data by using a safety factor. These secondary values are then used to determine allowable usage rate (i.e., permit limit, application rates).

An additive review by the Wisconsin Department of Natural Resources (WDNR) is necessary when

- 1) The additive may enter a surface water without receiving treatment; or
- 2) The additive is used in a treatment process, is not expected to be removed by wastewater treatment, and may contribute to effluent toxicity.

This document is intended to assist WDNR staff in calculating secondary values for additives, will be updated as needed, and is located at

<http://dnr.wi.gov/topic/wastewater/documents/Chap1x7Additives.pdf>. This guidance supports the authority of s. 283.31(3)(d)1. and ss. 105.02(3), NR 105.05, and NR 106.05(1)(b), Wis. Adm. Code, to protect Wisconsin’s surface water resources from such products. Additives should be approved on a case-by-case basis; blanket approvals should not be given. The procedures described in this guidance document are based on those in ss. NR 105.05(4) for the secondary acute values and ss. 105.06(6) for the secondary chronic values. These procedures are consistent with the methodology for deriving Tier II aquatic life criteria in the *Water Quality Guidance for the Great Lakes System* (40 CFR 132).

Each region should clearly identify which runoff management and wastewater staff are responsible for additive decisions and communication. The Water Evaluation Section Toxicologist (Sarah Yang: sarah.yang@wisconsin.gov or 608-266-9262) should be informed of additive staffing assignments to make sure that consistent communication and resources are provided to these key staff. To support consistent and efficient decision making across the state, the following WDNR staff are recommended to take the lead on these reviews and be able to adequately describe the process in this guidance.

- **Wastewater:** Requests for additive reviews will most often occur during either the permit application/reissuance process or during the permit term for additive changes that occur after the permit has been issued. Additive reviews that are needed at permit reissuance time should be conducted by water quality based effluent limits (WQBEL) calculators along with other effluent limit and WET determinations. Additive reviews that are requested by permittees during the permit term may be conducted by permit

drafters since they are likely to be the ones that receive the request. If permit drafters need assistance, they can enlist the help of the WQBEL calculator or staff in the central office. Additive review reports should be attached to WQBEL recommendation memos and/or permit files and saved in SWAMP, System for Wastewater Applications, Monitoring and Permits.

- **Runoff Management:** For runoff management, an additive review generally occurs when the product is proposed for sediment control, erosion control, and solids separation purposes include, but are not limited to: storm water clarification, sediment removal, manure lagoon clarification, and frac sand mining process water clarification. This guidance is used in conjunction with the appropriate conservation standard/additional guidance documents as detailed in Step 4C. Additive reviews that are requested should be reviewed/conducted by Water Resources Engineer: Jan Kucher (jan.kucher@wisconsin.gov or 608-266-9260).

2. DETERMINATION OF ALLOWABLE ADDITIVE USAGE RATE

This guidance outlines the process to be followed by WDNR staff to assist with the timely and thorough evaluation of information related to additives. The additive review process consists of four general steps:

- Step 1) Additive review request
- Step 2) Secondary acute value (SAV) calculation
- Step 3) Secondary chronic value (SCV) calculation
- Step 4) Allowable usage rate determination

Each of these steps is described in more detail below. Figure 1 is a detailed flowchart of the additive review process. An excel template, the *Secondary Value Calculator*, was developed to assist with calculating secondary acute and secondary chronic values for additives. Instructions for using the *Secondary Value Calculator* can be found in Appendix A for Wastewater Staff and Appendix B for Runoff Management staff.

Step 1: Additive review request

- A. The permittee/applicant submits a request for the approval of an additive (i.e., the complete production formulation) to the WDNR staff responsible for their WPDES permitting or runoff management decisions.

Step 1. Additive review request submitted	1A. The permittee/applicant submits a request for the approval of additives to the WDNR staff responsible for their WDPES permitting or runoff management decisions.
	1B. The WDNR staff member receiving information in Step 1 compiles all information provided by requestor and determines if the information package is complete. A complete request package should include general product information, product dosage/application information, and official aquatic life toxicity test results and parameters for the whole product (see Figure 2 for more details).
	1C. Once the package is complete, the request package is forwarded to the DNR staff member responsible for calculating the secondary value.
Step 2. Secondary Acute Value Calculated	2A. The DNR staff member enters the permittee/applicant and product information into the "Secondary Value Report" into the <i>Secondary Value Calculator</i> .
	2B. The DNR staff member enters all acute toxicity test results for the substance into the <i>Secondary Value Calculator</i> .
	2C. The DNR staff member determines if the toxicity test results are acceptable to use for the additive review (See Tables 1 and 2 for more details).
	2D. The <i>Secondary Value Calculator</i> automatically calculates the species mean acute value (SMAV) and genus mean acute value (GMAV).
	2E. The <i>Secondary Value Calculator</i> automatically calculates the SAV(s) for the appropriate designated use classification(s) and these values are included in the Secondary Value Report.
Step 3. Secondary Chronic Value Calculated	3A. The DNR staff member enters all chronic toxicity test results for the substance into the Secondary Value Calculator. Note: The calculator yields Secondary Chronic Values (SCVs) even if there no chronic toxicity test results are available.
	3B. The DNR staff member determines if the toxicity test results are acceptable to use for the additive review (see Step 2B for more details).
	3C. The <i>Secondary Value Calculator</i> automatically calculates the toxicity test acute-chronic ratio (TACR).
	3D. The <i>Secondary Value Calculator</i> automatically calculates the species mean acute-chronic ratio (SMACR). Note: if no test results are available for a required taxa category, a default SMACR of 18 is used.
	3E. The <i>Secondary Value Calculator</i> automatically calculates the secondary acute-chronic ratio (SACR).
	3F. The <i>Secondary Value Calculator</i> automatically calculates the SCV(s) for the appropriate designated use classification(s) and these values are included in the "Secondary Value Report".
Step 4. Approved Usage Rate Determined	4A. Once the Secondary Value Calculator is completed, the applicable secondary acute and chronic values are automatically populated into the "Secondary Value Report".
	4B. The DNR staff member calculating the secondary value makes a final decision whether to approve or disapprove the use of the product as requested and sends a copy of the Secondary Value Report to WDNR staff member who received the request and the Water Evaluation Toxicologist.
	4C. The WDNR staff member who received the request determines the approved usage concentration (i.e., the level of the additive acceptable for use). <ul style="list-style-type: none"> - Wastewater Permit staff calculate a final acceptable application rate for the product and modify or issue the permit as necessary (see text for more details). - Runoff management staff calculate a final acceptable application rate for the product (see text for more details).
	4D. The Water Evaluation Toxicologist maintains all additive review files and related toxicological information and updates the relevant information in the additives database.

Figure 1. Steps involved in preforming an additive review

- B. The WDNR staff member receiving information in Step 1 compiles all information and determines if the information package is complete. A complete request package should include general product information, product dosage/application information, official aquatic toxicity test (bioassay) results and parameters.
- The Additive Review Request Worksheet (Appendix C) can be used by the permittee/applicant to obtain the proper information for the additive review from the product manufacturer/supplier.
 - Figure 2 provides details on the specific information needed from each of these categories.
 - Table 1 – Acute and Chronic Test Types describes the toxicity test species, test types and results acceptable for use in performing an additive review.
 - Table 2 – Test Parameter Summary describes the toxicity test parameters used to determine if the toxicity test results are acceptable for use in performing an additive review and the reasons why each parameter is needed.

Note (1): In some instances, MSDS sheets provide a “no effects level” or 0% mortality value. If the applicant is using an additive at a substantially lower concentration than the no effect level, it is not necessary to calculate a SAV or SCV and limitations for this additive are not needed in the WPDES permit for wastewater dischargers. It is important to verify that proper test methods were used to calculate a no effect level for an additive (see Appendix C).

Note (2): Certain additives, typically certain erosion control products, may not be soluble in water (e.g. wood chips). Because these products contain materials that are not soluble in water, the primary ecological concern is not for organisms that live in the water column (i.e., fish) but for organisms that live in or near the sediment (e.g., amphipods, crustaceans). Therefore, for these types of additives, the traditional, water-column toxicological testing methods are not appropriate. Instead, toxicity testing methods that use sediment-dwelling species should be used (see Appendix D for more information).

- C. Once the request package is complete, it is forwarded to the DNR staff member responsible for calculating the allowable usage rate (WPDES permitting: WQBEL calculators; Runoff Management: Jan Kucher, jan.kucher@wisconsin.gov or 608-266-9260).

Step 2: Secondary Acute Value (SAV) Calculation

- A. The DNR staff member enters the permittee/applicant information and available product information into the “Secondary Value Report” in the *Secondary Value Calculator*.
- B. The DNR staff member enters all acute toxicity test results for the substance into the *Secondary Value Calculator*.

Note: If there is not at least one acceptable test result for a water flea species (i.e., *Ceriodaphnia* spp., *Daphnia* spp., or *Simocephalus* spp.), a secondary acute value (SAV) cannot be calculated. If this is the case, contact the Water Evaluation Section Toxicologist (Sarah Yang: sarah.yang@wisconsin.gov or 608-266-9262) for assistance.

General product information	<ul style="list-style-type: none"> • Permittee/Applicant contact information • Product trade name & manufacturer (if available) • Product chemical name (if available) • Product active ingredient(s) including CAS # of product components (if available- CAS # may not be available if additives are not OSHA regulated)
Product dosage/ application Information	<ul style="list-style-type: none"> • Proposed application rate (runoff management applicants) • Proposed dosage rate (WPDES permittees) • Maximum discharge concentration (i.e., discharge concentration the represents worst case scenario –maximum additive dosage, minimum discharge flow, no degradation of additive; WPDES permittees).
Official aquatic life toxicity (bioassay) test results	<ul style="list-style-type: none"> • Table 1 – Acute and Chronic Test Types describes the toxicity test species, test types and results acceptable for use in performing an additive review • Table 2 – Test Parameter Summary describes the toxicity test parameters used to determine if the toxicity test results are acceptable for use in performing an additive review and the reasons why each parameter is needed • Note (1): The toxicity information submitted must address the commercial product formulation in order to be applicable. The whole product is all active ingredients and any and all carriers, buffering agents, binding agents, and additional materials. Toxicity data for only the active ingredient(s) are not acceptable because they are not representative of what is actually being used. • Note (2): In some instances, MSDS sheets provide a “no effects level” or 0% mortality value. If the discharger is using an additive at a substantially lower concentration than the no effect level, it is not necessary to calculate a SAV or SCV, or include limitations for this additive in the WPDES permit. It is important to verify that proper test methods were used to calculate a no effect level for an additive (see Appendix B).
Official aquatic test parameters	<ul style="list-style-type: none"> • Test duration and endpoint • Test method • Exposure format • Control response • Additional parameters, if needed (see Appendix B) • Note : The parameters listed above are necessary for completing the additive review. Material safety data sheets (MSDS) do not always contain the toxicity data needed to calculate secondary values and rarely contain the information necessary to determine if the available data is acceptable to use in calculating a secondary value. In these instances, the permittee/applicant can obtain additional toxicity test information from the chemical distributor and/or manufacturer (see Appendix B).

Figure 2. Information needed for a complete additive review request package

Table 1. Acceptable acute and chronic test types and results for common test species

Test Format	Test Species	Acute		Chronic	
		Test Type	Test Result	Test Type	Test Result
Water Column Tests	Ceriodaphnia dubia (Water flea)	48-hr	EC ₅₀ OR LC ₅₀	Life-cycle	LOAEL or NOAEL
	Ceriodaphnia reticulata (Water flea)				
	Ceriodaphnia serrulatus (Water flea)				
	Daphnia magna (Water flea)				
	Daphnia pulex (Water flea)				
	Simocephalus serrulatus (Water flea)				
	Simocephalus vetulus (Water flea)				
	Pimephales promelas (Fathead minnow)	96-hr	LC ₅₀	Early life stage	LOAEL or NOAEL
	Lepomis macrochirus (Bluegill)			OR	
	Oncorhynchus mykiss (Rainbow trout)			Partial Life-cycle	
	Salvelinus fontinalis (Brook trout)			OR Life-cycle	
Whole Sediment Tests*	Ceriodaphnia dubia (Water flea)	48-hr	NOAEL	N/A	N/A
	Daphnia magna (Water flea)				
	Hyalella azteca (Amphipod)	N/A	N/A	10 day	NOAEL

*Certain additives, typically certain erosion control products, may not be soluble in water. For these types of additives, sediment testing should be conducted in place of water column testing (see Appendix D for more information).

Definitions:

Early life stage = used as predictors of life-cycle and partial life-cycle tests with the same species.

EC₅₀ = estimated concentration of product that would cause 50% effect (e.g., mortality, immobilization) to the test population following the given time period

LC₅₀ = the estimated concentration of product that would cause 50% mortality to the test population following the given time period

Life-cycle = exposures of each of two or more groups of individuals of a species to a different concentration of the test material throughout a life cycle

LOAEL = lowest observable adverse effect level

NOAEL = no observable adverse effect level

Partial Life-cycle = exposures of each of two or more groups of individuals of a species of fish to a different concentration of the test material through most portions of a life cycle-allowed with fish species that require more than a year to reach sexual maturity, so that all major life stages can be exposed to the test material in less than 15 months

Table 2. Tests parameter descriptions and reasons for use in determining if the toxicity test results are acceptable for use in performing an additive review

Test Parameter	Reason Why Test Parameter Is Important
REQUIRED TEST PARAMETERS	
Test method	Indicates which protocols were followed during the test
Exposure format	Indicates the manner in which the organisms were exposed to the substance of concern
Toxicity endpoint	The method for calculating secondary values is based on using these toxicity endpoints
Control response	If a large number of control organisms die, the calculated secondary value may be artificially lower because some other factors may be affecting the health of the organisms
ADDITIONAL TEST PARAMETERS	
Dilution water	The proper dilution water is necessary for organisms to function properly and minimizes concerns of contamination
Number of test concentrations	A large number of test concentrations provides consistency and helps reduce potential for an “all-or-nothing” response (ie, either all organisms alive or all dead)
Dilution series	A stepwise dilution series also provides consistency and helps reduce potential for an “all-or-nothing” response
Temperature	Higher or lower temperatures than those of the organism’s optimal range can affect how the substance of concern is metabolized and, thus, impact toxicity
Test duration	The shorter an organism is exposed to a toxic substance, the higher the concentration needed to cause the effect. Therefore, improper test duration can result in inaccurate secondary values
Age of organisms prior to test	Organisms must all be undergoing the same developmental processes during the test for the results to be valid
Number of organisms per test chamber	The more organisms used, the better the accuracy of the results
Number of chambers per concentration	
Number of organisms per concentration	

- C. The DNR staff member determines if the toxicity test results are acceptable to use for the additive review (see Tables 1 and 2).
- D. The *Secondary Value Calculator* automatically calculates the Species Mean Acute Value (SMAV) by taking the geometric mean of all available toxicity test results for a given species and the Genus Mean Acute Value (GMAV) by taking the geometric mean of all SMAVs for a given genus.

- E. The *Secondary Value Calculator* automatically calculates the Secondary Acute Values (SAVs) for the appropriate designated use classification(s). The SAV equals the lowest Genus Mean Acute Value (GMAV) divided by the Secondary Acute Factor (SAF); the SAF is automatically selected based on how many different organism classes are represented.

Table 3: Applicable Secondary Acute Factor (SAF)

Number of organism classes represented	SAF
1	21.9
2	13
3	8
4	7
5	6.1
6	5.2
7	4.3

Step 3: Secondary Chronic Value (SCV) calculation

- A. The DNR staff member enters all chronic toxicity test results for the substance into the *Secondary Value Calculator*.

Note: The calculator yields Secondary Chronic Values (SCVs) even if no chronic toxicity test results are available.

- B. The DNR staff member determines if the toxicity test results are acceptable to use for the additive review (see Step 2B for more details).

- C. The *Secondary Value Calculator* automatically calculates the Toxicity Test Acute-Chronic Ratio (TACR). The TACR is the Species Mean Acute Value (SMAV) divided by Species Mean Chronic Value (SMCV) for each species.

- D. The *Secondary Value Calculator* automatically calculates the Species Mean Acute-Chronic Ratio (SMACR). The SMACR is the geometric mean of all available TACRs for a given species.

Note: A SMACR is required for the following organism categories: fish, invertebrate, sensitive freshwater species. If no TACRs are available for a category, a default SMACR of 18 is used.

- E. The *Secondary Value Calculator* automatically calculates the Secondary Acute-Chronic ratio (SACR). The SACR is the geometric mean of the Species Mean Acute Chronic Ratios (SMACRs) for at least one species (or default value) in each organism category.

- F. The *Secondary Value Calculator* automatically calculates the Secondary Chronic Values (SCVs) for the appropriate designated use classification(s). The SCV equals the Secondary Acute Value (SAV) divided by the Secondary Acute-Chronic Ratio (SACR).

Step 4: Allowable usage rate determination

- A. Once the *Secondary Value Calculator* is completed, the applicable secondary acute and chronic values are automatically populated into the “Secondary Value Report.”
- B. The DNR staff member calculating the secondary value (i.e., WQBEL calculator, Water Resources engineer) makes a final decision whether to approve or disapprove the use of the product as requested and sends a copy of the Secondary Value Report to the WDNR staff member who received the request and the Water Evaluation Section Toxicologist.
- C. The WDNR staff member who received the request determines the allowable usage concentration (i.e., the level of the additive acceptable for use).
- Wastewater Permit staff
 - Once the secondary acute and secondary chronic values are calculated, an allowable application rate is determined.
 - To estimate the effluent concentration, the following are considered:
 - The maximum proposed application/dosage rate
 - Any dilution that would be expected to occur with other effluent streams prior to discharging, using low flow conditions as conservative estimates.
 - No degradation of the additive is typically assumed.
 - In some instances, the water containing the additive may be mixed with other wastewater that dilutes the concentration prior to discharging. In these instances, the additive may be at the intended concentration where added but well below that concentration at the discharge point. Therefore, the estimated effluent concentration is typically compared to a water quality based effluent limitation (WQBEL) equal to the acute secondary value. Table 3 lists the typical approval conditions based on the comparison between the estimated effluent concentration and WQBEL.

Table 4. Proposed decision matrix for additive decisions

Estimated Effluent Concentration	Potential Outcome
Significantly less than the lowest calculated WQBEL (typically < 1/5 th of the limit)	Additive may be approved for use at the proposed application rate. WQBEL is not required, as long as application rate does not increase.*
Less than the lowest calculated WQBEL but greater than 1/5 th of the limit	Additive may be approved for use at the proposed application rate, but staff should use best professional judgment to determine if a WQBEL or use restriction should be included in the permit to insure that additive use does not increase.*
Greater than the lowest calculated WQBEL	The additive is not approved for use at the proposed application rate.*

* Staff should clearly document decisions about additive approvals (or denials) and/or the need for WQBELs in permit fact sheets accompanying reissued permits or in written correspondence to the permittee, if changes in additive use are being evaluated during the permit term.

- **Runoff management staff**

- Once the Secondary Values have been calculated, Runoff Management staff calculate the allowable application rate for the product using the procedures detailed in the following documents:
 - Water Application for Sediment Control Additives - DNR Conservation Standard 1051: dnr.wi.gov/topic/stormWater/documents/dnr1051.pdf
 - Land Application for Erosion Control Additives - DNR Conservation Standard 1050: dnr.wi.gov/topic/stormWater/documents/dnr1050-polyacrylimide.pdf
 - Water Application of Additives for Manure Sedimentation (in development)
- This final allowable application rate is compared to the proposed application rate to determine if the product can be used as requested.
- Runoff management staff prepare a letter to the applicant that states the application rate at which the product can be used in Wisconsin and whether or not the product can be used as proposed. Department of Transportation staff are provided this information as necessary.

D. Once a final decision is made on whether to approve or disapprove the use of the product as requested, the Water Evaluation Toxicologist is provided with a copy of the "Secondary Value Report" for tracking purposes.

- For Wastewater additive reviews, WQBEL calculators include the additive review report in the official permit file and upload it into SWAMP. Associated permits, fact sheets, and/or approval letters, should reflect approval (or denial) decisions and should be added to SWAMP so that others can tell why decisions were made.
- For runoff management additive reviews, the staff member responsible for calculating the allowable usage rate (Jan Kucher: jan.kucher@wisconsin.gov or 608-266-9260) adds the product information and allowable application rate to WDNR's *List of Water-Applied Additives for Sediment Control Completing Toxicity Testing* Table or the WisDOT Product Acceptability List (PAL) *for Land-Applied Additives for erosion control*.

3. DETERMINING THE NEED FOR WET TESTING (WASTEWATER REVIEWS)

For wastewater dischargers, whole effluent toxicity (WET) tests may be needed to determine the potential for impacts to the receiving stream fish and aquatic life community from point source discharges. These tests may be needed in addition to or in lieu of secondary values. The Whole Effluent Toxicity (WET) Checklist (described in Chapter 1.3 of the WET Guidance Document: <http://dnr.wi.gov/topic/wastewater/WETguidance.html>) was designed to help WDNR staff make decisions regarding the appropriate WET monitoring frequencies for wastewater effluents discharged to surface waters, based on their potential to exhibit toxicity. The Checklist assesses a wastewater's toxicity potential by assigning points for industry type (or industrial contributors), wastewater treatment type and operations, and other factors. Since many of these factors may be absent when the discharge does not contain process wastewaters the Checklist may not apply well to those situations; examples of this include discharges that are made up solely of cooling water, boiler blowdown, or cooling tower blowdown.

This guidance document is intended to apply to those situations that do not fit well into the Checklist, specifically when secondary values for additives may be needed to protect against effluent toxicity. In situations where more complex wastewaters are being evaluated, the WET Checklist may be more appropriate for use in determining whether WET testing is needed to protect against effluent toxicity. WET testing should be considered when any of the following conditions apply:

- When the toxicity data needed to calculate secondary values are not made available to the WDNR.
- When historical or projected use of an additive suggests that the effective dose may exceed $1/5^{\text{th}}$ of the calculated secondary value.
- When a discharge contains multiple additives that are likely to be discharged simultaneously.

If WDNR staff are unsure which process should be applied to a given situation, they should contact the Biomonitoring Coordinator (Kari Fleming: kari.fleming@wisconsin.gov or 608-267-7663).

The amount of WET monitoring that is needed in a given situation will be site-specific and will depend on the number of additives used simultaneously and the discharge conditions involved. The monitoring frequencies recommended below are an attempt to cover some of the possible discharge scenarios that may call for WET testing.

Table 5. Recommended WET testing monitoring frequencies for dischargers with multiple additives

Monitoring Frequency	Number of Additives	WET test conducted on effluent that is likely to contain the
Once a year	1	Additive or its residual*
for first 2 years	≥2 that are likely to be discharged simultaneously	Mixture or the residual of the mix
Once every 3 months	>2 that are not likely to be discharged simultaneously	Additive or its residual
for the first 9 months		
* This recommendation applies independently to each additive used unless otherwise noted.		

Note: These recommendations represent the **minimum** frequencies recommended to evaluate the reasonable potential for additive-related impacts to receiving stream fish and aquatic life communities. These frequencies should be increased if there are case-specific reasons that warrant a further evaluation of the reasonable potential.

Best professional judgment should be used to determine if any unusual circumstances exist that may warrant additional testing. Examples of discharge/additive-specific circumstances that may require additional testing include known effects of water chemistry (temperature, pH, etc.) on the toxicity of an additive, changes in the receiving stream species composition on a seasonal basis, etc.

4. GLOSSARY

- **Additive:** substance, typically a commercial product, that has the potential to be directly discharged to a surface water and may cause toxicity to fish and aquatic organisms,
- **Acute Toxicity Criterion:** maximum daily concentration of a substance which ensures adequate protection of sensitive species of aquatic life from the acute toxicity of that substance and will adequately protect the designated fish and aquatic life use of the surface water if not exceeded more than once every 3 years,
- **Biocide:** a chemical substance (e.g., pesticide, herbicide, fungicide) or microorganism which is used to deter or kill living organisms through chemical or biological means.
- **CAS number:** unique numerical identifier assigned by Chemical Abstracts Service (CAS) to every chemical substance described in the open scientific literature.
- **Chronic Toxicity Criterion:** the maximum 4-day concentration of a substance which ensures adequate protection of sensitive species of aquatic life from the chronic toxicity of that substance and will adequately protect the designated fish and aquatic use of the surface water if not exceeded more than once every 3 years.
- **Clarifying agent:** chemicals that are used to remove suspended particles from liquids by inducing flocculation.
- **Effective Concentration 50% (EC₅₀):** concentration of a toxic substance which causes an adverse effect including mortality in 50% of the exposed organisms in a given time period.
- **Flocculent log:** a block made of polymers and/or other additives used reduce and prevent fine and colloidal particles from entering stormwater.
- **Frac sand:** quartz sand used in hydraulic fracturing (i.e., fracking) to produce oil, natural gas, or other petroleum-based materials.
- **Genus Mean Acute Value (GMAV):** the geometric mean of the all species mean acute values (SMAVs) for a given genus.
- **Lethal Concentration 50% (LC₅₀):** concentration of a toxic substance which is lethal to 50% of the exposed organisms in a given time period.
- **Lowest observable adverse effect level (LOAEL):** the lowest tested concentration that caused an adverse effect in comparison with a control when all higher test concentrations caused the same effect.
- **Material safety data sheet (MSDS):** a document that outlines chemical information and procedures for handling and working with the chemical; typically include physical and chemical property information, potential hazard information, emergency procedures, and manufacturer contact information. MSDS are now referred to as Safety Data Sheets (SDS).
- **No observable adverse effect level (NOAEL):** highest tested concentration that did not cause an adverse effect in comparison with a control when no lower test concentration caused an adverse effect.
- **Polymer:** natural or synthetic materials that have a chain of carbon molecules that are identical, repeating units.

- **Secondary Acute Factor (SAF):** safety factor based on how many different organism classes are represented in the available data.
- **Secondary Acute Value (SAV):** temporary value that represents the concentration of a substance which ensures adequate protection of a sensitive species of aquatic life to adverse effects from acute exposure to that substance; equal to the lowest genus mean acute value divided by the appropriate secondary acute factor for a given fish and aquatic life designated use subclassification.
- **Secondary Acute-Chronic Ratio (SACR):** The geometric mean of at least one Species Mean Acute-Chronic Ratio (SMACR) for each of the following categories. Used when a final acute-chronic ratio FACR cannot be calculated because all of the required data is not available.
- **Secondary Chronic Value (SCV):** temporary value that represents the concentration of a substance which ensures adequate protection of a sensitive species of aquatic life to adverse effects from acute exposure to that substance; equal to the appropriate secondary acute value (SAV) divided by the secondary acute-chronic ratio (SACR) for a given fish and aquatic life designated use subclassification.
- **Species mean acute value (SMAV):** the geometric mean of all acceptable acute toxicity values for a given species.
- **Species Mean Acute-Chronic Ratio (SMACR):** the geometric mean of all available TACRs for a given species. A SMACR is required for the following organism categories: fish, invertebrate, sensitive freshwater species.
- **Species Mean Chronic Value (SMCV):** the geometric mean of all acceptable chronic toxicity values for a given species.
- **System for Wastewater Applications, Monitoring and Permits (SWAMP):** a computer system designed to assist with management of the WPDES Permit Program.
- **Toxicity Test Acute-Chronic Ratio (TACR):** the Species Mean Acute Value (SMAV) divided by Species Mean Chronic Value (SMCV) for toxicity test available for each species.
- **Water quality based effluent limits (WQBEL):** effluent limitations established by the department to meet applicable water quality standards.
- **Whole Effluent Toxicity (WET):** toxicological testing conducted on point-source end-of-pipe effluent to measure, predict, and control the discharge of materials that may be harmful to aquatic life.
- **Wisconsin Department of Transportation (WisDOT):** state agency responsible for addressing transportation erosion aspects.
- **Wisconsin Pollution Discharge Elimination System (WPDES):** As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. In most cases, the NPDES permit program is administered by delegated states. The Wisconsin DNR administers the Wisconsin Pollutant Discharge Elimination System (WPDES) permit program for discharges to waters of the state.

5. REFERENCES

- "Water Quality Guidelines for the Great Lakes System" 40 CFR 132 (1995)
- Weber, C., et al. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 5th Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH. EPA/600/4-90/027F.
(http://water.epa.gov/scitech/methods/cwa/wet/disk2_index.cfm)
- Weber, C., et al. 2002. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms*, 4th Edition. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH. EPA-821-R-02-013.
(http://water.epa.gov/scitech/methods/cwa/wet/disk3_index.cfm)
- Wisconsin Department of Natural Resources. 2001. Erosion Control Land Application of Anionic Polyacrylamide (Technical Standard 1050).
<http://dnr.wi.gov/topic/stormWater/documents/dnr1050-polyacrylimide.pdf>
- Wisconsin Department of Natural Resources. 2002. *Interim Sediment Control Water Application of Polymers* (Technical Standard 1051).
<http://dnr.wi.gov/topic/stormWater/documents/dnr1051.pdf>
- Wisconsin Department of Natural Resources. 2004. State of Wisconsin Aquatic Life Toxicity Testing Methods Manual, 2nd edition.(<http://dnr.wi.gov/topic/wastewater/WET.html>)
- Wisconsin Department of Natural Resources. 2014. *Whole Effluent Toxicity Program Guidance Document, Revision #9*.
(<http://dnr.wi.gov/topic/wastewater/WETguidance.html>)

Appendix A

Tutorial for Using the *Secondary Value Calculator* for Wastewater Additive Reviews

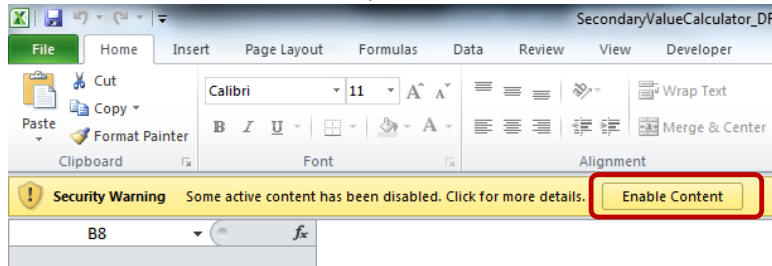
GENERAL TIPS

- **Save Before Changing-** Save the additive review spreadsheet under a new name before making edits to the spreadsheet.
- **Locked Cells-** This spreadsheet has locked cells to avoid editing the wrong features, unlocked cells to be edited by the WDNR staff are highlighted in blue.
- **Copy and Paste-** To copy and paste text into highlighted cells double click the appropriate cell first, so the text cursor appears in the cell. You cannot simply click the cell and paste text without being in the “text” mode.
- **Watch for “red flags”-** Red flags are comment features in excel, and provide additional information for the person filling out the spreadsheet.
- **Deleting Selection** - To delete dropdown information, click the incorrect cell and press the backspace or delete key.

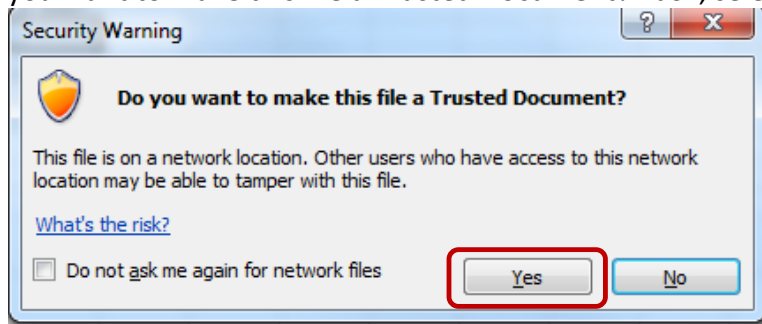
SECONDARY VALUES REPORT

This is the first sheet that should come up when you open the spreadsheet.

Step 1: In the “Macros has been disabled” box, select “Enable Content”.



Step 2: In the “Do you want to make this file a Trusted Document?” box, select “Yes”.

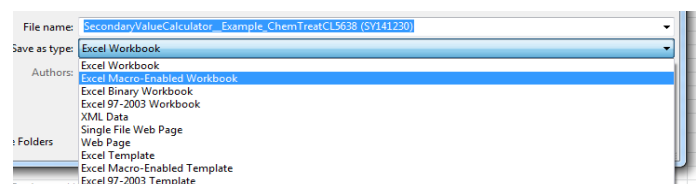
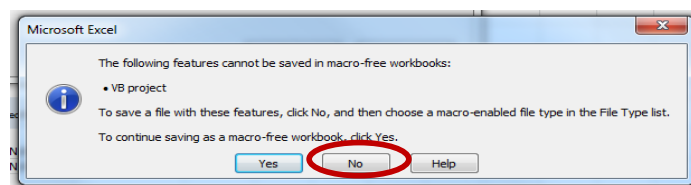


Step 3: Save the document in the appropriate subfolder in the “Approved Reviews” folder on the Water drive under a new name using the format: Year_Product Name_Initials.

[\water\WQWT PROJECTS\WY CP Additives\Approved reviews\Wastewater](#)

Tip: A separate folder can be created to store additional files (product information, safety data sheets, etc)

Tip: If you get an error when trying to save (see box below), click “No” and select “Excel Macro-Enabled Workbook” under “Save as Type”.



Step 4: In the “General Information” section, fill in all highlighted cells for which you have data. You will likely need to refer to previous permit documents, SWAMP data, and MSDS sheets to complete this tab.

Step 5: For “Designated Use Classification”, select the appropriate box(es).

NOTE: The applicable secondary acute and chronic value rows (Rows 19 and 20) will automatically fill-in with the correct data once you fill out the rest of the spreadsheet.

Step 6: In the “Product Application” section, fill in all highlighted cells for which you have data. You will likely need to refer to previous permit documents, SWAMP data, and MSDS sheets to complete this tab.

General Information					
WDNR Staff Completing Review Name:	Amanda Minks				
WDNR Staff Email:	Amanda.Minks@Wisconsin.Gov				
Facility Name (Wastewater staff):	Minkstopia				
WPDES Permit Number (if applicable):	WI-	0000916			
Product Trade Name:	Biomate MCB2881				
Product Manufacturer:	GE Water & Process Technologies				
Active Ingredients:	Ingredient Name*	CAS Number*	%wt or %vol*		
	DBNPA	10222-01-02	15-40		
	SODIUM BROMIDE	7647-15-6	3-7		
	DIBROMOACETONITRILE	3252-43-5	1-5		
* Copy from MSDS sheet, if available					
<input type="checkbox"/>					
Product Secondary Values					
Select Designated Use Classification:	<input type="checkbox"/> Cold Water/Runoff Application <input type="checkbox"/> Warm Water <input type="checkbox"/> Limited Forage Fish <input type="checkbox"/> Limited Aquatic Life				
Applicable Secondary Acute Value:	N/A	N/A	N/A	N/A	mg/L
	N/A	N/A	N/A	N/A	µg/L
Applicable Secondary Chronic Value:	N/A	N/A	N/A	N/A	mg/L
	N/A	N/A	N/A	N/A	µg/L
Product Application Information					
Purpose of Additive:	Biocide				
Does WPDES permit currently have a limit for this additive?	No				
Effective concentration:					mg/L
Average dosage rate:					lbs/day
Estimated maximum discharge					mg/L

From MSDS Sheet (Step 4)

Select appropriate classification(s) (Step 5)

Will be populated once you complete other tabs

From permittee (Step 6)

Don't forget to save!

A (ACUTE)

Step 7: Use the dropdown menus to fill in the toxicity information provided from the MSDS sheet(s) and/or lab sheet(s). This should also include test method data provided by the lab.

Tip: Test method data may be available via lab reports or through lab correspondence.

Work with the permittee to ascertain these data.

Tip: Contact the Water Evaluation Toxicologist if toxicity data are provided for species other than those listed in A (Acute) tab.

Tip: Only 48-hour and 96-hour toxicity endpoints should be used in this tab.

Step 8: Review the spreadsheet, in particular the “Acceptable?” column (Column L), to determine if data can be used to calculate secondary values. Column L will automatically be labeled “Yes” if data are acceptable. In some cases, data is not flagged as acceptable because “Other” was selected as the “Test Method” (Column H). If this is the case, go to Step 9 in B (Acute-Optional) tab to determine if this data can be used in the calculation.

Taxa Category	Genus	Species	Common Name	Test Duration & Endpoint	Toxicity Test Result Value	Units	Test Method	Exposure Format	Control Response	Acceptable?
Planktonic Crustacean	Ceriodaphnia	dubia	Cladoceran (water flea)							N/A
										N/A
		reticulata	Water flea							N/A
										N/A
		serrulatus	Water flea							N/A
	Daphnia	magna	Water flea	48-hr LC50	3.30	mg/L (ppm)	EPA 2021.0	Static-renewal	≥ 90% survival	Yes
		pulex	Water flea							N/A
										N/A
	Simocephalus	serrulatus	Water flea							N/A
		vetulus	Water flea							N/A
Non-Salmonid Fish	Pimephales	promelas	Fathead minnow	96-hr LC50	8.70	mg/L (ppm)	EPA 2000.0	Static-renewal	≥ 90% survival	Yes
	Lepomis	Macrochirus	Bluegill	96-hr LC50	6.50	mg/L (ppm)	Wt certified	Static-renewal	≥ 90% survival	Yes
										N/A
Salmonid Fish	Oncorhynchus	mykiss	Rainbow trout	96-hr LC50	2.30	mg/L (ppm)	Other	Static non-	≥ 90% survival	No
	Salvelinus	fontinalis	Brook trout							N/A
										N/A
Other*							Wt certified method			N/A
Other*							EPA 2002.0			N/A
Other*							EPA 2021.0			N/A
Other*							EPA 2000.0			N/A
Other*							EPA 2019.0			N/A
Other*							Other			N/A

Only data from rows labeled “Yes” is included in the calculation

If Test Method is “Other”, go to Tab B (Acute-Optional).

B (ACUTE-OPTIONAL)

Note: This tab is used for data that for which "Other" was selected as the "Test Method" (see step 8).

Step 9 (optional): Use the dropdown menus to select the test parameters used to generate the toxicity endpoint. All fields must be filled in before the data can be considered acceptable. Contact the Water Evaluation Toxicologist with questions. Once completed, go to C (Acute) tab.

Toxicity Test Parameters	Water flea			Fathead Minnow	Bluegill	Rainbow Trout
	(Ceriodaphnia spp.)	(Daphnia spp.)	(Simocephalus spp.)	(Pimephales promelas)	(Lepomis macrochirus)	(Oncorhynchus mykiss)
Temperature:		25±1 °C				
Dilution water:		20±1 °C 25±1 °C Other				
Number of test concentrations:		≥ 5 + control				
Dilution series setup:		≥0.5 dilution series				
Age of test organisms:		< 24 h				
Number of organisms/test chamber:		≥ 5				
Number of replicate chambers per concentration:		≥ 4				
Number of organisms per concentration:		≥ 20				
Data acceptable?	No	Yes	No	No	No	No

Don't forget to save!

C (ACUTE)

Step 10: *No action is necessary in this tab.* DNR staff may wish to review to verify findings. All information is automatically entered into tab and a SAV is calculated. The final SAVs are highlighted in orange.

Taxa Category	Genus	Species	Common Name	Test Result mg/L	SMAV mg/L	GMAV mg/L	Designated Use Classification			
							CW	WW	LFF	LAL
Planktonic Crustacean	Ceriodaphnia	dubia	Water flea		N/A					
		reticulata	Water flea		N/A	N/A	X	X	X	X
		serrulatus	Water flea		N/A					
	Daphnia	magna	Water flea	3.30	3.30					
		pulex	Water flea		N/A	3.30	X	X	X	X
	Simocephalus	serrulatus	Water flea		N/A					
		vetulus	Water flea		N/A	N/A	X	X	X	
Non-Salmonid Fish	Pimephales	promelas	Fathead minnow	8.70	8.70	8.70	X	X	X	
	Lepomis	Macrochirus	Bluegill	6.50	6.50	6.50	X	X	X	
Salmonid Fish	Oncorhynchus	mykiss	Rainbow trout	2.30	2.30	2.30	X			
	Salvelinus	fontinalis	Brook trout		N/A	N/A	X			
				SAF: 8						
				Lowest GMAV: 2.30 3.30 3.30 3.30						
				Calculated SAV: 0.29 0.41 0.41 0.41						
				Selected SAV: 0.288 0.413 0.413 0.413 mg/L						
				287.5 412.5 412.5 412.5 µg/L						

D (CHRONIC)

Step 11: Determine whether chronic data have been submitted to DNR for review. If chronic data have been submitted, proceed to Step 12. If no chronic data is submitted, go to Step 16 (“Secondary Values Report” Tab). A secondary chronic value will be calculated using default parameters.

Step 12: Use the dropdown menus to fill in the toxicity information provided from the MSDS sheet(s) and/or lab sheet(s). This should also include test method data provided by the lab.

Tip: Test method data may be available via lab reports or through lab correspondence. Work with the permittee to ascertain these data.

Tip: Contact the Water Evaluation Toxicologist if toxicity data are provided for species other than those listed in D (Chronic) tab.

Tip: Only long-term toxicity endpoints (e.g., NOAEL, LOAEL) should be used in this tab.

Step 13: Review the spreadsheet, in particular the “Acceptable?” column (Column M), to determine if data can be used to calculate secondary values. Column M will automatically be labeled “Yes” if data are acceptable. In some cases, data is not flagged as acceptable because “Other” was selected as the “Test Method” (Column I). If this is the case, go to Step 14 in E (Chronic-Optional) tab to determine if this data can be used in the calculation.

Taxa Category	Genus	Species	Common Name	Test Type	Test Endpoint	Toxicity Test Result Value	Units	Test Method	Exposure Format	Control Response	Acceptable?
Invertebrate	Ceriodaphnia	dubia	Water flea								N/A
	Ceriodaphnia	reticulata	Water flea								N/A
	Ceriodaphnia	serrulatus	Water flea								N/A
	Daphnia	magna	Water flea	Reproduction	NOEL/NOAEL	0.35	mg/L (ppm)	EPA 1002.0	Flow-through	280% survival	Yes
	Daphnia	pulex	Water flea								N/A
	Simocephalus	serrulatus	Water flea	Survival	LOEL/LOAEL	1.50	mg (ppm)	Other	Static non-renewal	280% survival	No
	Simocephalus	vetulus	Water flea								N/A
	Pimephales	promelas	Fathead minnow								N/A
	Lepomis	Macrochirus	Bluegill								N/A
	Oncorhynchus	mykiss	Rainbow trout								N/A
Fish	Salvelinus	fontinalis	Brook trout								N/A
	Other*										N/A
	Other*										N/A
	Other*										N/A
	Other*										N/A

Only data from rows labeled “Yes” is included in the calculation

If Test Method is “Other”, go to Tab B (Acute-Optional).

Don’t forget to save!

E (CHRONIC-OPTIONAL)

Note: This tab is used for data that for which "Other" was selected as the "Test Method" (see step 13).

Step 14 (optional): Use dropdown menus to select the test parameters used to generate the toxicity endpoint. All fields must be filled in before the data will be considered acceptable. Contact the Water Evaluation Toxicologist with questions. Once completed, go to F (Chronic) tab.

Toxicity Test Parameters	Water flea			Fathead Minnow
	(Ceriodaphnia spp.)	(Daphnia spp.)	(Simocephalus spp.)	(Pimephales promelas)
Test duration:	≤ 8 days			
Temperature:	20±1 °C			
Dilution water:	Synthetic water			
Number of test concentrations:	≥ 5 + control			
Dilution series setup:	≥0.5 dilution series			
Age of test organisms:	< 24 h			
Number of organisms/test chamber:	< 24 h Other			
Number of replicate chambers per concentration:	≥ 10			
Number of organisms per concentration:	≥ 10			
Data acceptable?	Yes	No	No	No

F (CHRONIC)

Step 15: *No action is necessary in this tab.* DNR staff may wish to review to verify findings. All information is automatically entered into tab and a SCV is calculated. The final SCVs are highlighted in orange.

Taxa Category	Genus	Species	Common Name	SMAV mg/L	Chronic Test Value mg/L	SMCV	SMACR	Designated Use Classification			
								CW	WW	LFF	LAL
Invertebrate	Ceriodaphnia	dubia	Water flea					X	X	X	X
	Ceriodaphnia	reticulata	Water flea					X	X	X	X
	Ceriodaphnia	serrulatus	Water flea					X	X	X	X
	Daphnia	magna	Water flea	3	FALSE			X	X	X	X
	Daphnia	pulex	Water flea					X	X	X	X
	Simocephalus	serrulatus	Water flea		1.500	1.50		X	X	X	X
	Simocephalus	vetulus	Water flea					X	X	X	X
Invertebrate SMACR:						18.00	(default)				
Fish	Pimephales	promelas	Fathead minnow	8.7				X	X	X	
	Lepomis	Macrochirus	Bluegill	6.5				X	X		
	Oncorhynchus	mykiss	Rainbow trout	2.3				X			
	Salvelinus	fontinalis	Brook trout					X			
Fish SMACR:						18.00	(default)				
Sensitive Freshwater Species SMACR:						9.43					
SACR:								13.027	14.510	14.510	13.027
Selected SAV:								0.288	0.413	0.413	0.413
Calculated SCV:								0.022	0.028	0.028	0.032
Selected SCV:								0.02	0.03	0.03	0.03 mg/L
								22.1	28.4	28.4	31.7 µg/L

Don't forget to save!

SECONDARY VALUES REPORT

Step 16: Return to “Secondary Values Report” Tab. The appropriate final secondary acute and chronic values are highlighted in orange.

Note: If the SAV/SCV is greater than 0.1 mg/L (100 µg/L), the value with units of mg/L will be highlighted. If the SAV/SCV is less than 0.1 mg/L (100 µg/L), the value with units of µg/L will be highlighted.

Product Secondary Values					
Select Designated Use Classification:	<input type="checkbox"/> Cold Water/Runoff Application	<input checked="" type="checkbox"/> Warm Water	<input type="checkbox"/> Limited Forage Fish	<input type="checkbox"/> Limited Aquatic Life	
Applicable Secondary Acute Value:	N/A	0.413	N/A	N/A	mg/L
	N/A	413	N/A	N/A	µg/L
Applicable Secondary Chronic Value:	N/A	8.83	N/A	N/A	mg/L
	N/A	28.4	N/A	N/A	µg/L

Step 17: Use the SAV and SCV to derive water-quality based effluent limits (WQBEL) using the procedures described in ss. NR 106, Wis. Adm. Code.

Appendix B

Tutorial for Using the *Secondary Value Calculator* for Runoff Management Additive Reviews

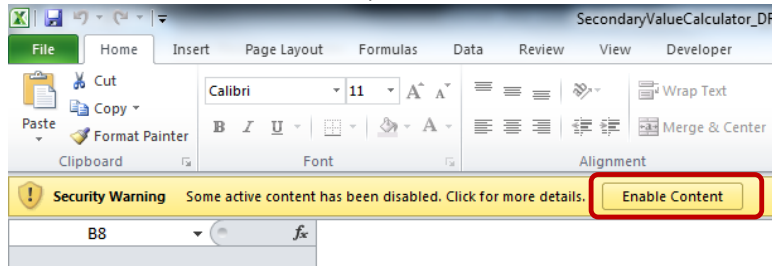
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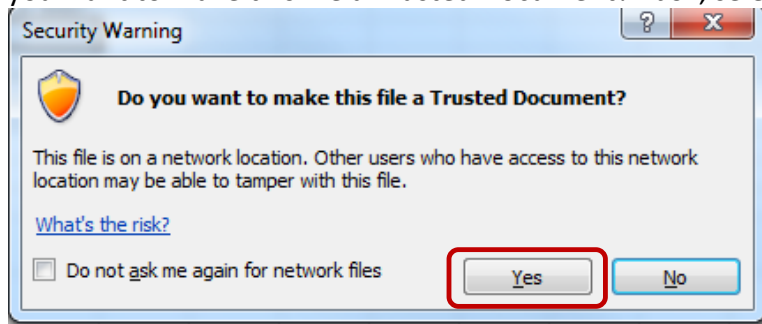
SECONDARY VALUES REPORT

This is the first sheet that should come up when you open the spreadsheet.

Step 1: In the “Macros has been disabled” box, select “Enable Content”.



Step 2: In the “Do you want to make this file a Trusted Document?” box, select “Yes”.

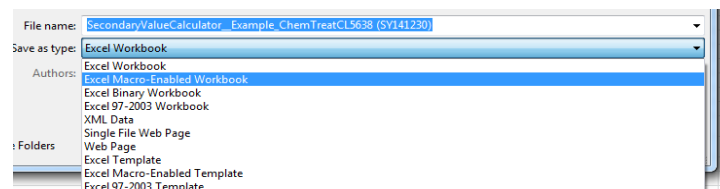
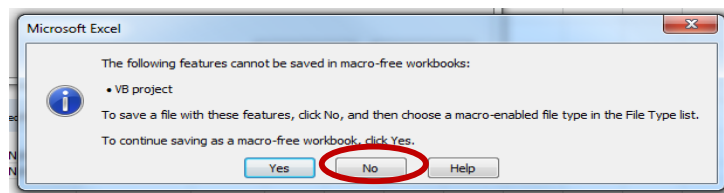


Step 3: Save the document in the appropriate subfolder in the “Approved Reviews” folder on the Water drive under a new name using the format: Year_Product Name_Initials.

[\water\WQWT PROJECTS\WY CP Additives\Approved reviews\Runoff](#)

Tip: A separate folder can be created to store additional files (product information, safety data sheets, etc.)

Tip: If you get an error when trying to save (see box below), click “No” and select “Excel Macro-Enabled Workbook” under “Save as Type”.



Step 4: In the “General Information” section, fill in all highlighted cells for which you have data. You will likely need to refer to MSDS sheets and product technical documents to complete this tab.

Step 5: For “Purpose of Additive”, select the appropriate box. Once selected, additional rows will appear.

NOTE: The applicable secondary acute and chronic value rows (Rows 15 and 16) will automatically fill-in with the correct data once you fill out the rest of the spreadsheet.

General Information			
WDNR Staff Completing Review:	Jan Kucher		
WDNR Staff Email:	Jan.Kucher@Wisconsin.gov		
Applicant Contact Information:			
Product Trade Name:	CleanWater CW100		
Product Manufacturer:	Water is Great, Inc.		
Active Ingredients:	Ingredient Name*	CAS Number*	%wt or %vol*
	Cationic Polymer	N/A	25
* Copy from MSDS sheet, if available			
Product Secondary Values			
Secondary Acute Value:	N/A	mg/L	
Secondary Chronic Value:	N/A	mg/L	
Purpose of Additive (select one):	<div style="border: 2px solid red; padding: 10px;"> Product Application Information <input type="checkbox"/> Water Application for Sediment Control Land Application for Erosion Control Products ↳ <input type="checkbox"/> Non-Soluble Solid <input checked="" type="checkbox"/> Polymer or other soluble solid <input type="checkbox"/> Additive for Manure Sedimentation </div>		

From MSDS Sheet (Step 4)

Will be populated once you complete other tabs

Once selected, the appropriate boxes will fill in below (Step 5)

Step 6: In the “Product Application” section, fill in all highlighted cells

- For Water Application for Sediment Control, enter the proposed application rate.

Product Application Information		
Purpose of Additive (select one):	<input checked="" type="checkbox"/> Water Application for Sediment Control	
	Land Application for Erosion Control Products	
	<input type="checkbox"/> Non-Soluble Solid <input type="checkbox"/> Polymer or other soluble solid <input type="checkbox"/> Additive for Manure Sedimentation	
Water Application for Sediment Control		
Proposed Application Rate:	3.00	lbs/acre-ft
Allowable Application Rate:		lbs/acre-ft

From applicant

Will be populated once you complete other tabs

- For Land Application for Erosion Control Products—Non-Soluble Solid, a different process is used (see Appendix D for steps).

Product Application Information	
Purpose of Additive (select one):	<input type="checkbox"/> Water Application for Sediment Control
	Land Application for Erosion Control Products
	<input checked="" type="checkbox"/> Non-Soluble Solid <input type="checkbox"/> Polymer or other soluble solid <input type="checkbox"/> Additive for Manure Sedimentation

- For Land Application for Erosion Control Products—Polymer or other soluble solid, enter the proposed application rate.

Product Application Information		
Purpose of Additive (select one):	<input type="checkbox"/> Water Application for Sediment Control	
	Land Application for Erosion Control Products	
	<input type="checkbox"/> Non-Soluble Solid <input checked="" type="checkbox"/> Polymer or other soluble solid <input type="checkbox"/> Additive for Manure Sedimentation	
Land Application for Erosion Control (Soluble Solid)		
Proposed Application Rate:	3.00	lbs/acre
Allowable Application Rate:		lbs/acre

From applicant

Will be populated once you complete other tabs

- For Manure Additive for Nutrient Management, enter the appropriate information

Product Application Information		
Purpose of Additive (select one):	<input type="checkbox"/> Water Application for Sediment Control	
	Land Application for Erosion Control Products	
	<input type="checkbox"/> Non-Soluble Solid <input type="checkbox"/> Polymer or other soluble solid <input checked="" type="checkbox"/> Additive for Manure Sedimentation	
Additives for Manure Sedimentation		
Proposed Application Rate:	510	lbs/day
Raw Manure Flow Rate:	100000	gallons/day
Rate of manure solid separation:	92000	lb solid manure/day
Manure spreading rate:	2.4	tons/acre
Manure incorporation depth:	3	inches
Soil density:	1900	tons/acre-ft
Allowable Application Concentration:		mg additive/L

From applicant (Step 5)

Will be populated once you complete other tabs

Don't forget to save!

A (ACUTE)

Step 7: Use the dropdown menus to fill in the toxicity information provided from the MSDS sheet(s) and/or lab sheet(s). This should also include test method data provided by the lab.

Tip: Test method data may be available via lab reports or through lab correspondence. Work with the applicant to ascertain these data.

Tip: Contact the Water Evaluation Toxicologist if toxicity data are provided for species other than those listed in A (Acute) tab.

Tip: Only 48-hour and 96-hour toxicity endpoints should be used in this tab.

Step 8: Review the spreadsheet, in particular the “Acceptable?” column (Column L), to determine if data can be used to calculate secondary values. Column L will automatically be labeled “Yes” if data are acceptable. In some cases, data is not flagged as acceptable because “Other” was selected as the “Test Method” (Column H). If this is the case, go to Step 9 in B (Acute-Optional) tab to determine if this data can be used in the calculation.

Taxa Category	Genus	Species	Common Name	Test Duration & Endpoint	Toxicity Test Result Value	Units	Test Method	Exposure Format	Control Response	Acceptable?
Planktonic Crustacean	Ceriodaphnia	dubia	Cladoceran (water flea)							N/A
										N/A
		reticulata	Water flea							N/A
										N/A
		serrulatus	Water flea							N/A
	Daphnia	magna	Water flea	48-hr LC50	3.30	mg/L (ppm)	EPA 2021.0	Static-renewal	≥ 90% survival	Yes
		pulex	Water flea							N/A
										N/A
	Simocephalus	serrulatus	Water flea							N/A
		vetulus	Water flea							N/A
Non-Salmonid Fish	Pimephales	promelas	Fathead minnow	96-hr LC50	8.70	mg/L (ppm)	EPA 2000.0	Static-renewal	≥ 90% survival	Yes
	Lepomis	Macrochirus	Bluegill	96-hr LC50	6.50	mg/L (ppm)	Wt certified	Static-renewal	≥ 90% survival	Yes
										N/A
Salmonid Fish	Oncorhynchus	mykiss	Rainbow trout	96-hr LC50	2.30	mg/L (ppm)	Other	Static non-	≥ 90% survival	No
	Salvelinus	fontinalis	Brook trout							N/A
										N/A
Other*										
Other*										
Other*										
Other*										
Other*										
Other*										
Other*										

Only data from rows labeled “Yes” is included in the calculation

If Test Method is “Other”, go to Tab B (Acute-Optional).

B (ACUTE-OPTIONAL)

Note: This tab is used for data that for which "Other" was selected as the "Test Method" (see step 8).

Step 9 (optional): Use the dropdown menus to select the test parameters used to generate the toxicity endpoint. All fields must be filled in before the data can be considered acceptable. Contact the Water Evaluation Toxicologist with questions. Once completed, go to C (Acute) tab.

Toxicity Test Parameters	Water flea			Fathead Minnow	Bluegill	Rainbow Trout
	(Ceriodaphnia spp.)	(Daphnia spp.)	(Simocephalus spp.)	(Pimephales promelas)	(Lepomis macrochirus)	(Oncorhynchus mykiss)
Temperature:		25±1 °C				
Dilution water:		20±1 °C 25±1 °C Other				
Number of test concentrations:		≥ 5 + control				
Dilution series setup:		≥0.5 dilution series				
Age of test organisms:		< 24 h				
Number of organisms/test chamber:		≥ 5				
Number of replicate chambers per concentration:		≥ 4				
Number of organisms per concentration:		≥ 20				
Data acceptable?	No	Yes	No	No	No	No

Don't forget to save!

C (ACUTE)

Step 10: *No action is necessary in this tab.* DNR staff may wish to review to verify findings. All information is automatically entered into tab and a SAV is calculated. The applicable final SAV is highlighted in orange.

Taxa Category	Genus	Species	Common Name	Test Result mg/L	SMAV mg/L	GMAV mg/L	Designated Use Classification			
							CW	WW	LFF	LAL
Planktonic Crustacean	Ceriodaphnia	reticulata	Water flea		N/A	N/A	X	X	X	X
		serrulatus	Water flea		N/A					
	Daphnia	magna	Water flea	3.30	3.30					
		pulex	Water flea		N/A	3.30	X	X	X	X
	Simocephalus	serrulatus	Water flea		N/A	N/A	X	X	X	
		vetulus	Water flea		N/A					
	Non-Salmonid Fish	Pimephales	promelas	8.70	8.70	8.70	X	X	X	
		Lepomis	Macrochirus	6.50	6.50	6.50	X	X	X	
Salmonid Fish	Oncorhynchus	mykiss	Rainbow trout	2.30	2.30	2.30	X			
	Salvelinus	fontinalis	Brook trout		N/A	N/A	X			
				SAF: 8						
				Lowest GMAV: 2.30 3.30 3.30 3.30						
				Calculated SAV: 0.29 0.41 0.41 0.41						
				Selected SAV: 0.288 0.41 0.41 0.41 mg/L						

D (CHRONIC)

Step 11: Determine whether chronic data have been submitted to DNR for review. If chronic data have been submitted, proceed to Step 12. If no chronic data is submitted, go to Step 16 (“Secondary Values Report” Tab). A secondary chronic value will be calculated using default parameters.

Step 12: Use the dropdown menus to fill in the toxicity information provided from the MSDS sheet(s) and/or lab sheet(s). This should also include test method data provided by the lab.

Tip: Test method data may be available via lab reports or through lab correspondence. Work with the applicant to ascertain these data.

Tip: Contact the Water Evaluation Toxicologist if toxicity data are provided for species other than those listed in D (Chronic) tab.

Tip: Only long-term toxicity endpoints (e.g., NOAEL, LOAEL) should be used in this tab.

Step 13: Review the spreadsheet, in particular the “Acceptable?” column (Column M), to determine if data can be used to calculate secondary values. Column M will automatically be labeled “Yes” if data are acceptable. In some cases, data is not flagged as acceptable because “Other” was selected as the “Test Method” (Column I). If this is the case, go to Step 14 in E (Chronic-Optional) tab to determine if this data can be used in the calculation.

Taxa Category	Genus	Species	Common Name	Test Type	Test Endpoint	Toxicity Test Result Value	Units	Test Method	Exposure Format	Control Response	Acceptable?
Invertebrate	Ceriodaphnia	dubia	Water flea								N/A
	Ceriodaphnia	reticulata	Water flea								N/A
	Ceriodaphnia	serrulatus	Water flea								N/A
	Daphnia	magna	Water flea	Reproduction	NOEL/NOAEL	0.35	mg/L (ppm)	EPA 1002.0	Flow-through	280% survival	Yes
	Daphnia	pulex	Water flea								N/A
	Simocephalus	serrulatus	Water flea	Survival	LOEL/LOAEL	1.50	mg (ppm)	Other	Static non-renewal	280% survival	No
	Simocephalus	vetulus	Water flea								N/A
	Pimephales	promelas	Fathead minnow								N/A
	Lepomis	Macrochirus	Bluegill								N/A
	Oncorhynchus	mykiss	Rainbow trout								N/A
Fish	Salvelinus	fontinalis	Brook trout								N/A
	Other*										N/A
	Other*										N/A
	Other*										N/A

Only data from rows labeled “Yes” is included in the calculation

If Test Method is “Other”, go to Tab B (Acute-Optional).

Don’t forget to save!

E (CHRONIC-OPTIONAL)

Note: This tab is used for data that for which "Other" was selected as the "Test Method" (see step 13).

Step 14 (optional): Use dropdown menus to select the test parameters used to generate the toxicity endpoint. All fields must be filled in before the data will be considered acceptable. Contact the Water Evaluation Toxicologist with questions. Once completed, go to F (Chronic) tab.

Toxicity Test Parameters	Water flea			Fathead Minnow
	(Ceriodaphnia spp.)	(Daphnia spp.)	(Simocephalus spp.)	(Pimephales promelas)
Test duration:	≤ 8 days			
Temperature:	20±1 °C			
Dilution water:	Synthetic water			
Number of test concentrations:	≥ 5 + control			
Dilution series setup:	≥0.5 dilution series			
Age of test organisms:	< 24 h			
Number of organisms/test chamber:	< 24 h Other			
Number of replicate chambers per concentration:	≥ 10			
Number of organisms per concentration:	≥ 10			
Data acceptable?	Yes	No	No	No

F (CHRONIC)


Step 15: *No action is necessary in this tab.* DNR staff may wish to review to verify findings. All information is automatically entered into tab and a SCV is calculated.

Taxa Category	Genus	Species	Common Name	SMAV mg/L	Chronic Test Value mg/L	SMCV	SMACR	Designated Use Classification			
								CW	WW	LFF	LAL
Invertebrate	Ceriodaphnia	dubia	Water flea					X	X	X	X
	Ceriodaphnia	reticulata	Water flea					X	X	X	X
	Ceriodaphnia	serrulatus	Water flea					X	X	X	X
	Daphnia	magna	Water flea	3	FALSE			X	X	X	X
	Daphnia	pulex	Water flea					X	X	X	X
	Simocephalus	serrulatus	Water flea		2.500	2.50		X	X	X	X
	Simocephalus	vetulus	Water flea					X	X	X	X
	Invertebrate SMACR:							18.00	(default)		
Fish	Pimephales	promelas	Fathead minnow	8.7				X	X	X	
	Lepomis	Macrochirus	Bluegill	6.5				X	X		
	Oncorhynchus	mykiss	Rainbow trout	2.3				X			
	Salvelinus	fontinalis	Brook trout					X			
Fish SMACR:							18.00 (default)				
Sensitive Freshwater Species SMACR:							9.43				
SACR:								13.027	14.510	14.510	13.027
Selected SAV:								0.288	0.413	0.413	0.413
Calculated SCV:								0.022	0.028	0.028	0.032
Selected SCV:								0.02	0.03	0.03	0.03 mg/L

Don't forget to save!

SECONDARY VALUES REPORT

Step 16: Return to “Secondary Values Report” Tab. The appropriate final secondary acute and chronic values are highlighted in orange.

Product Secondary Values			
Secondary Acute Value:	0.288	mg/L	 Used to calculate allowable application rate
Secondary Chronic Value:	0.02	mg/L	

Step 17: The SAV is used to calculate an application rate using the appropriate conversion factors. Compare the allowable application rate to the proposed application rate to determine if the product can be used as proposed.

- Water Application Products for Sediment Control

Water Application for Sediment Control			Compare the proposed application rate to the allowable application rate
Proposed Application Rate:	3.00	lbs/acre-ft	
Allowable Application Rate:	0.388	lbs/acre-ft	

- Land Application Products for Erosion Control

Land Application for Erosion Control (Soluble Solid)			Compare the proposed application rate to the allowable application rate
Proposed Application Rate:	3.00	lbs/acre	
Allowable Application Rate:	0.200	lbs/acre	

- Additives for Manure Sedimentation

Additives for Manure Sedimentation			Compare the proposed application rate to the allowable application rate
Proposed Application Rate:	510	lbs/day	
Raw Manure Flow Rate:	100000	gallons/day	
Rate of manure solid separation:	92000	lb _{solid manure} /day	
Manure spreading rate:	2.4	tons/acre	
Manure incorporation depth:	3	inches	
Soil density:	1900	tons/acre-ft	
Allowable Application Concentration:	134055.6	mg _{additive} /L	

Appendix C

Additive Review Request Worksheet

Additive Review Worksheet

This worksheet supplements the “*Water Quality Review Procedures for Additives*” guidance document by summarizing the information to be submitted to the WDNR for review and approval decisions relating to water and land-applied treatment additives. This information is required because additives are approved on a case-by-case basis.

The fields highlighted in blue are required for all additive reviews. Parts D and E need to be completed **for each species** for which a toxicity test is conducted. The fields highlighted in green are required for toxicity tests conducted when “Other” is selected for Test Method in Part D-1.

Some, but not all of the required information, will may be available on the Material Safety Data Sheets (MSDS). If all of the needed information is not provided on the MSDS, it is highly recommended that you contact the chemical distributor and/or manufacturer to obtain the required information. If the required toxicity data is not provided to the Department, the additive product may not be approved for use

Note: Toxicity test results must address the ***commercial product formulation***. The commercial product formulation is all active ingredients and any and all carriers, buffering agents, binding agents, and additional materials – the entire product as used. Information related to active ingredient alone is not sufficient.

A. General Production Information

Date of Request:	Click here to enter a date.	
Permittee Facility Name:	enter text here	WPDES Permitting
Applicant Contact Information:	enter text here	Runoff Management
Product Trade Name:	enter text here	
Product Manufacturer:	enter text here	

Active Ingredients:

Ingredient Name*	CAS Number**	%wt or % vol
enter text here	enter text here	enter text here
enter text here	enter text here	enter text here
enter text here	enter text here	enter text here
enter text here	enter text here	enter text here
* Must be provided unless noted to be proprietary information		
** If available		

Is this product replacing another additive (if yes, include product name)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Current Product Name: enter text here	

B. Dosage or Application Information

Purpose of additive:	enter text here		
Proposed application rate (expressed in lb/acre for land and lbs/acre-ft for water applications):	enter text here	lb/acre	Runoff management applicants
	enter text here	lb/acre-ft	
Proposed dosage rate:	enter text here	lbs/day	
	enter text here	mg/L	Wastewater permittees
Estimated maximum discharge concentration:	enter text here	lbs/day	
	enter text here	mg/L	

C. Toxicity Test Results

Test Species	Toxicity Value Type	Toxicity Value	Toxicity Value Units
Select from list	Select from list	enter text here	Select from list
Select from list	Select from list	enter text here	Select from list
Select from list	Select from list	enter text here	Select from list
Select from list	Select from list	enter text here	Select from list

D. Toxicity Test Parameters (Species: Select from list)

1. Parameters needed for **ALL** reviews

Test method:	<input type="checkbox"/> WI certified WET testing lab/method <input type="checkbox"/> EPA method (Method: <i>Select from list</i>) <input type="checkbox"/> Other (additional information needed; see part D2)
Test type:	<input type="checkbox"/> Static non-renewal <input type="checkbox"/> Static-renewal <input type="checkbox"/> Flow-through
Control response:	<input type="checkbox"/> $\geq 90\%$ survival <input type="checkbox"/> Other (Note: if this is selected, this data cannot be used)

2. Parameters needed when using “**other**” test methods

Dilution water:	<input type="checkbox"/> Moderately hard synthetic water <input type="checkbox"/> Synthetic water <input type="checkbox"/> Receiving water <input type="checkbox"/> Ground water <input type="checkbox"/> Other (Specify: <i>enter text here</i>)
Number of test concentrations:	<i>enter text here</i>
Dilution series:	<input type="checkbox"/> ≥ 0.5 <input type="checkbox"/> Other (Specify: <i>enter text here</i>)
Water chemistry analyses (check all that apply):	<input type="checkbox"/> pH <input type="checkbox"/> Conductivity <input type="checkbox"/> Hardness <input type="checkbox"/> Alkalinity
Temperature:	<i>Choose an item. (If other, specify enter text here:)</i>
Number of organisms per test chamber:	<i>enter text here</i>
Number of replicate chambers per concentration:	<i>enter text here</i>
Number of organisms per concentration:	<i>enter text here</i>
Method for calculating the response endpoint:	<i>enter text here</i>

If additional species have been tested, copy the above table (Part D) and paste on a separate page.

Appendix D

Additive Review for Non-Soluble Additives

1. Introduction

Some additives, typically erosion control products, are composed of solid materials that are not soluble in water. Examples may include, but are not limited to, bonded fiber matrices (e.g. wood chips), certain flocculating agents, and certain soil stabilizers. Because these products contain materials that are not soluble in water, the primary ecological concern is not for organisms that live in the water column (i.e., fish) but for organisms that live in or near the sediment (e.g., amphipods, crustaceans). Therefore, the traditional, water-column toxicological testing methods are not appropriate for these types of additives. Instead, toxicity testing methods with sediment-dwelling species should be used.

2. Acceptable Toxicity Tests

Table 1 lists the recommended test organisms, test type, test result, endpoint type, and test method for “non-soluble solid” additives.

Table 1. Acceptable whole sediment testing methods for common test species

Test Organism	Test Type	Test Result	Endpoint Type	Test Method
<i>Ceriodaphnia dubia</i> (Water flea)	48-hr	NOAEL*	Survival	ASTM E1706—05 Section 13 Procedure 1
<i>Daphnia magna</i> (Water flea)				
<i>Hyalella azteca</i> (Amphipod)	10 day	NOAEL*	Survival and/or Growth	ASTM E1706—05 Annex A2 Section 2.5.2.1

*NOAEL = no observable adverse effect level

In these tests, the erosion control product is used in place of the "whole sediment", since this is a close surrogate of how the product would exist in an aquatic environment.

Note: toxicity tests are to be conducted on the "commercial product formulation", which is all active ingredients and any and all carriers, buffering agents, binding agents, non-soluble solids, and additional materials (i.e. the entire product as used). Toxicological information related to "active ingredient" alone is not sufficient.

For these products, a secondary value is not derived. Instead, the highest test concentration that causes no mortality (i.e., the no observable adverse effect level-NOAEL) is used as the acceptable maximum application concentration.

Note: To determine the highest concentration that causes no mortality, several concentrations may need to be tested. It is recommended to start with the maximum proposed application concentration and use a 0.5 dilution factor to select other concentrations if necessary.

Runoff Management staff then calculate the allowable application rate for the product using the procedures detailed in the Land Application for Erosion Control Additives - DNR Conservation Standard 1050: dnr.wi.gov/topic/stormWater/documents/dnr1050-polyacrylimide.pdf

This final allowable application rate is compared to the proposed application rate to determine if the product can be used as requested. Runoff management staff then prepare a letter to the applicant that states the application rate at which the product can be used in Wisconsin and whether or not the product can be used as proposed. Department of Transportation staff are provided this information as necessary.

3. Specific Toxicity Test Process

At least two toxicity tests should be run-each with appropriate controls. Therefore, a sufficient amount of land applied erosion control product should be prepared to be used in:

- At least one 10-day acute *Hyaella azteca* whole sediment test, and/or
- At least one 2-day acute overlying water test with *Ceriodaphnia dubia*, and/or
- At least one 2-day acute overlying water test with *Daphnia magna*.

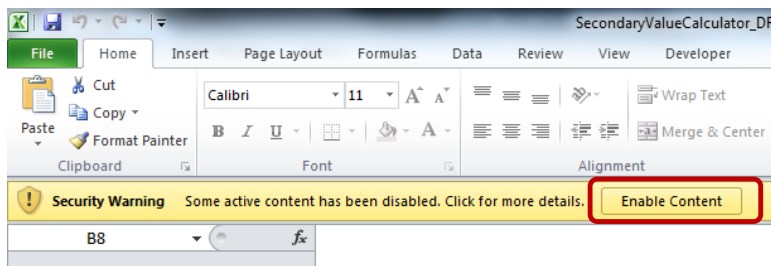
Additional considerations:

- Replace any reference to "sediment" in any of the methods above with the erosion control product.
- For the water flea tests, slight modifications of the methods can be used to get the erosion control product into the test chamber (e.g. chamber size, use of syringe to dispense product, etc.). However, the 1:4 sediment to water ratio should be maintained. If a modification is used, what was changed and how should be noted and included into the toxicity test results submitted to the DNR
- Immobility of test organisms in the test treatments due to the physical nature of the product (such as in viscous polymer) shall be considered as equivalent to death for the purpose of these tests.

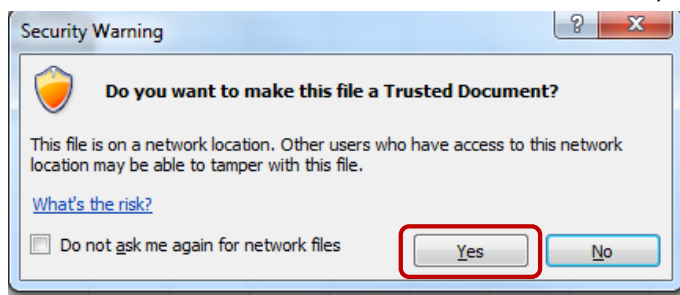
4. Instructions for Using the *Secondary Value Calculator* for Non-Soluble Additives

SECONDARY VALUES REPORT

Step 1: In the “Macros has been disabled” box, select “Enable Content”.



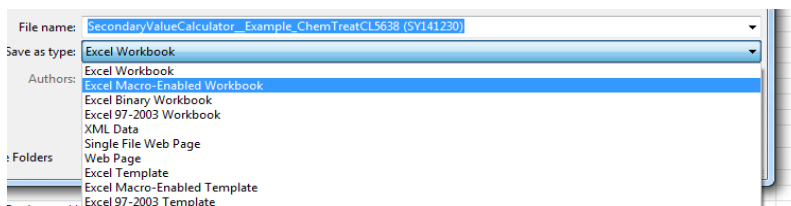
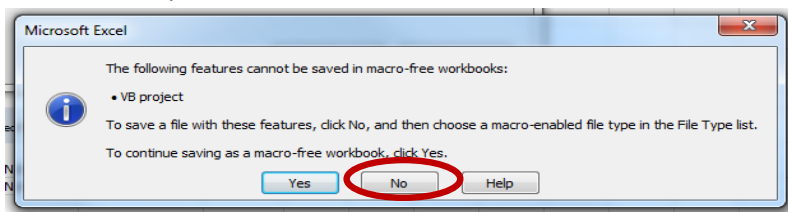
Step 2: In the “Do you want to make this file a Trusted Document?” box, select “Yes”.



Step 3: Save the document in the appropriate subfolder in the “Approved Reviews” folder on the Water drive under a new name using the format: Year_Product Name_Initials.

\water\WQWT_PROJECTS\WY_CP_Additives\Approved reviews\Runoff

Tip: A separate folder can be created to store additional files (product information, safety data sheets, etc)



Step 6: In the “Product Application” section, enter the proposed application rate.

NON-SOLUBLE ADDITIVES

Step 7: Use the dropdown menus to fill in the toxicity information provided from the MSDS sheet(s) and/or lab sheet(s). This should also include test method data provided by the lab.

Tip: Test method data may be available via lab reports or through lab correspondence.

Work with the applicant to ascertain these data.

Note: Only the species and toxicity endpoints listed in this tab may be used to review non-soluble solid additives.

Step 8: Review the spreadsheet, in particular the “Acceptable?” column (Column L), to determine if data can be used to calculate secondary values. Column L will automatically be labeled “Yes” if data are acceptable. In some cases, data is not flagged as acceptable because “Other” was selected as the “Test Method” (Column I). If this is the case, contact the Water Evaluation Toxicologist for assistance.

Step 9: Once the acceptable information has been entered, the spreadsheet will automatically calculate the allowable application rate.

Taxa Category	Genus	Species	Common Name	Test Duration & Endpoint	Toxicity Test Result			Test Method	Control Response	Acceptable?
					Tested Concentration	Units	% Survival			
Planktonic Crustacean	Ceriodaphnia	dubia	Cladoceran (water flea)	48-hr NOAEL	1000.00	mg/L (ppm)	100	ASTM E 1706-05 A2.5.2.1	≥ 90% survival	Yes
				48-hr NOAEL	2000.00	mg/L	100	Other		No
	Daphnia	magna	Water flea					ASTM E 1706-05 A2.5.2.1		N/A
								Other		N/A
Benthic Crustacean	Hyalella	azteca	Amphipod	48-hr NOAEL	1100.00	mg/L	90	ASTM E 1706-05	≥ 90% survival	No
										N/A
										N/A
										N/A
Other				10-day NOAEL	1200.00	mg/L (ppm)	100	ASTM E 1706-05 13-1	≥ 80% survival	Yes
Other										N/A
Other										N/A
Other										N/A
Other										N/A
Other										N/A
Other										N/A
Other										N/A
								Note: If any data are available for species other than those listed, contact the Water Evaluation Toxicologist for assistance.		
								Allowable Application Rate		
								1000.0 mg/L		

Only data from rows labeled “Yes” is included in the calculation

If Test Method is “Other”, contact the Water Evaluation Toxicologist for assistance.

SECONDARY VALUES REPORT

Step 10: Compare the allowable application rate to the proposed application rate to determine if the product can be used as proposed.

	Product Application Information	
Purpose of Additive:	<input type="checkbox"/> Water Application for Sediment Control	
	Land Application for Erosion Control Products	
	↳ <input checked="" type="checkbox"/> Non-Soluble Solid	
	<input type="checkbox"/> Polymer or other soluble solid	
	<input type="checkbox"/> Manure Additive for Nutrient Management	
Land Application for Erosion Control (Non-Soluble Solid)		
Proposed Application Rate:	3.00	lbs/acre
Allowable Application Rate:	1000	lbs/acre

Compare the proposed application rate with the allowable application rate

5. References

ASTM E 1706-05, "Standard Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates", in Annual Book of ASTM Standards 2005, Section 11 Water and Environmental Technology, vol. 11.05, Biological Effects and Environmental Fate; Biotechnology; Pesticides. ASTM International, West Conshohocken, PA, pp. 1151-1268.