

TITLE 35: ENVIRONMENTAL PROTECTION

SUBTITLE C: WATER POLLUTION

CHAPTER II: ENVIRONMENTAL PROTECTION AGENCY

PART 355

DETERMINATION OF AMMONIA NITROGEN WATER QUALITY BASED EFFLUENT LIMITS
FOR DISCHARGES TO GENERAL USE WATERS

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NOTE: In this Part, unless the context clearly indicates otherwise, superscript numbers or letters are denoted by parentheses; subscript are denoted by brackets.

SUBPART A: INTRODUCTION

Section 355.101 Purpose, Scope and Application

- a) This Part contains procedures to determine water quality based effluent limits for ammonia nitrogen (as N) (ammonia nitrogen WQBELs) that are necessary to prevent waters of the State from

exceeding water quality standards pursuant to 40 CFR 122.44(d)(1) and 35 Ill. Adm. Code 309.141(d)(3). Ammonia nitrogen WQBELs must be sufficient to ensure compliance with the water quality standards for ammonia nitrogen found in the Illinois Pollution Control Board (IPCB) regulations at 35 Ill. Adm. Code 302.202, 302.212, 302.213 and 304.122.

- b) Ammonia nitrogen WQBELs are applicable to the general use waters of the State.
- c) There shall be an opportunity for compliance with the ammonia nitrogen water quality standards as provided by the IPCB regulations through application of allowed mixing, mixing zones and zones of initial dilution at 35 Ill. Adm. Code 302.102 and 302.213.
- d) In addition to water quality based effluent limits, the discharge of ammonia nitrogen from a facility may be limited based on other provisions in the Environmental Protection Act [415 ILCS 5] (Act) and regulations adopted thereunder or the Federal Water Pollution Control Act, 33 USC 1251-1387 (FWPCA) and regulations adopted thereunder.

Section 355.103 Definitions

All terms in this Part shall have the meanings set forth in the Environmental Protection Act and in the IPCB regulations under 35 Ill. Adm. Code 301 and 302 except, for purposes of this Part, the following definitions apply:

"7Q10" means the average daily flow of the lowest total flow for a seven day period that occurs once in a 10 year period.

"AWQMN" or "Ambient Water Quality Monitoring Network" means the network of sampling stations maintained by the Agency and located on streams throughout the State.

"Agency" means the Illinois Environmental Protection Agency.

"Ammonia decay" refers to the cumulative effect of nitrification, volatilization, plant uptake, and other processes that reduce the concentration of ammonia nitrogen in waters by natural means.

"cfs" means cubic feet per second.

"DAF" means design average flow.

"DMR" means discharge monitoring report.

"EMW" or "Effluent Modified Water" means those waters or portions of waters that the Agency has determined, pursuant to 35 Ill. Adm. Code 302.213, are not subject to the chronic ammonia nitrogen standards of 35 Ill. Adm. Code 302.212(b).

"IPCB" means the Illinois Pollution Control Board.

"ISWS" means the Illinois State Water Survey, a part of the Office of Scientific Research and Analysis in the Illinois Department of Natural Resources.

"Kjeldahl" means the total of organic nitrogen and ammonia

nitrogen.

"MGD" means million gallons per day.

"PEL" or "Preliminary Effluent Limitation" is an estimate of an allowable discharge concentration taking into consideration allowed mixing or dilution.

"PEQ" or "Projected Effluent Quality" is the maximum contaminant concentration estimated to be discharged by a facility or activity taking into account statistical analysis of the discharge or activity.

"Reasonable Potential Analysis" or "Reasonable Potential to Exceed" means the procedure to predict whether an existing or future discharge may cause or contribute to a violation of water quality standards, criteria or values.

"Summer" means the months of April through October, inclusive.

"USEPA" means the United States Environmental Protection Agency.

"USGS" means the United States Geological Survey.

"WQBEL" or "Water Quality Based Effluent Limit" means an NPDES permit limit that ensures that applicable water quality standards and criteria are met in waters where such standards and criteria apply.

"Winter" means the months of November through March, inclusive.

SUBPART B: AMMONIA NITROGEN (as N) WATER QUALITY STANDARDS AND WQBELS

Section 355.201 Introduction

The need for an ammonia nitrogen (as N) WQBEL is based on the reasonable potential of a discharge to cause or contribute to a violation of the applicable ammonia nitrogen water quality standard. During the NPDES permit review process, the Agency shall conduct an analysis of the reasonable potential for ammonia to exceed or contribute to excursions above the ammonia nitrogen water quality standard that may occur in the receiving water. This analysis shall be conducted for both acute and chronic winter and summer ammonia nitrogen water quality standards. The Agency may subdivide summer or winter periods into quarterly or monthly segments with analysis of reasonable potential corresponding to those smaller time segments in individual permit applications.

- a) The first step in the reasonable potential analysis is to compare the Projected Effluent Quality (PEQ), as provided in Section 355.205, to the water quality standard as converted to total ammonia nitrogen as provided in Section 355.203. If the PEQ is less than or equal to the water quality standard as converted to total ammonia nitrogen as provided in Section 355.203, then no reasonable potential to exceed the standard exists and no effluent limitation will be established in the permit unless otherwise warranted under subsection (c) of this Section.
- b) If the PEQ exceeds the applicable water quality standard as converted to total ammonia nitrogen as provided in Section

355.203, the analysis shall proceed to the second step as provided in Section 355.207.

- c) If the wastewater prior to treatment contains total Kjeldahl nitrogen at levels in which a reasonable potential to exceed water quality standards as converted to total ammonia nitrogen as provided in Section 355.203 exists, then the discharge of ammonia nitrogen shall be limited in the NPDES permit by an ammonia nitrogen WQBEL. Reasonable potential to exceed water quality standards will be determined consistent with Sections 355.203 through 355.211 of this Part. Even if there appears to be no potential to exceed the water quality standards based on the effluent quality analysis in subsection (a) or (b), an ammonia nitrogen WQBEL shall be established.

Section 355.203 Conversion of Total Ammonia and Un-ionized Ammonia Nitrogen

The numeric water quality standards for ammonia nitrogen in 35 Ill. Adm. Code 302.212 are established as the un-ionized fraction of the total ammonia nitrogen present, since the un-ionized component more closely relates to the toxicology information utilized in deriving the ammonia nitrogen standard. However, most discharge monitoring data used in deriving a PEQ will be in the form of total ammonia nitrogen. WQBELs will be set as total ammonia nitrogen concentrations. The conversion formula contained in 35 Ill. Adm. Code 302.212 shall be used to estimate the portion of total ammonia nitrogen that exists in the un-ionized condition. The primary variables effecting the equilibrium between ionized and un-ionized fractions are temperature and pH. Both stream temperature and pH can be expected to be different than discharge temperature and pH; therefore, the conversion calculation will be based on conditions expected to exist downstream of the discharge.

- a) Where stream specific data is available, that data shall be the basis for the selection of temperature and pH values to be used in converting total ammonia nitrogen to un-ionized ammonia nitrogen. When stream specific data is not available, data from the closest representative Agency water quality monitoring station during the most recent five years will be used in this conversion formula. The temperature will be set at the 75th percentile (75 percent of the values are less than). The pH value will be set at the 75th percentile (75 percent of the values are less than) for determination of both acute and chronic conditions. If the 75th percentile pH value results in a permit limit for chronic exposure conditions (monthly average ammonia permit limit) less than 1.5 mg/L summer limit or 4.0 mg/L winter limit, the values will be recalculated based on a 50th percentile pH value (half the values are less than). The permit limit will then be set at the value derived with a 50th percentile pH as long as that value does not exceed 1.5 mg/L for summer months and 4.0 mg/L for winter months. If a 50th percentile pH value would allow a higher summer limit than 1.5 mg/L, the limit will be set at 1.5 mg/L. If a 50th percentile pH would allow a higher winter limit than 4.0 mg/L, the winter limit would be set at 4.0 mg/L.
- b) When sufficient stream specific information is available with simultaneous measurements of total ammonia, pH, and temperature, a conversion relationship reflecting the dynamic interaction between pH, temperature and ammonia equilibrium may be developed instead of the approach presented in subsection (a) above.

Section 355.205 Estimation of Projected Effluent Quality

The Projected Effluent Quality (PEQ) is the estimation of the maximum expected effluent concentration. Individual PEQs shall be estimated for both summer and winter acute and chronic exposure periods.

- a) The PEQ shall be derived from representative facility specific data to reflect a 95 percent confidence level for the 95th percentile value. These data will be presumed to adhere to a lognormal distribution pattern with a coefficient of variation of 0.6 unless the facility's effluent data demonstrates a different distribution pattern. If facility specific data in excess of 10 data values is available, a facility specific coefficient of variation that is the ratio of the standard deviation to the arithmetic average may be calculated. The PEQ is derived as the upper bound of a 95 percent confidence bracket around the 95th percentile value through a multiplier from the following table applied to the maximum value in the data set that has its quality assured consistent with subsection (e) as appropriate for acute and chronic data sets.

$$PEQ = (\text{maximum data point})(\text{statistical multiplier})$$

No. of Samples	Coefficient of Variation						
	0.1	0.2	0.3	0.4	0.5	0.6	0.7
1	1.4	1.9	2.6	3.6	4.7	6.2	8.0
2	1.3	1.6	2.0	2.5	3.1	3.8	4.6
3	1.2	1.5	1.8	2.1	2.5	3.0	3.5
4	1.2	1.4	1.7	1.9	2.2	2.6	2.9
5	1.2	1.4	1.6	1.8	2.1	2.3	2.6
6	1.1	1.3	1.5	1.7	1.9	2.1	2.4
7	1.1	1.3	1.4	1.6	1.8	2.0	2.2
8	1.1	1.3	1.4	1.6	1.7	1.9	2.1
9	1.1	1.2	1.4	1.5	1.7	1.8	2.0
10	1.1	1.2	1.3	1.5	1.6	1.7	1.9
11	1.1	1.2	1.3	1.4	1.6	1.7	1.8
12	1.1	1.2	1.3	1.4	1.5	1.6	1.7
13	1.1	1.2	1.3	1.4	1.5	1.6	1.7
14	1.1	1.2	1.3	1.4	1.4	1.5	1.6
15	1.1	1.2	1.2	1.3	1.4	1.5	1.6
16	1.1	1.1	1.2	1.3	1.4	1.5	1.6
17	1.1	1.1	1.2	1.3	1.4	1.4	1.5
18	1.1	1.1	1.2	1.3	1.3	1.4	1.5
19	1.1	1.1	1.2	1.3	1.3	1.4	1.5
20	1.1	1.1	1.2	1.2	1.3	1.4	1.4
30	1.0	1.1	1.1	1.1	1.2	1.2	1.2
40	1.0	1.0	1.1	1.1	1.1	1.1	1.1
50	1.0	1.0	1.0	1.0	1.0	1.0	1.0
60 or greater	1.0	1.0	1.0	1.0	1.0	1.0	1.0

No. of Samples	Coefficient of Variation					
	0.8	0.9	1.0	1.1	1.2	1.3
1	10.1	12.6	15.5	18.7	22.3	26.4
2	5.4	6.4	7.4	8.5	9.7	10.9
3	4.0	4.6	5.2	5.8	6.5	7.2

4	3.3	3.7	4.2	4.6	5.0	5.5
5	2.9	3.2	3.6	3.9	4.2	4.5
6	2.6	2.9	3.1	3.4	3.7	3.9
7	2.4	2.6	2.8	3.1	3.3	3.5
8	2.3	2.4	2.6	2.8	3.0	3.2
9	2.1	2.3	2.4	2.6	2.8	2.9
10	2.0	2.2	2.3	2.4	2.6	2.7
11	1.9	2.1	2.2	2.3	2.4	2.5
12	1.9	2.0	2.1	2.2	2.3	2.4
13	1.8	1.9	2.0	2.1	2.2	2.3
14	1.7	1.8	1.9	2.0	2.1	2.2
15	1.7	1.8	1.8	1.9	2.0	2.1
16	1.6	1.7	1.8	1.9	1.9	2.0
17	1.6	1.7	1.7	1.8	1.9	1.9
18	1.6	1.6	1.7	1.7	1.8	1.9
19	1.5	1.6	1.6	1.7	1.8	1.8
20	1.5	1.5	1.6	1.6	1.7	1.7
30	1.3	1.3	1.3	1.3	1.4	1.4
40	1.1	1.2	1.2	1.2	1.2	1.2
50	1.1	1.1	1.1	1.1	1.1	1.1
60 or greater	1.0	1.0	1.0	1.0	1.0	1.0

- 1) If the PEQ determined in this Section is less than or equal to the applicable water quality standard, there is no reasonable potential and no WQBEL will be established in the permit unless otherwise warranted under Section 355.201(c).
 - 2) If the PEQ as determined in this Section exceeds the applicable water quality standard but does not exceed the PEL determined through Section 355.209, there is no reasonable potential and no WQBEL will be established unless otherwise warranted under Section 355.201(c).
- b) The Agency shall compare monthly average effluent data values, when available, with the chronic water quality standard to evaluate the need for monthly average WQBEL. If a monthly average WQBEL is included in an NPDES permit, the Agency will also include a daily maximum WQBEL to enforce the acute water quality standard.
- c) The Agency may apply other scientifically defensible statistical methods for calculating PEQ at the 95 percent upper confidence level for use in the reasonable potential analysis. For new or existing discharges where no prior operating record is available, PEQ shall be estimated based on knowledge of the tributary wastewater characteristics and treatment facility capabilities. For existing sources where the PEQ for the term of the permit cannot be accurately characterized by historical performance data as specified in subsection (a) of this Section due to significant changes in tributary loading, plant operating parameters or other factors affecting treatment efficiency during the term covered by the permit, a PEQ representative of the future permit term may be estimated by analysis of the historical data consistent with subsection (a) with adjustment of the historical value to reflect the change expected from the anticipated loading or operating changes.
- d) Regardless of the statistical procedure used, if the PEQ for ammonia nitrogen (as N) is less than or equal to the water quality standard, the Agency shall deem the discharge not to have a reasonable potential to exceed and a WQBEL shall not be required

unless otherwise required under Section 355.201.

e) Data Requirements

The derivation of PEQ is based on the effluent quality demonstrated by self-monitoring data as required by the NPDES permit or Agency-generated data, such as effluent sampling or facility-related stream studies. Effluent data used in the derivation of PEQ shall be representative of the concentration and variability of ammonia nitrogen in the discharge anticipated for the applicable period of the NPDES permit. Data shall be collected and analyzed in accordance with USEPA or Agency approved sampling and analytical methods (40 CFR 136). The following criteria shall be followed in data selection:

- 1) the most recent five years of data shall be used unless the Agency determines that an alternative period better represents the time period for which effluent quality is being projected. Such alternative time periods may include, but are not limited to, shorter periods that reflect changed discharge characteristics resulting from changes in manufacturing activities or wastewater treatment systems; and
- 2) data anomalies resulting from collection, analysis or recording errors or atypical plant operating conditions may be eliminated from the data.

Section 355.207 Mixing Allowance

If the PEQ for ammonia nitrogen (as N) is greater than the water quality standard, the Agency shall assess the level of treatment being provided by the discharger. If the discharger is providing (or will be providing) a level of treatment consistent with the best degree of treatment required by 35 Ill. Adm. Code 304.102(a), the PEQ derived under Section 355.205 shall be compared to the PEL determined by applying allowed dilution to the discharge consistent with Section 355.209.

Section 355.209 Calculation of Preliminary Effluent Limitation

- a) The preliminary effluent limitation (PEL) is calculated in a mass balance approach reflecting allowed dilution as referenced in Section 355.207:

$$WQS = [(Q[e])(PEL) + (Q[d])(C[d])]/(Q[e] + Q[d])$$

or

$$PEL = [WQS(Q[e] + Q[d]) - (Q[d])(C[d])]/Q[e]$$

where:

WQS = applicable water quality standard as converted to total ammonia nitrogen pursuant to Section 355.203

Q[e] = effluent flow rate

Q[d] = allowed mixing flow rate as determined in accordance with the mixing zone provisions of 35 Ill. Adm. Code 302.102 and implementation procedures adopted thereunder

C[d] = background ammonia nitrogen (as N) concentration in mixing water

Effluent flow rate shall be selected to coincide with the critical

stream flow condition used to quantify allowed dilution. Typically this will be estimated to be the average of the lowest three months average flow rate during the previous year for domestic wastewater sources. For industrial and other wastewater sources where flow rates are not directly correlated to climatic patterns, Q[e] will be estimated as the average of the highest three monthly average flow rates. With either approach, Q[e] shall be modified when future flows are expected to vary significantly from historical data.

- b) The reasonable potential analysis shall be completed separately for the winter and summer seasons and for acute and chronic water quality standards. The Agency may subdivide summer or winter periods into quarterly or monthly segments with analysis of reasonable potential corresponding to those smaller time segments in individual permit applications. WQBELs based on the acute water quality standard shall be expressed as a daily maximum. WQBELs based on the chronic water quality standard shall be expressed as a monthly average.

Section 355.211 Summary of the Results for a Reasonable Potential Analysis and the Determination of Ammonia Nitrogen WQBELs

- a) If the PEQ determined in Section 355.205 is less than or equal to the applicable water quality standard, there is no reasonable potential and no WQBEL will be established in the permit unless otherwise warranted under Section 355.201(c).
- b) If the PEQ exceeds the applicable water quality standard but does not exceed the PEL determined through Section 355.209, there is no reasonable potential and no WQBEL shall be established unless otherwise warranted under Section 355.201(c).
- c) If the PEQ exceeds the PEL determined through Section 355.209, there is reasonable potential to exceed the standard and the PEL shall be established as the WQBEL.
- d) If a WQBEL is warranted under Section 355.201(c), the WQBEL shall be set at the PEL as determined through Section 355.209.

SUBPART C: EFFLUENT MODIFIED WATERS

Section 355.301 Introduction

IPCB regulations at 35 Ill. Adm. Code 302.202, 302.212, 302.213, and 304.122 establish provisions for designating waters as EMWs. EMWs are subject to all general use water quality standards except for the chronic ammonia nitrogen water quality standards of 302.212(b). This Section provides for the designation of an EMW wherein the chronic portion of the un-ionized standard is inapplicable. In lieu of the chronic standard, the IPCB has established discharge restrictions at 35 Ill. Adm. Code 304.122(d) for any discharge tributary to an EMW. These restrictions include limits on discharges at 1.5 mg/L total ammonia nitrogen during the April through October summer season and 4.0 mg/L total ammonia nitrogen during November through March as monthly averages. Beyond these monthly average limits, there is also a provision to assure continuation of the existing level of performance and adherence to the nondegradation provision of 35 Ill. Adm. Code 302.105. The criteria for designation of an EMW include two specific provisions: the water body must have the potential to exceed the chronic standard due to a permitted discharge; and the elevated chronic ammonia nitrogen concentration will not adversely impact designated uses of the affected stretch of the water body. EMW status shall be designated in the

receiving water body if:

- a) aquatic life expected to exist in the receiving waters is known to be tolerant of the projected ammonia nitrogen concentrations resulting from the treatment plant effluent in conjunction with ambient conditions. Determination of the aquatic community expected to inhabit the receiving waters shall be consistent with stream morphology, particularly physical features and hydrologic regimes of the water body;
- b) the receiving stream does not exceed the acute water quality standard of 35 Ill. Adm. Code 302.212(b); and
- c) the discharger demonstrates a reasonable potential to exceed the chronic ammonia nitrogen standard pursuant to Subpart B of this Part.

If an EMW cannot be granted, then monthly average effluent limits in the NPDES permit shall be determined from the procedures for establishing ammonia nitrogen WQBELs pursuant to Subpart B of this Part. If necessary, a schedule to attain compliance with these limits shall also be included in the discharger's NPDES permit.

Section 355.303 EMW Application Requirements

The Agency shall consider designating a portion of the receiving waterbody as an EMW upon receipt of a valid application for an EMW and when the provisions of this Subpart are met.

- a) All applicants shall provide:
 - 1) the name, address and design average flow of the facility;
 - 2) all instream ammonia nitrogen, pH and water temperature data collected by or available to the applicant;
 - 3) a physical description of the receiving stream including information on depth, substrate, instream cover, average width, percent canopy, riffle-pool sequence, stream gradient and other pertinent factors that the discharger wishes to be considered; and
 - 4) any other information concerning the receiving waterbody that the applicant believes is relevant.

Receiving stream information must be collected from the reach anticipated to constitute the requested EMW and continuing downstream for an additional distance comprising 33% of the requested EMW length.

- b) Applicants having one or more of the following characteristics shall supply, in addition to the information in subsection (a), information required under subsection (c) below:
 - 1) a DAF larger than 0.25 MGD;
 - 2) a receiving stream with springs, or other sources of permanent flow constituting 7Q10 flows of greater than zero (excluding the applicant's discharge), upstream or within the reach of the anticipated EMW; or
 - 3) a discharge location on a receiving stream evaluated under the Agency's Biological Stream Characterization (BSC) program and having received an "A" or "B" rating, provided the discharge is located no more than four stream miles upstream of the furthest upstream BSC monitored site.
- c) Dischargers applying for EMW status and having one or more of the characteristics of subsection (b) above must also supply the following information:
 - 1) Stream survey data that assesses ammonia nitrogen impact to the aquatic life of the receiving stream. Generally, data

collected within the past five years that are reflective of current loading, stream flow, and physical conditions are preferred. If none of these factors have significantly changed, older data may suffice. However, any additional data concerning the aquatic life community of the receiving stream must be included in the application as it becomes known to the discharger. The Agency may have previously conducted such studies and these may satisfy this requirement; and

- 2) Data concerning the presence of sensitive species including threatened and endangered federally or State listed aquatic species, self-sustaining populations of cold water species or species of special significance regarding their sensitivity to ammonia nitrogen. Such data may be available from one or more of the following sources or other local or regional sources:
 - A) the Illinois Department of Natural Resources Division of Natural Resources Review & Coordination;
 - B) the report "Biologically Significant Illinois Streams", a publication of the INHS (Center for Biological Diversity Technical Report 1992(1)); or
 - C) local colleges and universities.

Section 355.305 Evaluation of EMW Applications

The Agency shall evaluate EMW applications based on all information provided pursuant to Section 355.303, as well as information available from the Agency's monitoring programs. Additionally, the Agency shall seek and obtain information from other Illinois natural resource agencies. Such information shall include the following:

- a) biological studies conducted on the receiving water;
- b) ammonia nitrogen, pH, and temperature data from ambient, intensive basin, or facility-related stream surveys;
- c) ammonia nitrogen, pH and temperature effluent data;
- d) physical instream habitat data; or
- e) total ammonia nitrogen loading and related information attributed to other sources in the affected reach.

Section 355.307 Determination of EMW Designation

Upon evaluating the EMW application and any additional information available, the Agency shall determine whether the receiving stream can be designated as an EMW based on the provisions of 35 Ill. Adm. Code 302.213, 304.122, and 355.305. Existing EMW designations are subject to review as to whether requirements for such designations continue to be met at the time of an NPDES permit renewal or modification.

- a) If the Agency determines that a receiving stream cannot be designated as an EMW, the Agency shall notify the applicant in writing as to its decision and the basis for that decision.
- b) If a receiving stream can be designated as an EMW, the Agency shall issue a public notice that contains:
 - 1) determination of the length of the EMW, and
 - 2) summary of the ecological analysis used in the EMW designation process.

Section 355.309 Procedures for Delineating an EMW

The methodology for determining the length of a water body to be designated as EMW shall be based on the chronic total ammonia nitrogen (as N) water quality standard for winter conditions and a decay coefficient representing colder ambient conditions as indicated in Section 355.311. Winter conditions depict the "worst-case" ammonia nitrogen decay rates and are to be used when calculating the reach of a water body to be designated as EMW. This modeling shall be performed in the following manner:

- a) Downstream waters shall be subdivided into segments where discharge and stream cross-sectional area are uniform. Segments will typically begin at confluences with other streams or where additional point sources of total ammonia nitrogen (as N) enter the receiving water.
- b) The DAF for domestic wastewater treatment plants and the maximum flow for industrial plants and other point sources of ammonia nitrogen (as N) downstream will be used as effluent flow rates in the analysis. A 7Q10 flow rate shall be determined for each segment. Discharge rates under 7Q10 conditions are to be obtained from maps generated by the ISWS unless the Agency has previously approved an alternate 7Q10 discharge rate.
- c) The average velocity for each segment shall be derived for 7Q10 discharge conditions. In the absence of field measurements, velocity shall be determined from hydraulic geometry equations derived by the ISWS. These equations are published in the University of Illinois Water Resources Center publication, "WRC Research Report No. 15, Hydraulic Geometry of Illinois Streams" (July 1968), which is hereby incorporated by reference and includes no further editions or amendments. A minimum velocity of 0.2 ft/sec will be used unless field measurements indicate that a different velocity exists during 7Q10 conditions.
- d) The chronic water quality standard shall be converted to total ammonia nitrogen (as N) as outlined in Section 355.203.
- e) The concentrations of ammonia nitrogen in the effluents shall be the same as the monthly average winter ammonia nitrogen permit limit for the point source. If no monthly average winter ammonia nitrogen permit limit exists, then a value of 4.0 mg/L shall be used.
- f) The ammonia nitrogen concentration at the end of each segment shall be calculated using the equations contained in Section 355.311. The point at which the water quality standard will be met shall be the downstream terminus of the EMW. The length of the EMW shall equal the sum of all segment lengths, but in no case shall be less than 100 yards in length.
- g) The permittee has the opportunity to submit field measurements to be used in this analysis.

Section 355.311 Ammonia Nitrogen Decay Equation

A decay equation shall be used to predict instream ammonia nitrogen concentrations at locations downstream of the outfall, thereby determining the linear extent of the EMW.

- a) Modeling of the decay (conversion to nitrite/nitrate) of ammonia nitrogen from a discharge and predicting the levels of ammonia nitrogen at points downstream from the discharge shall follow the decay equation:

$$C[nf] = [(Q[n] C[n] + Q[n-1] C[n-1]) / (Q[n-1] + Q[n])] \times e^{-(kt)}$$

where the parameters used in the decay equation are defined as follows:

- C[nf] = ammonia nitrogen concentration at the end of segment "n"
- t = travel time to point "n" (days)
- Q[n] = additional flow introduced into segment "n" (cfs) (see Section 355.309(b) for initial segment)
- C[n] = ammonia nitrogen concentration introduced into segment "n" (monthly average effluent limit for initial segment)
- Q[n-1] = upstream 7Q10 flow rate or flow rate entering segment "n" from previous segment (cfs)
- C[n-1] = upstream ammonia nitrogen concentration entering segment "n" from previous segment
- k = first order decay coefficient used in determining the natural biological, physical, and chemical degradation of ammonia nitrogen that occurs. The value of "k" may vary as a function of the receiving stream characteristics. In the absence of stream specific data, a representative value shall be selected from studies of streams with similar characteristics and shall be used in calculations as a default value representative of winter ammonia nitrogen decay.
- b) Where no upstream flow is available for mixing and no additional sources of ammonia nitrogen are present downstream, the equation reduces to the following:

$$C[nf] = C[n] e^{-kt}$$

where:

- C[nf] = the applicable winter chronic water quality standard
- C[n] = monthly average winter effluent limit

Section 355.313 Restrictions Applicable to Discharges with EMWs

When the Agency issues a publication of a draft NPDES permit designating an EMW, effluent limits for ammonia nitrogen shall be protective of the aquatic community expected to exist in the EMW as provided in 35 Ill. Adm. Code 304.122.

- a) In no instance shall these effluent limits exceed 30 day average concentrations of 1.5 mg/L total ammonia nitrogen (as N) during the months of April through October, and 4.0 mg/L total ammonia nitrogen (as N) during the months of November through March.
- b) When uses are at risk of impact due to increased concentrations of ammonia nitrogen, more stringent 30 day average effluent limits shall be incorporated.
- c) The draft permit shall also include daily maximum effluent limits for total ammonia nitrogen (as N) and these shall be determined by applying the acute water quality standards of 35 Ill. Adm. Code 302.212(b) pursuant to Section 355.203.
- d) The Agency shall take final action as to the designation of an EMW concurrent with final NPDES permit issuance.

Section 355.315 Publication of EMWs

The Agency shall compile the number and length of EMWs and report the information in each edition of the Illinois Water Quality Report pursuant

to Section 305(b) of the Federal Clean Water Act, as amended, 33 USC 1315(b), and in the Illinois Register on a semi-annual basis.