CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: April 14, 2017

TO: Conor Neal, U.S. EPA Region 5
Tyco/Ansul Project Manager

FROM: Department of Natural Resources
Brian Austin, DNR – Drinking Water & Groundwater
Trevor Moen, DNR – Water Quality
Jim Killian, DNR – Office of Great Waters
Kristin DuFresne, DNR – Remediation & Redevelopment

SUBJECT: DNR Comments Regarding Proposed Dye Test

The Department of Natural Resources (DNR) is in receipt of Tyco's January 31, 2017 submittal titled *Responses to DNR Review of Tyco Contract Documents – Subsurface Injection of Tracer Dye Scope of Work, dated March 30, 2016 and Technical Memorandum, Response to DNR Questions Regarding Proposed Dye Testing, dated April 15, 2016, CH2M-Hill EPA RCRA Administrative Order Docket No. RCRA-05-2009-00007 Tyco Stanton Street Facility; EPA ID No. WID006 125 215*. The DNR has reviewed this submittal and offers the following comments:

- To date, the DNR has not received a completed *Additive Review Worksheet* (attached) for the Rhodamine WT Liquid. The submittal of a completed worksheet is required in order for the DNR to review/approve of the dye test proposal. The DNR urges Tyco to actively communicate with the Rhodamine WT Liquid manufacturer and provide the requested information to the DNR.
- The submitted information does not provide enough information to assess the total mass of dye being injected into the groundwater and potentially released to the river (i.e. mass balance). Knowledge of the total mass to be injected, estimated groundwater travel rates, and estimates of dye lost to adsorption could provide a range of possible mass discharge rates to the river. Additionally, a thorough understanding of the river hydrology is necessary to assist with determining the amount of potential mixing. Factors to consider include Lake Michigan water levels, river flow and seiche-driven reversals, seasonal variations and relative temperature differences between the river and the groundwater. Upon knowing the mass range and river hydrology one can begin to evaluate the risks of dosing.

  The DNR asks that Tyco provide estimates, for the worst case scenario, on the mass loading of the Rhodamine WT Liquid entering the river. This worst case scenario would assume no dye is lost to adsorption prior to discharge through the barrier wall. In addition, because the original calculated injection volumes were based on the concept of displacing the entire pore volume of groundwater in the space between the injection well and the barrier wall, no groundwater dilution should be assumed for a worst case scenario.

- Based on information provided by Tyco, the DNR does not have enough information to determine whether or not the Rhodamine WT Liquid will impact downstream sources. Most chemical inputs are rarely introduced uniformly and would not experience instantaneous complete mixing in the river. Typically, they must travel a certain distance before the chemical concentration becomes uniform and mixed across the channel.

Tyco should consider using a mixing zone model such as CORMIX to predict the movement of any dye plume by modeling it as a multi-port diffusor with a low exit velocity under unsteady flow conditions.

Tyco may also consider modeling the flow data and the plume using the Fickian Mixing Model. This model will provide Tyco with concentrations of the conservative tracer (i.e. chemical that does not undergo degradation in the river and is not absorbed to the river channel or suspended particles) at any time after injection and any distance downstream.

- Due to DNR concerns related to this large scale dye test, Tyco is advised to develop a proposal for a pilot test. The DNR recommends implementing the pilot test upon completion of the outfall/storm water repair work. The DNR believes it may make more sense for Tyco to focus its efforts on a pilot dye test (i.e. collection of real data) rather than continued modeling (i.e. desktop) efforts. Note: The DNR envisions the potential to use one of the repaired outfalls to conduct the pilot dye test. Alternatively, a slug of dye could be injected directly into the river and its travel, dispersion, visibility and instrument detection characteristics could be observed and measured in real time. Realistic parameters for use in an acceptable mixing and dispersion model might also be developed with this pilot test.

- The DNR continues to believe that a proposal for sampling arsenic discharges at various horizontal and vertical locations along the barrier wall would provide useful information and should not be discounted. This sampling effort could be a stand-alone option or part of the dye test. Appropriate detection limits and background sampling would need to be a component of this proposal.

- The DNR recommends the U.S. EPA reach out to the Michigan Department of Environmental Quality (DEQ), if they haven't already, regarding the proposed dye test. The DEQ acknowledgement and acceptance of the dye test is requested.

- The Cabela's National Walleye Tour Championship will be held in Marinette, Wisconsin August 16 - 18, 2017. The DNR recommends that the dye test take place after the championship.

The DNR appreciates the opportunity to provide U.S. EPA with comments. Please contact the DNR if you have any questions.

Attachment

Additive Review Worksheet

Additive Review Worksheet

This worksheet summarizes the information to be submitted to the WDNR for review of additives including dyes. This information is required because additives are approved on a case-by-case basis.

The fields highlighted in orange are required for all additive reviews and are NOT typically found on a safety data sheet (SDS).
The fields highlighted in blue are required for all additive reviews and are typically found on a SDS.
Parts D and E need to be completed **for each species** (e.g. Daphnia -water flea); Pimephales (fathead minnow), etc) for which a toxicity test is conducted.
The fields highlighted in green are NOT typically found on a SDS and are required for toxicity tests conducted when "Other" is selected for Test Method in Part D-1.

If all of the needed information is not provided on the SDS, It is recommended that you contact the chemical distributor and/or manufacturer to obtain the required information. You do not need to conduct the toxicity test if the toxicity information is available on SDS or from the supplier/manufacturer. 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.

For more information on the additive review process, see the "*Water Quality Review Procedures for Additives*" guidance document.

A. General Production Information

Date of Request:
Permittee Facility Name:
Product Trade Name:
Product Manufacturer:
Active Ingredients:

Ingredient Name*	CAS Number**	%wt or % vol

* Must be provided unless noted to be proprietary information
** If available

B. Toxicity Test Results

Test Species	Toxicity Value Type (e.g., LC50, EC50, NOAEL)	Toxicity Value	Toxicity Value Units (e.g., mg/L, µg/L, ppm)

Print one copy of this page for each species that has been tested.

C. Toxicity Test Parameters

1. Parameters needed for **ALL** reviews

Test species:	☐ Ceriodaphnia species (specify:) ☐ Daphnia species (specify:) ☐ Pimephales promelas (fathead minnow) ☐ Lepomis macrochirus (bluegill) ☐ Oncorhynchus mykiss (rainbow trout) ☐ Salvelinus fontalis (brook trout)
Test method:	☐ WI certified WET testing lab/method ☐ EPA method (select from those listed below) □ Acute-2002.0 □ Chronic-1000.0 □ Acute-2021.0 □ Chronic-1001.0 □ Acute-2000.0 □ Chronic-1002.0 □ Acute-2019.0 □ Chronic-1003.0 ☐ Other (additional information needed; see part D2)
Test type:	☐ Static non-renewal ☐ Static-renewal ☐ Flow-through
Control response:	☐ ≥ 90% survival ☐Other (Note: if this is selected, this data cannot be used)

2. Parameters needed when using "**other**" test methods

Dilution water:	☐Moderately hard synthetic water ☐Synthetic water ☐Receiving water ☐Ground water ☐Other (Specify:)
Number of test concentrations:	
Dilution series:	
Water chemistry analyses (check all that apply):	☐ pH ☐ Conductivity ☐ Hardness ☐ Alkalinity
Temperature:	☐ 12±1 °C ☐ 20±1 °C ☐ 25±1 °C ☐ Other (Specify:)
Number of organisms per test chamber:	
Number of replicate chambers per concentration:	
Number of organisms per concentration:	
Method for calculating the response endpoint:	