BIOCIDE/CHEMICAL TREATMENT

WORKSHEET-FORM 101

The following calculations are to be performed on any biocidal products ultimately discharged to the surface waters of North Carolina. This worksheet must be completed separately for each biocidal product in use. This worksheet is to be returned with all appropriate data entered into the designated areas with calculations performed as indicated.

I. Facility Name _____

NPDES # NC _____ Outfall #_____

County _____

Receiving Stream _____ 7Q10_____(cfs)

(All above information supplied by the Division of Water Quality)

What is the Average Daily Discharge (A.D.D.) volume of the water handling systems to the receiving water body?

A.D.D. = _____ (in M.G.D.)

Please calculate the Instream Waste Concentration (IWC in percent) of this discharge using the data entered above.

$$IWC = \frac{(A.D.D.) \times 100}{(7Q10)(0.646) + (A.D.D)} = \frac{(\quad) \times 100}{(\quad)(0.646) + (\quad)} = \_\_\_\_\_\%$$

This value (IWC) represents the waste concentration to the receiving stream during low flow conditions.

II. What is the name of the whole product chemical treatment proposed for use in the discharge identified in Part I?

_____

Please list the active ingredients and percent composition:

_____ _____%

_____ _____%

_____ _____%

What feed or dosage rate (D.R.) is used in this application? The units must be converted to maximum grams of whole product used in a 24hr period.

D.R.= _____ grams/24hr period

Please note, fluid ounces (a volume) must be converted to grams (a mass). The formula for this conversion is:

$$\text{Grams of product} = \text{fluid oz. of product} \times \frac{1 \text{ gal. water}}{128 \text{ fl. oz.}} \times \frac{8.34 \text{ lbs.}}{1 \text{ gal. water}} \times \text{specific gravity of product} \times \frac{453.59 \text{g.}}{1 \text{ lb.}}$$

Facility Name: _____ NPDES #: NC_____

Estimate total volume of the water handling system between entry of biocidal product and NPDES discharge point. On an attached sheet please provide justification for this estimate (system volume, average cycles per blowdown, holding lagoon size, etc.)

Volume= _____ million gallons

What is the pH of the handling system prior to biocide addition? If unknown, enter N/A. _____

What is the decay rate (D.K.) of the product? If unknown, assume no decay (D.K.=0) and proceed to asterisk. The degradation must be stated at pH level within 1/2 pH standard unit within handling system. Enter the half life (Half Life is the time required for the initial product to degrade to half of its original concentration). **Please provide copies of the sources of this data**.

H.L. = _____ Days

The decay rate is equal to $\frac{1}{\text{H.L.}}$ X 0.69 = _____=Decay Rate (D.K.)

Calculate degradation factor (D.F.). This is the first order loss coefficient.

* D.F. = $\frac{\text{(A.D.D.)}}{\text{(Volume)}}$ + (D.K.) = $\frac{(\quad)}{(\quad)}$ + ( ) = _____

Calculate Steady State Discharge Concentration:

Dischg Conc. = $\frac{\text{(D.R.)}}{\text{(D.F.)(Volume)(3785)}} = \frac{(\quad)}{(\quad)(\quad)(3785)}$ = _____mg/l

Calculate concentration of biocide instream during low flow conditions.

(Receiving Stream Concentration)

$\frac{\text{(Dischg. Conc.) x (IWC\%)}}{100} = \frac{(\quad) \text{ x } (\quad)}{100}$ = _____mg/l

Receiving Stream Concentration

III. Calculate regulated limitation.

List all LC50 and EC50 data available for the whole product according to the following columns. (Note that units should be in mg/l). **Please provide copies of the sources of this data**.

Organism	Test Duration	LC50/EC50 (mg/l)

Facility Name: _____ NPDES #: NC_____

Choose the lowest LC50/EC50 listed above:

Enter the LC50/EC50: _____

If the half life (H.L.) is less than 4 days, perform the following calculation.

Regulated Limitation = 0.05 x LC50 = _____mg/l

If the half life (H.L.) is greater than or equal to 4 days or unknown, perform the following calculation.

Regulated Limitation = 0.01 x LC50 = _____mg/l

Choose the appropriate regulated limitation from the calculations immediately above and place in this blank:

_____mg/liter

From Part II enter the receiving stream concentration:

_____mg/liter

IV. Analysis.

If the receiving stream concentration is greater than the calculated regulated limitation, then this biocide is unacceptable for use.

Person in Responsible Charge

_____ _____

Name (Print) Email Address & Phone Number

_____ _____ _____

Signature Date Physical Address of Facility

Person Completing This Worksheet (If different from above)

_____ _____

Name (Print) Email Address & Phone Number

_____ _____

Signature Date

Please submit to: *Division of Water Quality*
Aquatic Toxicology Branch
1621 Mail Service Center
Raleigh, NC 27699-1621

Contact Info: Cindy Moore (cindy.a.moore@deq.nc.gov) or Molly Nicholson (molly.nicholson@deq.nc.gov)

Facility Name: _____ NPDES #: NC_____

Supplemental Metals Analysis

If copper, zinc, or chromium are present in the proposed biocidal compound, complete this worksheet. A separate form must be used for each metal and/or metal compound present in the biocide. List the metal, its chemical formula, molecular weight (MW), formula weight (FW), and the concentration of the metal compound in the biocide (MCC). Complete a separate form for every metal present in the biocide.

Metal	Chemical Formula	Molecular Weight of Metal	Formula Weight	Concentration in Biocide
EXAMPLE				
Copper	*$CuSO_4 \cdot 5H_2O$*	*63.546 g/mole*	*249.680 g/mole*	*0.2 %*
_____	_____	_____	_____	_____

Dosage rate of Biocide (DR) (from page 1):

DR = _____grams/day

Average Daily Discharge (ADD) (from page 1):

ADD = _____million gallons/day

Discharge Concentration (DC) of Biocide:

$$DC = \frac{DR}{ADD} = \frac{(\_\_\_\_\_\text{grams/day})}{(\_\_\_\_\_\text{million gallons/day})} = \_\_\_\_\_\text{grams/million gallons}$$

Convert DC to micrograms/liter (ppb):

$$DC\ (\mu g/l) = \_\_\_\_\_DC\ (\text{grams/million gal}) \times \frac{1 \times 10^6\ \mu g/g}{3.785 \times 10^6\ \text{liters/million gal.}} = \_\_\_\_\_\mu g/l$$

Calculate the fraction of metal in the metal-containing compound (MF):

$$MF = \frac{MW}{FW} = \frac{(\_\_\_\_\_\text{grams/mole})}{(\_\_\_\_\_\text{grams/mole})} = \_\_\_\_\_$$

Calculate the fraction of metal in the biocidal compound (BF):

$$BF = MF \times \frac{MCC\ (\%)}{100} = \_\_\_\_\_ \times \frac{\_\_\_\_\_\%}{(100)} = \_\_\_\_\_$$

Calculate the concentration of metal in the discharge (M):

M = DC **x** BF = _____µg/l **x** _____ = _____µg/l

Calculate the instream metal concentration (IMC) at low-flow conditions:

$$IMC = M \times \frac{IWC\ (\%)}{100} = \_\_\_\_\_\mu g/l \times \frac{\_\_\_\_\_\%}{100} = \_\_\_\_\_\mu g/l$$

Regulated limitation of metal (from below): _____µg/l

NC General Statutes 15A NCAC 2B.0211 define:
Copper- 7 µg/l water quality action level* **Zinc- 50 µg/l** water quality action level*
Chromium- 50 µg/l water quality standard
(*****Values which exceed action levels must be addressed directly by aquatic toxicity testing.)