Guidance for Implementation of Wisconsin's Thermal Water Quality Standards

Wisconsin Department of Natural Resources

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This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

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Abbreviations and Acronyms

This list contains the most common abbreviations used in this document.

ATL	Alternative temperature limit
AEL	Alternative effluent limit pursuant to s. NR 106, Subchapter VI, Wis. Adm. Code
BIC	Balanced indigenous community
CW	Waterbodies designated as “cold water communities” pursuant to ch. NR 102, Wis. Adm. Code
CWGL	Waterbodies designated as “cold water communities” in the Great Lakes Basin
CWPWS	Cold water communities identified as public water supplies
DC	Dissipative cooling
DMR	Discharge monitoring report
HUC	Hydrologic unit code
LAL	Limited aquatic life system pursuant to s. NR 104, Wis. Adm. Code
LALGL	Limited aquatic life system in the Great Lakes Basin
LFF	Limited forage fishery pursuant to s. NR 104, Wis. Adm. Code
LFFGL	Limited forage fishery in the Great Lakes Basin
MGD	Million gallons per day
MZ	Mixing zone
P99	99^{th} percentile of the dataset; P99= Mean + (2.327 X standard deviation)
POTW	Publicly Owned Treatment Operation
PS	Point source
Qe	Effluent flow
Qs	Stream flow
Qs:Qe	Ratio of stream flow to effluent flow
RET	Representative effluent temperature
TBL	Technology-based limit
USEPA	United States Environmental Protection Agency
WDNR	Wisconsin Department of Natural Resources
WPDES	Wisconsin Pollutant Discharge Elimination System
WQBEL	Water quality-based effluent limit
WQC	Water quality criteria
WW	Waterbodies designated as “warmwater sportfish communities” pursuant to ch. NR 102, Wis. Adm. Code
WWFF	Waterbodies designated as “warmwater forage fish communities” pursuant to ch. NR 102, Wis. Adm. Code

WWGL Waterbodies designated as “warmwater communities” in the Great Lakes Basin

WWTF Wastewater treatment facility

WWPWS Warmwater communities identified as public water supplies

Executive Summary

Revisions to Wisconsin's Thermal Water Quality Standards became effective on October 1, 2010. These revisions are reflected in two separate Chapters of the Wisconsin Administrative Code: Chapters NR 102 and NR 106, Wis. Adm. Code. Chapter NR 102, Wis. Adm. Code, includes water quality criteria for the protection of fish and aquatic life as well as human health. Chapter NR 106, Wis. Adm. Code, includes regulations on how the water quality criteria will be used to establish water quality-based effluent limitations for point source discharges subject to permits under the Wisconsin Pollution Discharge Elimination System (WPDES). These rules are available for download at: http://dnr.wi.gov/topic/surfacewater/thermal.html.

The intent of this document is to provide guidance to Wisconsin Department of Natural Resources (WDNR) staff as well as WPDES permittees and their associates on how to implement the procedures in Chapters NR 102 and NR 106, Wis. Adm. Code, to ensure the protection of the surface waters receiving effluent discharges of heated water. This guidance document is organized to discuss the overall rule process and temperature monitoring (Chapters 1 and 2), limit calculations (Chapters 3-6), determining the need for temperature limits (Chapters 7-8), alternatives and options for flexibility (Chapters 9-15), and permit language and compliance determinations (Chapter 16-18).

Questions about specific provisions of this document that are not addressed by this document can be directed to WDNR staff assigned to work on a particular WPDES permit. Any remaining unanswered questions can be directed to the DNR's thermal email account: DNRThermal@wisconsin.gov.

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Chapter 1 – Flow Diagrams for Thermal Standards Implementation

Author: **Amy Schmidt & Dan Joyce**
Last Revised: **August 27, 2010**

The flow diagrams (aka logic diagrams) provided in this Chapter is intended to help the reader follow the decision order of the Administrative Rules. Certain diagrams are specific to a particular group of dischargers (i.e., Municipal POTWs) or to a specific provision of the rules (i.e., 316(a) demonstrations).

Throughout the flow diagrams, the following abbreviations are used. A full list of abbreviations is available on pg. 3 of this Guidance.

AEL Alternative Effluent Limit

ATL Alternative Temperature Limit

BIC Balanced Indigenous Community

DC Dissipative Cooling

LAL Limited Aquatic Life

MZ Mixing Zone

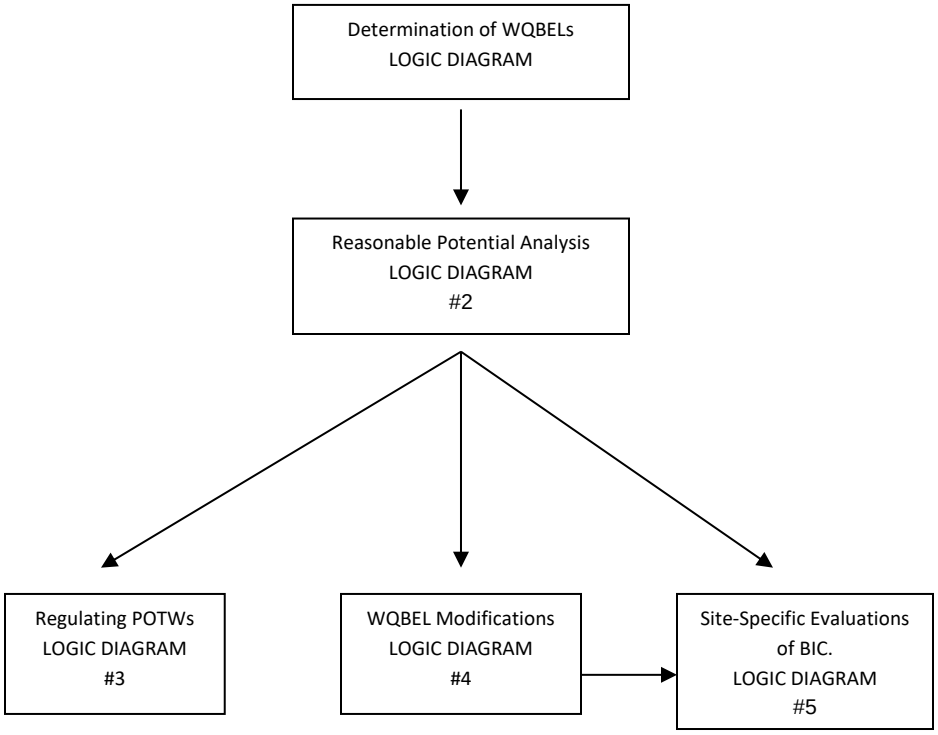
POTW Publicly Owned Treatment Works

RET Representative Effluent Temperature

WQBEL Water Quality Based Effluent Limits

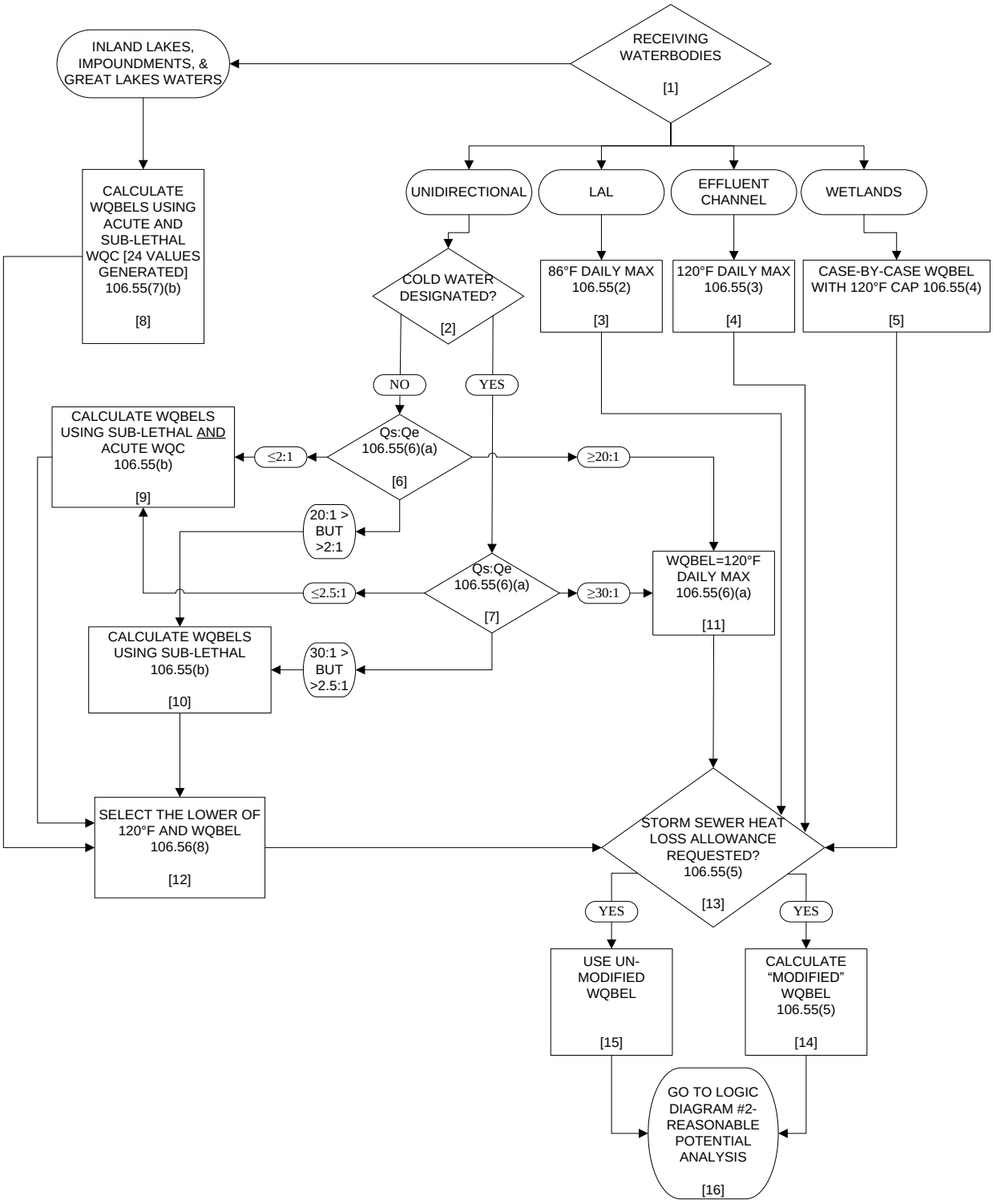
WQC Water Quality Criteria

OVERVIEW OF FLOWCHARTS



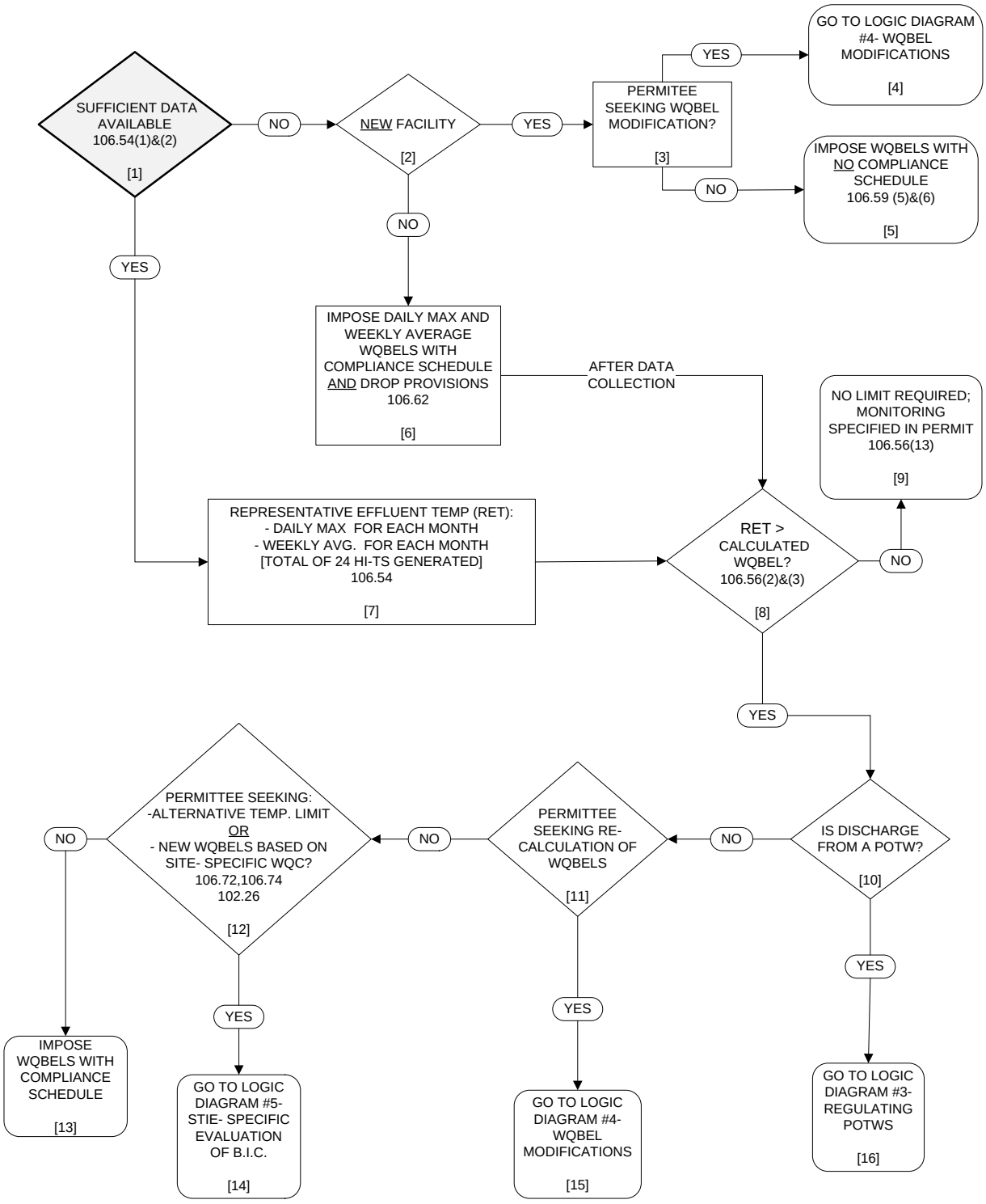
LOGIC DIAGRAM #1

DETERMINATION OF WQBELS



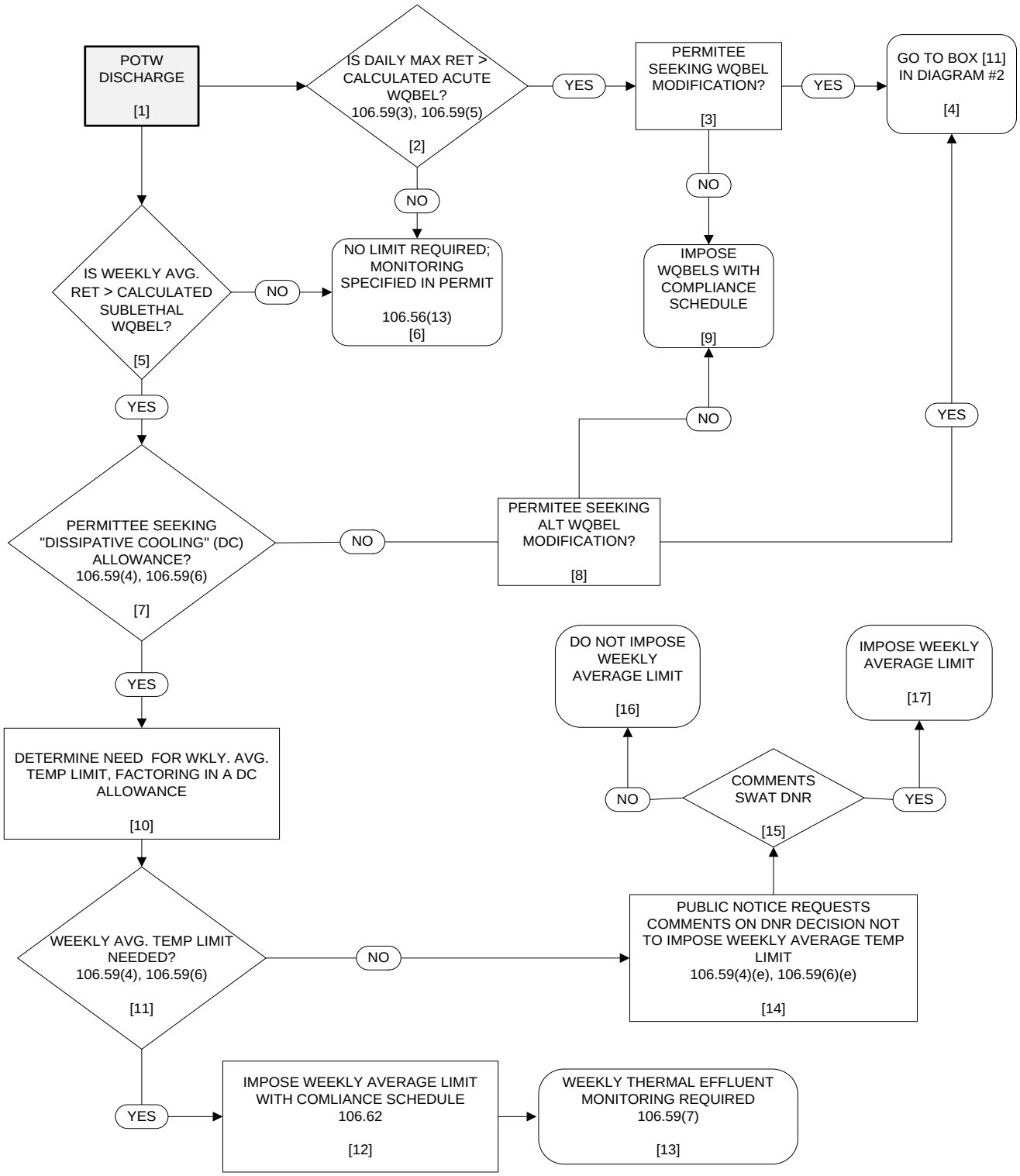
LOGIC DIAGRAM #2

REASONABLE POTENTIAL ANALYSIS



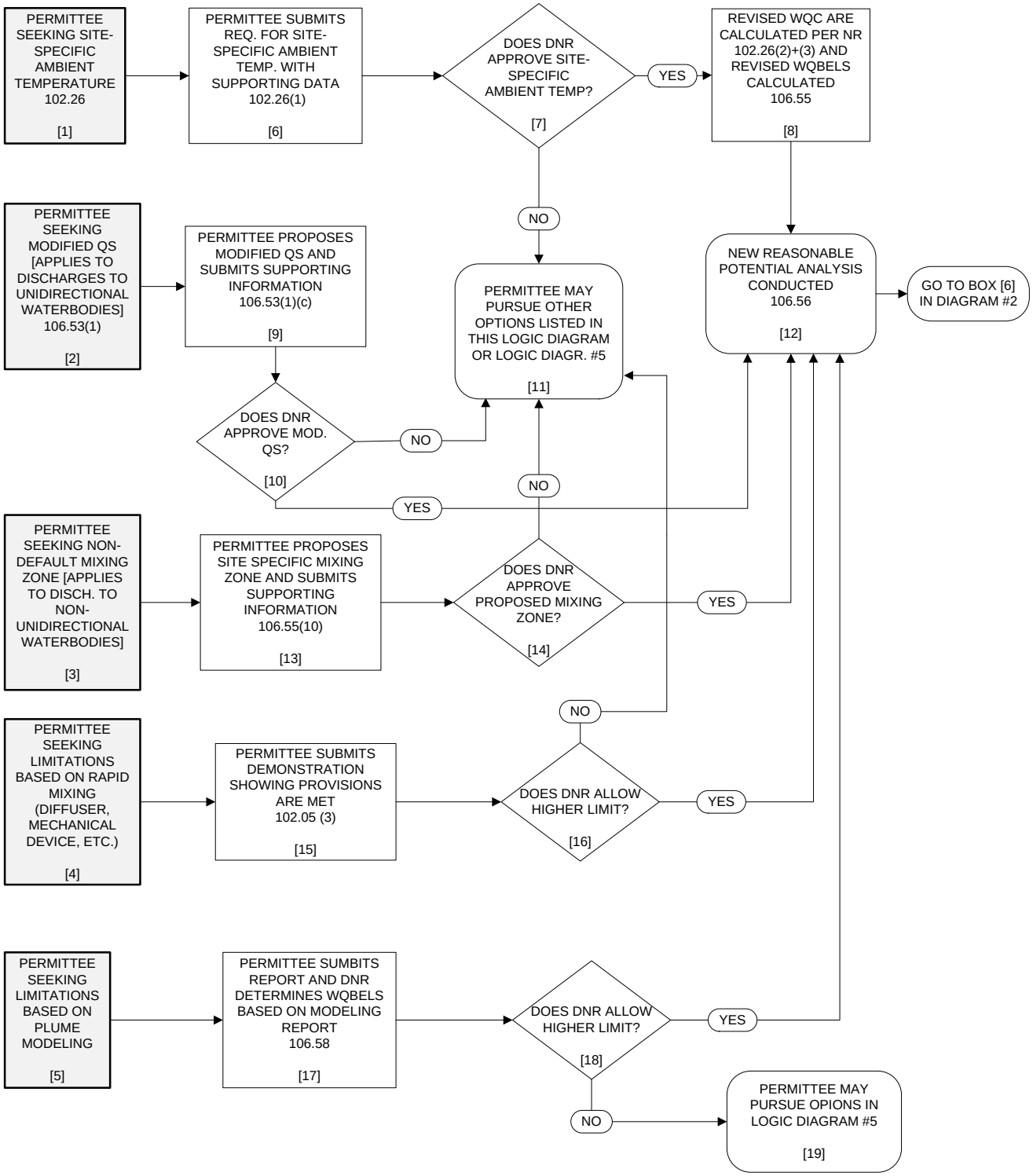
LOGIC DIAGRAM #3

REGULATING THERMAL DISCHARGES FROM POTWS



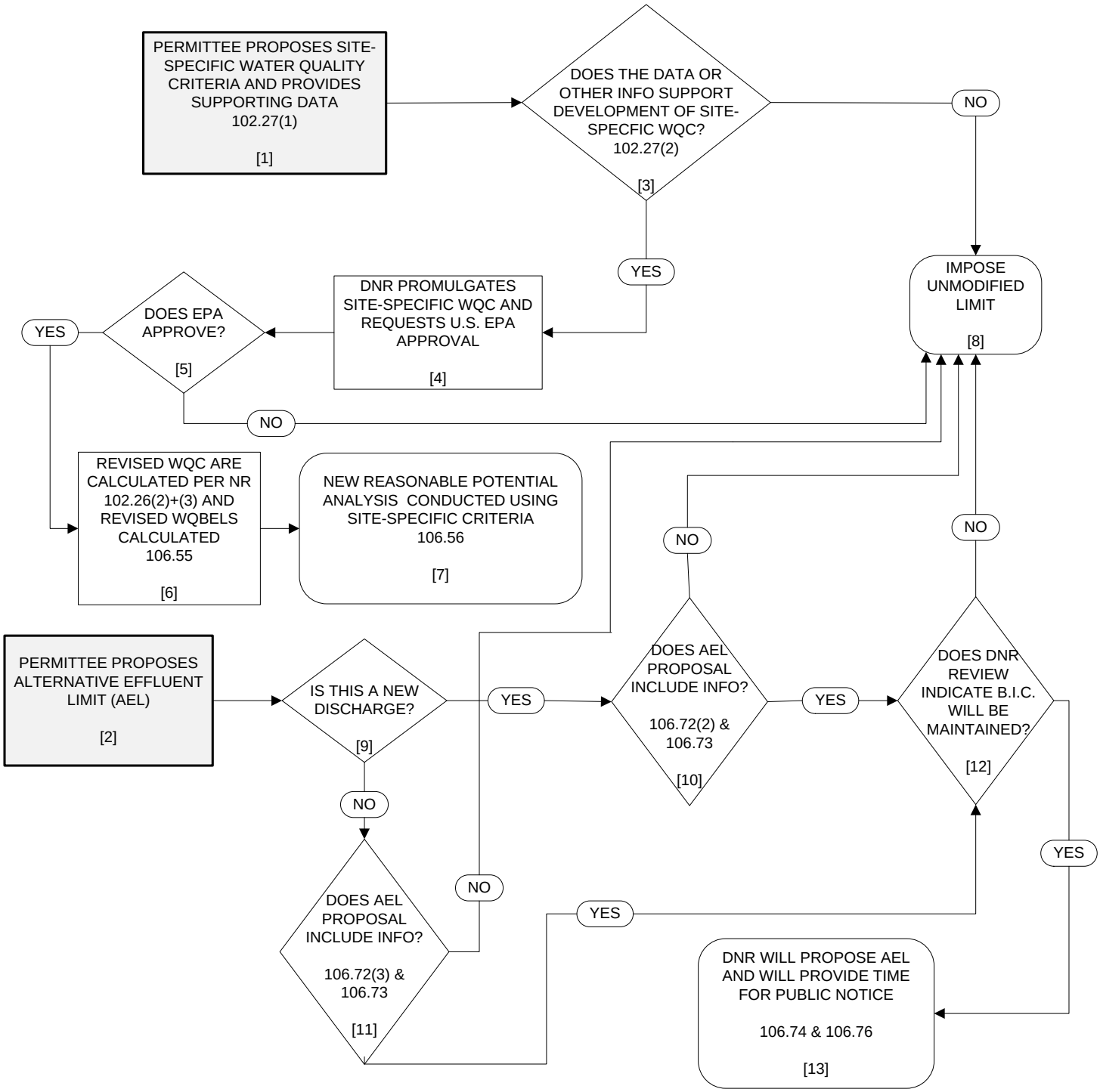
LOGIC DIAGRAM #4

WQBEL MODIFICATIONS



LOGIC DIAGRAM #5

SITE-SPECIFIC EVALUATION OF B.I.C.



Chapter 2 – Permit Application Monitoring Guidance

Applicable Rule Provision(s): s. NR 106.54, Wis. Adm. Code
Author: Bob Masnado and Amanda Minks
Last Revised: August 15, 2013

Representative temperature data are needed to calculate temperature limits for the wastewater discharged to surface waters. The provisions of s. NR 106.56(12), Wis. Adm. Code, make it very important to have these representative effluent temperature data at the time of permit application. Having a complete and representative data set will mitigate the need for including "limits subject to drop" in a Wisconsin Pollutant Discharge Elimination System (WPDES) permit (see Chapter 17, pg. 114). If the data requirements specified in the rule are not satisfied at the time of permit issuance, limitations will be included in a WPDES permit with a compliance schedule for meeting those limits when determined to be necessary and appropriate. Those limitations will go into effect on that effective date unless the minimum data requirements have been satisfied AND the Department modifies the permit to drop the temperature limits out if there is no reasonable potential to exceed the specified limitations (see Chapter 15, pg. 109).

Accordingly, Department staff is encouraged to inform permittees of the need to collect effluent temperature data consistent with this guidance. Typically this includes sending a letter to permittees prior to or with their permit application (see Chapter 18, pg. 117 for details). Permittees are also encouraged to review this guidance to determine if available historical data satisfy the minimum data requirements. This Chapter is intended to provide permit drafters – as well as WPDES permittees – with the minimum data requirements to facilitate both the calculation of water quality-based effluent limitations (WQBELs) and the reasonable potential demonstration to determine if WQBELs need to be included in a permit.

> *Note to permittees with historical data:* If a permittee has been collecting temperature data, they may compile those data and send them with a permit application for consideration by the Department if these data have not already been submitted. The submittal must include the maximum value recorded for any calendar day in which temperature data were generated. Anomalous values should be identified and a short explanation should be included to describe why those data are not representative of normal operating conditions.

Minimum Data Recommendations: Variability in effluent temperature over time is not uncommon and may be influenced by both operational and climatic factors. Permit staff should assess each discharge independently to determine the amount of data needed to characterize the variability of effluent temperature representing "normal operating conditions." In doing so, staff should require sufficient effluent temperature sampling to meet the following:

a. *Continuous Discharge – Limited Daily or Monthly Effluent Temperature Variability:* A minimum of one (1) full years of data collection where samples are recorded for at least one (1) operating day per week.
b. *Continuous Discharge – Highly Variable Daily or Monthly Effluent Temperature:* A minimum of two (2) full years of data collection where samples are recorded for at least one (1) operating day per week.
c. *Seasonal Discharges or Other Unusual Discharge Conditions:* A minimum of two (2) full years of data collection where samples are recorded for at least one (1) operating day per week.

It is recommended that a permittee collect additional monitoring above the minimum data requirements when a reasonable potential evaluation is necessary. The minimum data requirements specified in this section are not sufficient to calculate a 99th percentile value for each discrete month of the year. To utilize the P99 approach, described in Chapter 7 (pg. 41) of this Guidance, the Department strongly recommends the collection of temperature values for no less than three (3) days per week for a minimum of 12 days per month. This collection frequency will ensure an adequate data set to calculate a monthly P99 in lieu of relying on the highest recorded daily or weekly average values authorized in ss. NR 106.56(2)(a) and NR 106.56(3)(a), Wis. Adm. Code, respectively. The permittee should submit all collected effluent temperature data to the Department for review.

General Requirements: Data are to be collected that represent the daily maximum temperatures that occur during normal operating conditions (s. NR 106.54, Wis. Adm. Code). Censoring of data may be considered if a permittee provides written documentation that clearly identifies which data are not representative of normal conditions and a justification for the excursion(s). Decisions on censoring data must be documented clearly by Department staff in the WQBEL memo. The following factors should be considered when collecting temperature data:

1. *Sample Location:* Effluent temperature shall be measured at the outfall as near as possible to the actual point of discharge into the receiving water body, storm sewer, or other wastewater conveyance.

2. *Multiple Grab Sample Method:* Permittees choosing to collect effluent temperature data using multiple grab samples should record temperature at six (6) evenly spaced intervals during an active discharge covering the 24-hour period. For example, if heat is discharged for 9 hours during a 24-hour period sampling should occur every hour and a half during that active discharge period. Alternative sampling intervals may be approved if the permittee can show that the maximum effluent temperature is captured during the sampling interval.

   To request an alternative sampling interval, data should be submitted to the Department to verify that the alternative interval will capture the maximum effluent temperature of the discharge occurring in any 24-hour period. Data should be collected during critical conditions (ex. ambient low flow, high discharge temperatures, high discharge flow, etc.).

3. *Continuous Sample Method:* Permittees choosing to collect effluent temperature samples as continuous samples shall do so in accordance with the provisions of s. NR 218.04(13), Wis. Adm. Code. This means that discrete measurements samples shall be recorded at intervals of not more than 15 minutes during an active discharge in any 24-hour period.

4. *Temperature Monitoring Devices:* Temperature measurements can be made using a thermometer, temperature probe, or data logger that has been properly calibrated and maintained. The accuracy of the recording device should be tested in a water bath at two temperatures (0°C and 20°C) and recorded in any field notes. A NIST (National Institute of Standards and Technology: www.nist.gov) traceable thermometer accurate to 0.2°C is required to determine accuracy. For more information on calibration protocols, refer to U.S. EPA's Standard Operating Procedure for the Calibration of Thermometers which at the following link: http://www.epa.gov/pesticides/methods/atmpmethods/EQ-02-06.pdf

   The Department does not endorse any specific manufacturer of temperature recorder, although data loggers are the preferred method for collecting continuous temperature data records. The cost of temperature data loggers continues to decrease while their reliability and ease of use continues to improve. There are many manufacturers and models of data loggers from which to choose. A few of the more commonly available recorders are described below:

Table 1. Examples of commercially available submersible temperature loggers.

Manufacturer	Logger Type	Web Site	Temperature Range	Battery Type (Max. Life)
Onset	Stowaway TidBit v2	www.onsetcomp.com	-4°F – 122°F	Non-Replaceable (Up to 5 years)
Onset	Hobo Water Temp Pro v2	www.onsetcomp.com	-40°F – 158°F	Lithium Replaceable (Up to 6 years)
Veriteq	Spectrum 1000	www.veriteq.com	-40°F – 185°F	Lithium – Internal (Up to 10 years)
Vemco	Minilog-II—T	www.vemco.com	-22°F – 176°F	Unspecified (Up to 10 years)

   When selecting a data logger, the following characteristics are recommended:

   a. Submersible, waterproof logger
   b. Accuracy ±0.2°C
   c. Programmable start time/date
   d. User-selectable sampling interval

Other issues to consider when selecting a data logger are memory capacity and battery life. Storage capacity needs will depend on sampling interval (i.e., 30 seconds, 15 minutes, 2 hours) and the length of

deployment (i.e., 7 days, 6 months, 1 year). For battery life, some loggers have factory replaceable batteries and others have non-replaceable batteries, which should last at least 5 years with typical use. Data from these loggers can be transferred in the field to an optical shuttle at the operator's convenience (weekly, monthly, etc.) and brought back to a stationary computer for analysis.

Field Collection: Temperature recorded in the field (i.e., outfall or specified sampling location) should be collected as follows:

a. Place the thermometer, meter probe, or data logger in the water as least 4 inches below the surface or halfway to the bottom if in a shallow stream.
b. If using a thermometer, allow enough time for it to reach a stable temperature (at least 1 minute) before recording the temperature. If using a meter, allow the temperature reading to stabilize at a constant temperature reading before recording temperature.
c. If possible, try to read the temperature with the thermometer bulb beneath the water surface. If this is not possible, quickly remove the thermometer and read the temperature.

Data Reporting: All temperature data collected shall be reported as a daily maximum value, which is defined as the single highest discrete temperature recorded during any active discharge in a 24-hour period. These data will be used to demonstrate compliance with both daily maximum and weekly average temperature limits (see Chapter 16, pg. 111 for details).

Discretionary Monitoring Situations: Chapter NR 106, Wis. Adm. Code, requires the inclusion of thermal limits for dischargers that have the reasonable potential to exceed the criteria. If thermal limits are included in a WPDES permit, thermal monitoring is required throughout the permit term (see example on pg. 16).

If thermal limits are not required in a WPDES permit, the permit drafter can use professional judgment to stipulate a temperature monitoring frequency in the WPDES permit. In most cases, temperature monitoring should be required in the fourth year of the permit so that a reasonable potential analysis can be performed for temperature limits upon permit reissuance. If a reasonable potential analysis is not warranted, temperature monitoring may not be required in the WPDES permit. Situations where temperature monitoring may not be necessary include municipal discharge only subject to public health limits or biological treatment systems subject to temperature limits that exceed 90°F.

Decisions to not require thermal monitoring - and the summary points supporting those decisions - should be clearly stated in the PIF, Briefing Memo, or Fact Sheet depending on what form is used by the permit drafter.

Example: How temperature data will be used in permitting decisions.

In order to illustrate the basis for the daily maximum and weekly average flows and temperatures to be used in evaluating thermal limits, the following example is provided for a discharge from Permittee ABC in the month of September, 2010.

Table 2. Effluent data summary for permittee 'ABC', September 2010.

Date (1)	Day of the week (2)	Total daily effluent flow in MGD (3)	Weekly average effluent flow in MGD (4)	Daily maximum effluent temperature in deg. F (5)	Weekly average effluent temperature in deg. F (6)
1	Wed	0.052		77	
2	Thu	0.411		82	
3	Fri	0.805		63	
4	Sat	0.099		96	
5	Sun	0.686		60	
6	Mon	0.651		56	
7	Tue	0.126	0.404	52	
8	Wed	0.576	0.479	70	
9	Thu	0.032	0.425	62	
10	Fri	0.575	0.392	89	
11	Sat	0.884	0.504	73	66
12	Sun	0.343	0.455	54	
13	Mon	0.615	0.450	81	
14	Tue	0.684	0.530	99	
15	Wed	0.334	0.495	69	
16	Thu	0.836	0.610	91	
17	Fri	0.645	0.620	81	
18	Sat	0.488	0.564	69	78
19	Sun	0.321	0.560	69	
20	Mon	0.876	0.598	70	
21	Tue	0.036	0.505	70	
22	Wed	0.807	0.573	72	
23	Thu	0.102	0.468	75	
24	Fri	0.563	0.456	76	
25	Sat	0.633	0.477	77	73
26	Sun	0.672	0.527	76	
27	Mon	0.530	0.478	54	
28	Tue	0.146	0.493	95	
29	Wed	0.126	0.396	87	
30	Thu	0.261	0.419	65	

It should be noted that the daily effluent flows and temperatures in columns (3) and (5) of the above table were provided using a random number generator. It's possible that results as variable as this (especially for the flows) may be handled differently in a real-life situation, but in order to clearly illustrate the basis for averages the contents of columns (3) and (5) were generated totally at random.

Daily effluent flow, column (3), is the total effluent flow reported on the indicated day.

Weekly average effluent flow, column (4), is the arithmetic mean of the results from a given day and the six days preceding it during that month. Therefore, no weekly average flows would be available for the 1st through the 6th day of the month, but those results would be used to calculate the weekly average on the 7th and afterwards. Source = s. NR 106.52(8), Wis. Adm. Code.

Daily maximum temperature, column (5), is the maximum temperature reported at any time during the indicated day. If multiple measurements were made on a given day or if there were results generated off a continuous data logger, the value in column (5) is the highest individual result of those multiple measurements.

Weekly average effluent temperature, column (6), is the arithmetic mean of the results from a calendar week, meaning Sunday through Saturday. Here, the weekly average temperatures are only calculated for a week within a month when the whole calendar week is in that month. In the example above, the results from September 1st through the 4th are not used to calculate weekly averages, nor are the results from September 26th through the 30th. Those results are still used to determine the maximum value for the month, though. Source = s. NR 106.52(11), Wis. Adm. Code.

Using this information, the highest values from columns (3), (4), (5), and (6) are used to represent the month of September 2010 in the effluent limit calculation and the reasonable potential analysis for Permittee ABC:

Table 3. Final flows and temperatures for September 2010.

Daily maximum effluent flow	0.884 MGD (Sept. 11)
Weekly average effluent flow	0.620 MGD (Sept. 11 – 17)
Daily maximum effluent temperature	99 degrees F (Sept. 14)
Weekly average effluent temperature	78 degrees F (Sept. 12 – 18)

Daily maximum and weekly average flows and temperatures are calculated in the same manner for each month of each year during the permit term as part of the thermal evaluation for the next permit. The highest results for the month of September are used to determine the effluent limitations and the need for permit limits for the month of September, and the same process is used for the other months of the year.

If, for example, the permit for Permittee ABC was being reissued in 2011, the reported results from the previous 5-year permit term would be used. For September, this would include results from the years 2006 through 2010. The above tables summarized how relevant values from 2010 are determined. The following example lists Permittee ABC's results for all five Septembers, including the 2010 results from above (the 2006 – 2009 results were also randomly generated for this example).

Table 4. Daily maximum and weekly average flows and temperatures for permittee 'ABC', 2006-2010.

Year (7)	Highest daily effluent flow in MGD (8)	Highest weekly average effluent flow in MGD (9)	Highest daily maximum effluent temperature in deg. F (10)	Highest weekly average effluent temperature in deg. F (11)
2006	0.794	0.593	89	72
2007	1.026	0.696	95	81
2008	0.755	0.584	104	80
2009	0.906	0.703	95	73
2010	0.884	0.620	99	78

Using this information, the highest values from columns (8), (9), (10), and (11) are used to represent the month of September in the effluent limit calculation and the reasonable potential analysis for Permittee ABC:

Table 5. Final flows and temperatures for the month of September.

Daily maximum effluent flow	1.026 MGD (Sept., 2007)
Weekly average effluent flow	0.703 MGD (Sept., 2009)
Daily maximum effluent temperature	104 degrees F (Sept., 2008)
Weekly average effluent temperature	81 degrees F (Sept., 2007)

As it turns out, in this example none of the results from 2010 were used for September limit calculations and reasonable potential analyses because there were other years with higher maximum and average values for the month of September.

The same process would be used for other months, but no other examples are given here. An important thing to note from this evaluation is that the limit calculation and reasonable potential analysis processes are independent for each month of the year. If thermal limits are needed in the permit for September, that doesn't automatically mean limits are needed for the other months. Determinations for other months are solely based on results for those other months.

Chapter 3 – Use of Q_s:Q_e Ratios for Discharges to Flowing Waters

Applicable Rule Provision(s): s. NR 106.55(6)(a), Wis. Adm. Code
Author: Bob Masnado & Amy Schmidt
Last Revised: December 3, 2010

Similar to the development of water quality criteria and associated effluent limitations for toxic substances, a number of conservative assumptions were built into the process of deriving effluent limitations based upon the thermal water quality criteria in Chapter NR 102, Wis. Adm. Code. One notable difference with the discharge of hot water versus many other pollutants is that heat dissipates to the surrounding environment and is forever lost following dissipation. Typically, complex water quality models based on very localized data are necessary to definitively ascertain the loss of heat through dissipation. However, the data and resources necessary to model heat loss on a case-by-case basis are not available to Department staff so conservative alternatives are used as mentioned above.

In recognition of the fact that site-specific water quality modeling is not feasible for each and every discharge, a "screening" tool was built into the thermal rule package to help identify permitted discharges that pose the greatest risk to the fish and aquatic life communities of receiving waters. This tool is the Q_s:Q_e ratio specified in s. NR 106.55(6)(a), Wis. Adm. Code. The intent of this tool is to allow a Department staff to quickly assess each thermal discharger to flowing water to determine which type of limitations should be considered.

Selection of the proper Q_s and Q_e value is the key to making the ratio work successfully without compromising the goal of the Department to protect fish and aquatic life and humans. The following guidance should be used to help staff make sound decisions in a consistent manner where appropriate.

Selection of Receiving Water Low Flow (Q_s) for Calculation of Q_s:Q_e Ratio:
Section NR 106.53(1), Wis. Adm. Code, indicates how to select a Q_s value to be used to calculate the Q_s:Q_e ratio specified in s. NR 106.55(6)(a), Wis. Adm. Code. **In most cases, the Qs value will be the same as the value used to calculate effluent limitations for toxic substances.** However, some WPDES permittees may obtain seasonal or monthly low flow values from the United States Geological Survey (USGS) and those values can be used in lieu of a year-round value. For more information on conditions of using seasonal or monthly low flow values, refer to Chapter 9 (pg. 53) of this Guidance.

NOTE: The Qs value used in calculating the ratio is, in most cases, ¼ of the 7Q10, unless an alternative mixing zone has been approved. See Chapter 10 (pg. 55) for alternative mixing zone requests. A question was asked if Qs represented the full flow or ¼ of the flow. Since the formula in s. NR 106.55(6)(b), Wis. Adm. Code, for calculating thermal limits for discharges to streams defines Qs as ¼ of

the 7Q10 or 4B3, then that same "1/4" factor should be used to determine what limits need to be calculated based on the ratios in Table 1 of NR 106.

Selection of Effluent Flow (Q_e) for Calculation of Q_s:Q_e Ratio:

Section NR 106.53(2)(a), Wis. Adm. Code, states how to select a Q_e value to be used to calculate the Q_s:Q_e ratio specified in s. NR 106.55(6)(a), Wis. Adm. Code. For municipal discharges subject to Chapter NR 210, Wis. Adm. Code, the Q_e value is the annual average design flow. However, for discharges that are not subject to Chapter NR 210, Wis. Adm. Code, there is a need to evaluate the variability of the effluent flow over time to determine if an annual value or some alternative value should be used. As authorized in s. NR 106.53(2)(a)3, Wis. Adm. Code, the following guidance is available to staff to help determine if there is enough variability within the effluent flow over time to use something other than an annual value.

Variability in reported effluent flow can be attributed to many different factors, including, but not limited to seasonal production of manufactured goods and/or changes in the operation of wastewater treatment or production. As such, each discharge situation should be evaluated on a case-by-case basis considering the specific situation for any affected permittee as authorized by s. NR 106.53(2)(a)3, Wis. Adm. Code. Several approaches to determining variability may be available. Whichever approach is selected must be documented clearly if a decision is made to use something other than the annual Q_e value. One statistical approach that may be used by staff to asses a continuous discharge (12 months of operation) is described below:

1. Evaluate daily maximum flow data provided by the permittee from the previous five years or a subset of those five years if representative of normal operating conditions. This will be the "period of record."
2. Record the mean daily maximum flow for each month for each year in the period of record.
3. Sum the daily maximum flow for each respective month for all years in the period of record. Calculate the arithmetic mean of those values for each month. This value will be $Q_{dm.}$
4. Calculate the arithmetic mean and the standard deviation (S.D.) of the twelve monthly values for each year.
5. Select the highest arithmetic mean of the yearly values for the period of record. That value will be the "*Annual Average Flow*" consistent with s. NR 105.53(2)(a)2, Wis. Adm. Code.
6. Compare the Q_{dm} for each month to the *Annual Average Flow*.
7. If the Q_{dm} for any month is outside of the range of the *Annual Average Flow* $\pm$ 2 S.D., the flow ratio for that facility should be determined on a monthly basis using the Q_{dm} instead of the Annual Average Flow.

Two examples of how this procedure works are presented below. The first example is a determination of relatively consistent flow supporting use of the annual Q_e value. The second represents a scenario with variable flow for a portion of the year. The Qs:Qe ratio for Example 2 would require multiple values to be determined to assess the types of effluent limits to be reviewed.

Example 1: **Relatively Consistent Effluent Flow** = Annual Average Flow to be used for Flow Ratio determination pursuant to s. NR 106.53(2)(a)2, Wis. Adm. Code.

	Mean Daily Maximum Flow (MGD)						Ann.	Ann.	Higher of
	Year	Year	Year	Year	Year		Avg. Q	Avg. Q	Ann. Avg. Q
Month	1	2	3	4	5	Q_{dm}	- 2 S.D.	+ 2 S.D.	or Q_{dm}
Jan	6.2	6.4	6.0	5.9	6.2	6.1	5.9	6.5	6.2
Feb	6.2	6.2	5.5	6.2	6.3	6.1	5.9	6.5	6.2
Mar	5.7	5.8	6.1	6.4	6.3	6.1	5.9	6.5	6.2
Apr	6.1	5.6	5.8	6.5	6.3	6.1	5.9	6.5	6.2
May	5.8	6.0	5.8	6.1	6.4	6.0	5.9	6.5	6.2
Jun	5.7	6.2	6.2	6.2	5.9	6.0	5.9	6.5	6.2
Jul	5.8	5.9	6.3	6.0	6.3	6.1	5.9	6.5	6.2
Aug	6.0	6.2	6.1	6.3	6.1	6.1	5.9	6.5	6.2
Sep	6.2	6.0	6.0	6.4	6.0	6.1	5.9	6.5	6.2
Oct	5.7	5.9	6.0	6.2	6.1	6.0	5.9	6.5	6.2
Nov	6.1	5.7	5.8	6.0	6.0	5.9	5.9	6.5	6.2
Dec	5.6	5.5	5.3	6.1	5.9	5.7	5.9	6.5	6.2
Annual Avg.	~~5.9~~	~~6.0~~	~~5.9~~	6.2	6.2				
Std. Dev.	0.1348								
2 X Std. Dev.	0.2695								

Example 2: **Variable Effluent Flow** = Individual Monthly Values to be used for Flow Ratio Determination pursuant to s. NR 106.53(2)(a)3, Wis. Adm. Code.

	Mean Daily Maximum Flow (MGD)						Ann.	Ann.	Higher of
	Year	Year	Year	Year	Year		Avg. Q	Avg. Q	Ann. Avg. Q
Month	1	2	3	4	5	Q_{dm}	- 2 S.D.	+ 2 S.D.	or Q_{dm}
Jan	6.2	6.4	6.0	5.9	6.2	6.1	5.8	6.6	6.6
Feb	5.3	6.2	5.5	6.2	6.3	5.9	5.8	6.6	6.6
Mar	5.7	5.8	6.1	6.4	6.3	6.1	5.8	6.6	6.6
Apr	6.1	5.6	5.8	6.5	6.3	6.1	5.8	6.6	6.6
May	5.8	6.0	5.8	6.1	6.4	6.0	5.8	6.6	6.6
Jun	5.7	6.2	6.2	6.2	5.9	6.0	5.8	6.6	6.6
Jul	7.5	8.4	9.7	6.0	7.8	7.9	5.8	6.6	7.9
Aug	8.2	9.0	8.6	6.3	8.5	8.1	5.8	6.6	8.1
Sep	7.3	8.2	8.3	6.4	7.7	7.6	5.8	6.6	7.6
Oct	5.7	5.9	6.0	6.2	6.1	6.0	5.8	6.6	6.6
Nov	6.1	5.7	5.8	6.0	6.0	5.9	5.8	6.6	6.6
Dec	5.6	5.5	5.3	6.1	5.9	5.7	5.8	6.6	6.6
Annual Avg.	~~6.3~~	6.6	6.6	~~6.2~~	6.6				
Std. Dev.	0.2024								
2 X Std. Dev.	0.4047								

Documentation of Decisions:
In any case, if an alternative flow to the annual value is used; it should be clearly noted in the documentation prepared for the evaluation of effluent limitations. This particular issue was of high importance to staff at U.S. EPA during the deliberation of the rule language and is one that may be scrutinized closely. Complete documentation of any deviation from the "annual" values will help mitigate any concerns and will help ensure permits are processed in a timely manner.

An example of an alternative flow would be for intermittent discharges, including fill-and-draw discharges from municipalities. Whether or not a permittee's discharge is subject to ch. NR 210, Wis. Adm. Code, if the discharge rate is intermittent, seasonal, or even stream flow-related, this would be considered an "unusual discharge" which, pursuant to s. NR 106.53(2)(a)3, Wis. Adm. Code, would allow the use of something other than annual average design flow to be used as Qe.

Q_s:Q_e Screening:
In an effort to help permittees and staff have a general sense of which effluent limitations may be considered at the time of permit issuance or reissuance, the Department analyzed current information and compiled spreadsheets that reflect a current Q_s:Q_e ratio (See Appendix A1 and A2, pgs. 138 and 150, respectively). These projected ratios are not absolute and should be checked by staff before reaching any conclusions. The effluent limitations calculation spreadsheet will update these numbers based upon current flow data at the time of review.

> Information used to develop these spreadsheets was generally extracted from historical WQBEL memoranda and/or the System for Wastewater Application, Monitoring, and Permits (SWAMP) database.

Chapter 4 – Calculating Water Quality-Based Effluent Limitations for Temperature

Applicable Rule Provision(s): ch. NR 106, Subchapter V, Wis. Adm. Code
Author: Diane Figiel
Last Revised: August 15, 2013

Water quality-based effluent limitations (WQBELs) for temperature apply to point sources that discharge to surface waters of the state if the discharge contains an associated heat load or is elevated in temperature relative to the ambient temperature of the receiving water. Water quality standards for temperature defined in ch. NR 102 –Subchapter ll, Wis. Adm. Code, are set to protect fish and other aquatic life from acute and sub-lethal effects as well as to protect public health and welfare. The procedures for calculating water quality-bases effluent limitations are specified in ch. NR 106 - Subchapters V & VI, Wis. Adm. Code.

Chapter NR 102, Wis. Adm. Code, includes:

- Temperature criteria for limited aquatic life communities
- Default ambient temperatures and corresponding acute and sub-lethal temperature criteria.
- Procedures for determining site-specific ambient temperatures
- Requirements for determining site-specific water quality criteria

Chapter NR 106, Wis. Adm. Code, includes:

- Procedures for calculating default water quality-based effluent limitations (WQBELs).
- Procedures for calculating WQBELs using site-specific ambient temperatures (Ta).
- Procedures for determining a discharge's reasonable potential to exceed WQBELs, which will dictate if a limit should or should not be included in a WPDES permit.
- Options for relief from acute and sub-lethal temperature limits

The initial step in calculating WQBELs is to identify the category of receiving waters to which the effluent is discharged:

- Waters with unidirectional flow (non-specific and specific large rivers)
- Inland lakes, impoundments and Great Lakes waters
- Storm sewer or storm water conveyance channel
- Limited aquatic life (LAL)
    - Default limit = 86°F
- Wastewater effluent channel as defined in s. NR 104.02(1)(d), Wis. Adm. Code
    - Default limit = 120°F
- Wetlands
    - Limits calculated on a case-by-case basis as described in s. NR 106.55(4), Wis. Adm. Code

Note: See Chapter 6 (pg. 38) for additional information about temperature limits for LAL waters, wastewater effluent channels, and wetlands. Typically, no further calculation is needed for these waterbody types unless limits are based on downstream protection.

The next step is to determine the Qs:Qe ratio in unidirectionally flowing water situations. For a facility discharging to non-limited aquatic life waters with unidirectional flow calculating the Qs:Qe ratio as described in Chapter 3 (pg. 22) of this Guidance can be used to determine when WQBEL calculations are required. If the Qs:Qe is sufficiently high, only public health temperature limits apply. No further calculation is necessary.

In many cases, however, temperature WQBELs will need to be calculated. The following parameters are used in the calculation of temperature WQBELs:

- Water quality criteria and ambient temperature as defined in ch. NR 102, Wis. Adm. Code
- Effluent flow rate (Qe)
    - The effluent flows used to calculate limits are not the same as those used for calculate Qs:Qe ratios. The acute and sub-lethal limits are based on actual flows while the flows used to calculate Qs:Qe ratios are design or annual average flows.
    - This Qe is calculated from the effluent flow data consistent with the methods specified in ss. NR 106.53(2)(b) - (d), Wis. Adm. Code
        - The highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation.
        - The highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation, or
        - May be determined on a case-by-case basis for seasonal discharges, discharges proportional to stream flow, or other unusual discharge situations.

In addition the calculation of effluent limits for unidirectional water includes:

- Receiving water flow rate (Qs) consistent with s. NR 106.53(1), Wis. Adm. Code
    - 25% of 7Q10 (the 7 day, 10-year low flow) unless an alternative mixing zone size is approved (see Chapter 10, pg. 55), or
    - 25% of 4B3, the 4-day, 3-year biologically based stream flow, if available. This is not the same as the 4Q3 which is a hydrologically-based stream flow.
    - Monthly Qs values should be used when available and are discussed in Chapter 9, pg. 53.
- Fraction of the effluent flow that is withdrawn from the receiving water, if applicable.

The calculation of limits for lakes and impoundments includes additional information, such as the default values provided for the area of the mixing zone, an empirical factor and coefficients described in s. NR 106.55(7), Wis. Adm. Code. Discharge to the following receiving waters will need to utilize this information (s. NR 106.55(7)(b), Wis. Adm. Code):

- Inland lake or impoundment off shore discharge
- Inland lake or impoundment shore discharge
- Great Lakes harbor discharge
- Great Lakes off shore discharge
- Great Lakes shore discharge

Considering Representative Data

As with all types of limits based on data, each data set used in the calculation should be reviewed for accuracy and representativeness. With large data sets being used for this calculation, issues with some of the data are not uncommon. An easy, quick check is to plot temperature and flow rate data in an excel graph. Examples of questions to ask yourself and specific things to watch for within the data are as follows:

- Effluent Flow Rate
    - Are there unusual effluent flows?
        - For example, flooding events may not represent typical flows and it might be appropriate to not use the data.
    - Is the data representative/is it likely to be repeated in the future discharge?
    - Are there multiple dischargers?
        - If so, is it appropriate to add flows together?
        - Guidance on limits for multiple dischargers is provided in Chapter 5, pg. 34.
    - Is the reported flow rate for influent or effluent flows?
        - Some municipal facilities only report influent flow. If influent data are used this should be noted in the WQBEL. If reasonable potential shows the need for limits the facility may want to consider modifying the monitoring location to measure the effluent flow rate.
- Temperature
    - Are there any unusual high or low data?
    - Do temperatures vary largely from day to day?
    - Was temperature reported as a maximum daily value? (there are multiple temperature parameters in SWAMP, be sure to check all and include the maximum daily values in the spreadsheet)
    - Monitoring location – internal sampling point or at outfall
    - Unusual fluctuations in the data may be a result of the sampling device being exposed to the atmosphere in some cases

Best professional judgment should be used when reviewing data and when making decisions of whether or not data are applicable and should be used. Each case will be slightly different and specific recommendations are out of the scope of this guidance. All conclusions where it is determined that data are not representative should be clearly documented in the limit memo.

Water Quality Based Effluent Limits for temperature are then calculated using the formulas specified in s. NR 106.55(6), Wis. Adm. Code, for unidirectional waters, and s. NR 106.55(7), Wis. Adm. Code, for inland lakes, impoundments and Great Lakes waters.

Consideration of Downstream Impacts

Limitations may be necessary to protect downstream waters to maintain water quality standards in downstream or other nearby waters that may be impacted by the heated discharge. When determining limits at the point of discharge the length to the downstream water, the thermal sensitivity of the downstream water, and the potential for heat loss should be considered.

Discharges to Storm Sewers

For discharges to storm sewers and storm water conveyance channels only. The calculated temperature limit, heat loss value and length of the storm sewer are used to adjust limits for heat loss. An assumed heat loss value is specified in s. NR 106.55(5), Wis. Adm. Code. It is important to note where the temperature monitoring takes place. In most cases the facility monitors for temperature at a location prior to discharge into the sewer and this calculation may be used and the adjusted effluent limits would apply at this location. However if the facility monitors at a point following the flow through a sewer where the discharge to the surface water occurs then the calculation of heat loss from the sewer is not applicable.

Determining the Need for limits

Following the calculation of the water quality based effluent limits the procedures described in Chapter 7 (pg. 41) of this Guidance are used to determine when limits are required in permits by evaluating the reasonable potential of exceeding the effluent limits.

Limits should be included for each individual month that reasonable potential is exceeded. The representative highest daily maximum and weekly average effluent temperature for each month of the year must be supplied to make this determination.

Without actual effluent data reasonable potential cannot be determined. For these cases limits subject to drop as described in Chapter 17 (pg. 114) should be included in the permit unless an exemption as described in Chapter 8 (pg. 50) applies, or other data can be used to justify no temperature limits. For example, previous research has found that municipal wastewater treatment plants typically have effluent temperatures ranging from 50 to 70 °F and do not function well at temperatures exceeding

103°F[1]. Additionally, temperature data collected from municipal treatment plants in Wisconsin that treat primarily domestic waste do not have the potential to exceed temperature limits that are greater than 90 °F[2]. Department staff may consider these data as well as other data collected from similar facilities when evaluating the need for temperature limits on a case-by-case basis.

As discussed in Chapter 2 (pg. 14) of the Guidance, effluent temperature monitoring may not be needed if temperature limits are not required; specifically in situations where the effluent temperatures are well below the calculated limits. It appears possible that the reasonable potential may exist for limits to be triggered at the next permit reissuance, monitoring in the 4th year of the permit should be recommended to ensure a full year of temperature monitoring data are available. See Chapter 2 (pg. 14) for additional guidance. It is recommended that limit calculators document temperature monitoring recommendations in the limit memo.

Administrative Code Options to Adjust Potential Temperature Limits

Options to adjust or provide relief from the acute and sub-lethal temperature limits under ch. NR 106, Wis. Adm. Code:

- The receiving water flow rate Qs defined in s. NR 106.53, Wis. Adm. Code, can be based on either an annual 7Q10, or at the discharger's option, monthly 7Q10s determined as specified in Chapter 9, pg. 53.
- A request for a larger fraction than the default 25% of either the annual or monthly 7Q10s can be made under s. NR 106.53(1)(c)-(e), Wis. Adm. Code. The procedure is described in Chapter 10, pg. 55.
- Other ch. NR 106 Subchapter V, Wis. Adm. Code, options for increased mixing zones. For discharges to streams, these are similar to the demonstration for increased Qs above. However, these sections can also be used for lakes and harbors. They all refer back to the mixing zone considerations in s. NR 102.05(3), Wis. Adm. Code:
    - Section NR 106.54(10), Wis. Adm. Code, Limitations Based on Site-Specific Mixing Zone Analysis
    - Section NR 106.54(11), Wis. Adm. Code, Limitations Based on Installation of Diffusers
    - Sections NR 106.54(13) and NR 106.58, Wis. Adm. Codes, Limitations Based on Water quality Models
- Additional options for increased sub-lethal temperature limits for municipal discharges using dissipative cooling, described in Chapter 11, pg. 59.
    - Dissipative Cooling under s. NR 106.59(4), Wis. Adm. Code, for existing POTW outfalls

[1] Collins, C. E.; Grady, Jr., C. P.L.; and Incropera, F. P., "The Effects Of Temperature Control On Biological Wastewater TreatmentProcesses" (1978). *IWRRC Technical Reports.* Paper 98.
[2] Based on effluent temperature data gathered from SWAMP.

    - Dissipative Cooling under s. NR 106.59(6), Wis. Adm. Code, for new discharges or re-located outfalls.
    - Continued consideration of Dissipative Cooling under s. NR 106.59(8), Wis. Adm. Code,
- Alternative Effluent Limitations for Temperature under ch. NR 106 Subchapter VI, Wis. Adm. Code, same as a federal 316(a) demonstration and must be approved by EPA - see Chapter 10 (pg. 55) of this Guidance.

Option for relief from sub-lethal and acute temperature limit under ch. NR 102, Wis. Adm. Code:

- A request for site specific ambient temperatures can be made under s. NR 102.26, Wis. Adm. Code, as described in Chapter 11 (pg. 59). As mentioned in the guidance, an increase in ambient temperature can lead to an increase in sub-lethal and acute criteria without the need for rule making.
- Site specific water quality criteria for temperature can be proposed under the procedures in s. NR 102.27, Wis. Adm. Code, as described in Chapter 14 (pg. 106) of the Guidance. This may not be practical for most cases due to the need to go through a formal rule making process as outline in Chapter 227, Wis. Stats.

Options for variable sub-lethal and acute temperature effluent limits:

- Section NR 106.54(4), Wis. Adm. Code, Effluent limitations based on real-time data allows determination of effluent limits based on continuous monitoring of receiving water flow and temperature along with effluent flow and temperature.
- Section NR 106.55(8), Wis. Adm. Code, Limitations for Discharges with Fluctuating Effluent Flow Rates allows for effluent limits to be based on fluctuating or variable effluent flow rates.

Potential relief from 120 °F limit for the protection of public health and welfare:

- The permittee must demonstrate to the satisfaction of the department that the heated effluent is not discharged in a manner that will cause a potential for scalding of humans. Additional guidance is available in s. NR 106.56(8), Wis. Adm. Code, and Chapter 8 (pg. 50) of this Guidance.

Special Cases:

- Discharges to storm sewers under s. NR 106.55(5), Wis. Adm. Code, allows for consideration of temperature drop within the storm sewer.

- Sections NR 106.55(6)(c) and 7(a), Wis. Adm. Codes, allow for short term excursions from the effluent limitations for purposes of zebra or other mussel control if approved by the Department and authorized in the WPDES permit.
- Section NR 106.55(6)(d), Wis. Adm. Code, required that discharges be evaluated for their potential impacts to threatened and endangered species. If information suggests potential impacts to federally-listed species, the facility needs to go through the threatened and endangered species permit process laid out in Wisconsin Stat. 29.604 in addition to the wastewater permitting process. Specific information about the threatened and endangered permit is available at http://dnr.wi.gov/topic/endangeredresources/permits.html. This permit process will require coordination between WDNR, EPA, the U.S. Fish and Wildlife Service, and others, where appropriate. The goal of this coordination is to remove and/or reduce any detrimental effects to listed species stemming from the WPDES action.

Antidegradation

Thermal limits are not subject to antidegradation procedures in ch. NR 207 if the limit is a first time imposition of a temperature limit pursuant to s. NR 207.01(1)(a), Wis. Adm. Codes. If temperature limits were included in previous permit the existing temperature limits should be compared to the limits calculated using the procedures specified in ch. NR 106, Wis. Adm. Code, and the more restrictive of the two limits should be included in the WPDES permit. If the existing limits are more restrictive than the criteria-based temperature limits, antidegradation procedures must be followed before the less restrictive temperature limits can take effect. Additional guidance will be developed as thermal standards continue to be implemented in WPDES permits.

Ambient Temperature and Water Quality Criteria (s. NR 102.25, Wis. Adm. Code)

Categories for Unidirectional waters:

- **Non-Specific Waters**
  - Cold = waters with a fish and other aquatic life use designation of "cold water community"
  - Warm –Large = waters with a fish and other aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows > 200 cfs (129 mgd)
  - Warm – Small = waters with a fish and other aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows < 200 cfs (129 mgd)
  - LFF = waters with a designation of "limited forage fish community"
- **Specific Large Rivers:**
  - Mississippi River = applies to any portion of Wisconsin's Mississippi River reach
  - Rock River = applies to waters downstream of Lake Koshkonong
  - Upper Wisconsin River = applies to waters upstream of Petenwell Dam
  - Lower Wisconsin River = applies to waters downstream of Petenwell Dam to the confluence with the Mississippi River
  - Lower Fox River = applies to waters downstream of the Lake Winnebago outlet

Lake Categories:

- **Inland Lakes and Impoundments (s. NR 102.25(4), Wis. Adm. Code)**
  - Northern Inland Lakes = applicable for those lakes and impoundments north of State Highway 10
  - Southern Inland Lakes = applicable for those lakes and impoundments south of State Highway 10
- **Great Lakes Waters of Wisconsin (s. NR 102.25(5), Wis. Adm. Code)**
  - Green Bay waters south = south of the Brown County line to the Fox River mouth
  - Green Bay waters north = north of the Brown County line to the northernmost point on Washington Island
  - Lake Michigan waters south = south of the Milwaukee River mouth (downtown Milwaukee)
  - Lake Michigan waters north = north of the Milwaukee River mouth (downtown Milwaukee)
  - Lake Superior = waters in Lake Superior except those in Chequamegon Bay
  - Chequamegon Bay = waters within the region enclosed by Chequamegon Point and a straight line west to the mainland

Chapter 5 – Multiple Discharges

Applicable Rule Provision(s): s. NR 106.57, Wis. Adm. Code
Author: Jim Schmidt
Last Revised: September 30, 2010

If two or more discharges are close enough to each other that the combined thermal discharge may have a potential adverse effect on the receiving water (acute and/or sub-lethal), s. NR 106.57, Wis. Adm. Code, allows the Department to assess the combined heat load and determine the need for thermal limits on one or all of the multiple discharges. The combined allowable thermal loading would then be allocated or divided among all the contributing discharges to determine appropriate permit limits as needed following a reasonable potential evaluation (using maximum or 99th percentile values – refer to Chapter 7, pg. 41 of this Guidance). The primary questions associated with this process are as follows:

a. How close do the discharge outfalls need to be in order to require a multiple discharge review?
b. How is the combined heat load determined?
c. How are temperatures allocated to individual discharges?
d. How is reasonable potential evaluated in a situation like this?

Answers provided below are intended to provide guidance to staff developing limits for multiple discharge situations.

1. **Separation Distance for Multiple Discharge Evaluation**
   Currently, there is no clear-cut requirement in the administrative rules or even any guidance on when combined discharges should be evaluated. Even multiple outfalls from one permittee could be evaluated individually if they are located far enough apart. How then, does one determine what is “far enough” or “close enough?”

   Past evaluations for other discharges have used the stream width as a guide. Specifically, loadings from outfalls were combined for purposes of limitations evaluations if the distance between outfalls was less than the stream width (or ¼ of the stream width to recognize the mixing zone requirements in s. NR 102.05(3), Wis. Adm. Code). However, such an approach has not been used consistently and when it has, it was for toxic substances which are assumed to be more conservative or persistent than temperature. For thermal discharges, it may very well come down to observations and sampling. Multiple discharges should be combined for limit calculation when the discharge plumes overlap whether by assumption or in reality. Another potential indicator is when the water entering the mixing zone is still elevated above the upstream (ambient) temperature measured

before any thermal influence. It will be necessary to document why this assumption is made, or if justified by observations, in the WQBEL memo.

2. **Determination of Combined Heat Load**
   Typically, multiple discharge situations are assessed by adding up the discharge rates and calculating a limit that would theoretically be applied to each of the combined discharges. It may be necessary to modify the discharge rate or the limit calculation if any of the individual discharges are seasonally variable, or if one outfall has an alternative mixing zone calculated. The simplest way to look at this, however, is to just add up all the relevant discharge rates and calculate one limit on the combined flow. The allocations to the individual discharges would be made using that combined discharge limit as a starting point.

3. **Allocation of Thermal Limits**
   If, for example, a multiple discharge situation resulted in a limit of 100°F on the combined flow, the first step would normally be to apply the 100 °F limit to each of the individual discharges, and then, perform the reasonable potential analysis on those individual discharges for the need to include the 100 °F limit in a permit. However, temperatures may be "rearranged" or reallocated among the individual discharges, possibly to facilitate a different permit recommendation from the reasonable potential analysis. In this example, if there were two discharges, each at 1 MGD, to this mixing zone resulting in the 100 °F limit, they may each get 100 °F as a limit, but the limits could be reallocated in any manner such that the combined discharge is equal to or less than 100 °F, thereby still complying with the thermal criteria. If the two discharge rates were the same, one could get a 100 °F limit and the other one a 90 °F limit, which would be acceptable since the combined discharge still equals 100 °F. The allocation could be based upon effluent variability or discharge rate variability. In any event, the typical process to perform allocations (using s. NR 106.57, Wis. Adm. Code, for thermal and s. NR 106.11, Wis. Adm. Code, for toxic substances) is for the Department to perform a reasonable potential analysis (see item 4. below) to determine the need to include the allocated limits in any or all of the affected permits. Then the Department will notify all permittees who may be potentially affecting the water quality of this receiving water of the determination and limitations developed using this allocation. The decision process should provide for any public comment as per statutory requirements. If alternative allocations are suggested by the permittee(s) or the public, the Department staff should evaluate those alternatives based upon compliance with the limit calculated for the combined discharge. In the example used here, if anyone else suggests a different allocation and if the combined discharge temperature from the proposed allocation is equal to or less than 100 °F, the proposal is potentially acceptable.

4. **Reasonable Potential Analysis**
   The most common reason to use an allocation other than just giving the same limit to each of the discharges in the multiple discharge situation is if one of the discharges normally has a lower effluent temperature, thus freeing up some capacity for the other discharge(s). This especially could be the case if such a reallocation means that one or all discharges would no longer need a thermal

limit in their WPDES permits. One way to determine if such an approach could be used is by calculating a mix effluent temperature, using the effluent flows in a manner similar to a mass balance. Take the example in #3 above where two discharges of 1 MGD each received a limit of 100 °F in the initial recommendation. If Discharge A had a maximum effluent temperature of 110 °F and Discharge B had a maximum effluent temperature of 85 °F (using the reasonable potential process in ss. NR 106.56 (2) or (3), Wis. Adm. Codes, where applicable), it would appear that Discharge A would need the 100 °F limit included in its permit because the 110 °F effluent temperature exceeded the limit. However, since the two discharges shared the same effluent plume, a combined effluent temperature could be calculated. In this case, since the flows from each are the same, the combined effluent temperature is 97.5 °F.

$$\text{Combined Temperature} = \frac{(100\,^{\circ}\text{F} \times 1\ \text{MGD}) + (85\,^{\circ}\text{F} \times 1\ \text{MGD})}{(1 + 1\ \text{MGD})} = 97.5\,^{\circ}\text{F}$$

Since the combined effluent temperature of 97.5 °F is less than the 100 °F combined limit, no permit limit is theoretically required, although monitoring is suggested in the permits because the effluent temperature is "close to" the limit, especially in the permit for Discharge A.

The same conclusion would be reached by reallocating the effluent limits between the two discharges. Instead of both permittees having limits of 100 °F, Discharge A could get a limit of 111 °F and Discharge B could get a limit of 89 °F. The maximum effluent temperatures for both discharges would be below their reallocated limits and again, no permit limits would be necessary.

Calculating a reallocation in a case like this is suggested if one of the two discharges still needed a limit, or if based on the variability of each discharge, compliance with alternative limits on one or both would be more easily achieved if limits were reallocated. Using a different example, the combined effluent limit for Discharge C and D was 100 °F, both had discharge rates of 1 MGD, but the maximum effluent temperatures were 120 °F in Discharge C and 90 °F in Discharge D. The combined effluent discharge in this case was 105 °F (since the flows were equal), meaning limits would be needed in one or both permits because the combined temperature exceeded 100 °F. Since Discharge D is less than 100 °F, though, limits could be reallocated such that Discharge D's limit would be 90 °F instead of 100 °F and it still would not be needed in the permit because the discharge doesn't exceed 90 °F. In turn, Discharge C's reallocated limit would be 110 °F. The combined discharge temperature based on the limits would still be 100 °F, and Discharge C would still need a permit limit, but because of the reallocation it would only have to meet a limit of 110 °F instead of 100 °F, which may make for less expensive compliance options. Any of these options would still be proposed to the dischargers and the public for comment, and suggestion of different alternatives. If such alternatives fit in with the reasonable potential process and the combined discharges meet the limits on the combined discharges, they should potentially be acceptable to the Department.

NOTE: This approach should also be used for multiple discharges to a common storm sewer, locations in Milwaukee being the most obvious example. The difference between this situation and those discussed above is that the discharges share a common storm sewer outlet to the receiving water, rather than several outfalls near each other. The multiple discharges would be handled the same way, by determining combined thermal loads, allocated limits, and reasonable potential analyses. There may also be a need to adjust any or all of the multiple discharge limits based on storm sewer length.

Clearly, the multiple discharge process, including reallocations and reasonable potential alternatives, have no specified approach to use in all cases. Alternatives are suggested here in the guidance, but the important point to remember is that these alternatives still need to go through the affected permittees and public for comment, with any alternatives they suggest being evaluated the same way. For this reason, it is imperative to clearly document the approach used for multiple discharge analysis and to include a description of that analysis in the water quality-based effluent limitations memo.

Chapter 6 – Limit Calculations for Limited Aquatic Life (LAL) and Wetland Systems

Applicable Rule Provision(s): ss. NR 102.245 & NR 106.55, Wis. Adm. Codes
Author(s): Amanda Minks
Last Revised: August 13, 2013

Pursuant to s. NR 102.245, Wis. Adm. Code, limited aquatic life (LAL) systems, including wetlands, must be evaluated for thermal limits. Thermal limits have been specified in s. NR 106.55, Wis. Adm. Code, and are dependent on the type of diffuse water:

- The daily maximum effluent temperature limitation shall be 86°F for discharges to surface waters classified as **LAL** according to s. NR 104.02(3)(b)1, Wis. Adm. Code, and as defined in s. NR 104.02(1), Wis. Adm. Code (s. NR 106.55(2), Wis. Adm. Code). Specific waters that have been categorized as LAL waters by the Department are identified in ss. NR 104.05-10, Wis. Adm. Code.
- The daily maximum effluent temperature limitation shall be 120°F for discharges to surface waters classified as **wastewater effluent channels** according to s. NR 104.02(3)(b)1, Wis. Adm. Code, and as defined in s. NR 104.02(1)(d), Wis. Adm. Code (s. NR 106.55(3), Wis. Adm. Code).
- Effluent temperature limitations shall be established for **wetlands** on a case-by-case basis to meet the water quality standards provided in ch. NR 103, Wis. Adm. Code, but in no case shall the effluent temperature limitation be greater than 120°F (s. NR 106.55(4), Wis. Adm. Code).

Department staff should review the codified list of LAL waters in ch. NR 104, Wis. Adm. Code, and previous permitting decisions when determining if a point source discharges to a diffuse surface water, effluent channel, or wetland. Department staff must use the codified use of the receiving water to calculate temperature limits. However, some permits may have previously accepted effluent limitations based upon a reclassification of a stream that has not been codified. Based on DNR policy, as stated in the Kopecky/Baker memo of May 19, 1993, the Department will continue to use the same effluent limitations in reissued permits if a facility has previously accepted effluent limitations in a permit based upon a reclassification of a stream that has not been codified. Once codification occurs, these exemptions will no longer be necessary. In accordance with s. NR 102.245(2), Wis. Adm. Code, and existing state law, the Department maintains the authority to promulgate new and/or revised classifications into administrative code. Changes in stream classification will not be translated into thermal limitations for WPDES permits until the new classification has been incorporated into administrative code. A small number of exemptions apply to this.

Although the daily maximum effluent temperature limit has been defined in s. NR 106.55(2), Wis. Adm. Code, for LAL communities and in s. NR 106.55(3), Wis. Adm. Code, for wastewater effluent channels,

more stringent limits may be calculated in order to protect downstream uses. The following should be considered when determining the need for limits based on downstream protection:

- Proximity to the downstream water
- Designated use and thermal sensitivity of the adjacent downstream water
- Heat loss that occurs between the immediate receiving water and downstream water
- Effluent temperature values compared to the temperature limits of the direct receiving water and downstream water

It is recommended that downstream protection limits be included in the WPDES permit if there is a potential for the effluent temperature to adversely affect downstream waters. Best professional judgment should be used when making these determinations. Additionally, permit staff may want to coordinate with their local water quality biologist to determine if in-stream data can be collected at this site, or if the biologist has temperature-related concerns in the downstream water. In-stream monitoring can also be conducted by the permittee to justify that downstream protection limits are not warranted.

Thermal Limits for Wetlands

To calculate daily maximum temperature limits for wetlands consistent with s. NR 106.55(4), Wis. Adm. Code, site-specific information must be considered. Wetland evaluation should occur prior to limit calculations in order to determine the type of wetland and the potential impacts of the thermal discharge. Many wetlands have been identified by the Department and can be found at http://dnr.wi.gov/topic/wetlands/locating.html. It is recommended that Department staff visit the wetland, however, to ground truth this information.

If a wetland has not been evaluated by the Department, permittees may submit information to the Department to support a wetland classification. The Department may use this information or generate new information to evaluate and approve a wetland classification. It is recommended that staff complete Wetland Delineation Classes prior to wetland evaluation, or at lease consult with members of the staff who have completed this course or have had previous wetland evaluation experience- staff may include regional stormwater staff, water regulation staff, and wetland staff.

It is important to identify the wetland type in order to predict what impacts, if any, the thermal discharge has. Key types to look for include:

1. *Wetlands with channel flow*- if a permittee discharges to a channel with unidirectional flow within a wetland, the channel should be considered a default warmwater fishery unless site-specific data are available to suggest a different classification is more appropriate. This is because these types of discharges have little to no impact on wetland hydrology and are therefore not regulated under ch. NR 103, Wis. Adm. Code. These channels can also support

some fish assemblages, mainly fathead minnow, central mudminnow, and/or brook stickleback, or other thermally-sensitive organisms like amphibians. In order to protect these species, thermal limits should be based on small warm water discharges (Table 2 in ch. NR 102, Wis. Adm. Code). Permittees may submit site-specific temperature and biotic information if they believe this classification is inappropriate for the given wetland. There may be some discharges that flow into a wetland system that alternates between sheet and channelized flow. In these cases, it would be appropriate for the field biologist to determine whether small-warm or LFF criteria are more appropriate.

2. *Groundwater, seepage wetlands*- wetlands that are groundwater dependent, or are significantly affected by groundwater, tend to be cold water systems. Therefore, plant and amphibian communities tend to be thermally-sensitive. In order to protect these thermally-sensitive communities, thermal limits should be based on cold, non-specific waters unless site-specific data are available to suggest a different classification is more appropriate (Table 2 in ch. NR 102, Wis. Adm. Code). Permittees may submit site-specific temperature and biotic information if they believe this classification is inappropriate for the given wetland.
3. *Other wetlands*- there are many wetlands that have standing water, are not impacted significantly by groundwater, and do not have unidirectional flow. In these cases, it may be advantageous to identify the type and position of the plant community. For palustrine wetlands, limits should be more stringent, as water levels in these wetlands will vary throughout the year. For aquatic bed wetlands, thermal limits may be relaxed, as appropriate. For discharges that discharge to aquatic bed wetlands, it may be appropriate to treat these discharges as "inland lake" discharges for the purpose of limit calculations. Permittees may submit site-specific temperature and biotic information if they believe this classification is inappropriate for the given wetland.

Note: Some wetlands may support thermally sensitive aquatic organisms, despite their hydraulic characteristics. In these cases the Department may impose more stringent thermal effluent limits in order to protect these sensitive communities.

Data Submission

The permittee must provide the Department with all available site-specific data including effluent temperature data. Ambient temperature data may also be provided by the permittee to help determine if less stringent limits are appropriate. In the absence of site-specific information, temperature limits may be set in accordance with the daily maximum limited aquatic life limitation of 86°F, as wetlands are by default classified as limited aquatic life in ch. NR 104, Wis. Adm. Code. Again, consideration should be given to ensure that thermal limits are protective of downstream uses. Site-specific temperature limits can also be developed if the wetland discharge is believed to be causing the wetland adverse impacts from the heated discharge.

Chapter 7 – Reasonable Potential to Exceed an Effluent Limitation

Applicable Rule Provision(s): ss. NR 106.56(2) & (3), Wis. Adm. Codes
Author: Jim Schmidt
Last Revised: December 3, 2010

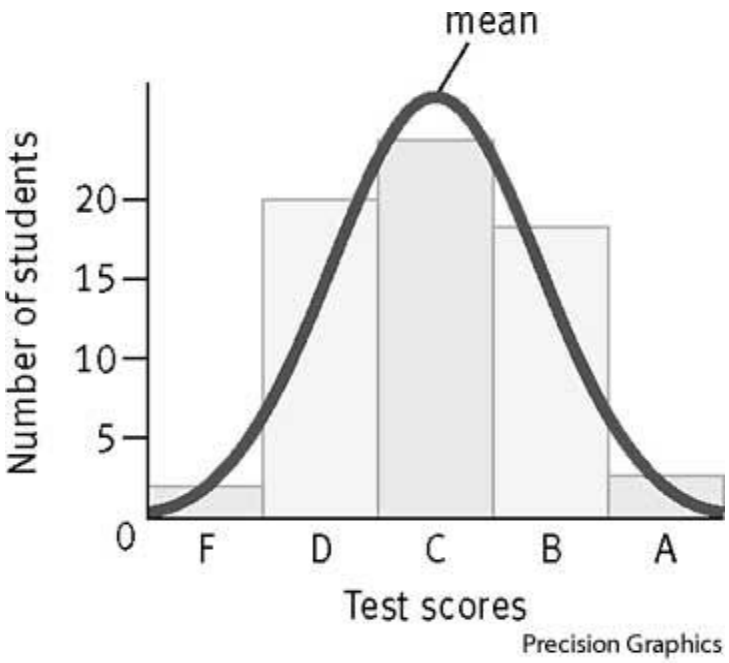
A thermal limitation is required to be included in a WPDES permit if there is the reasonable potential for that limit (based on a water quality criterion) to be exceeded in the discharge covered under that permit. According to s. NR 106.56(2), Wis. Adm. Code, acute water quality-based limits for temperature are required to be included in a WPDES permit, if the calculated daily maximum (acute) limit is exceeded by the greater of the highest recorded representative daily maximum temperature and the projected 99th percentile of all representative daily maximum temperatures for that permittee. In turn, under s. NR 106.56(3), Wis. Adm. Code, sub-lethal water quality-based limits for temperature are required to be included in a WPDES permit if the calculated weekly average (sub-lethal) limit is exceeded by the greater of the highest weekly average temperature and the projected 99th percentile of all representative weekly average temperatures for that permittee.

When dealing with toxic substances, s. NR 106.05(5), Wis. Adm. Code, lists a specific procedure for calculating a 99th percentile value using a number of formulas in a specific case, namely when there are at least 11 detected results available. That approach assumes what is called a delta-lognormal relationship, meaning the assumption that the logarithms of the reported effluent concentrations form a typical bell curve (see definition on the next page) and that there is the potential for a censored lower boundary represented by the level of detection, below which there is uncertainty over the actual measured concentration.

The reason this approach is mentioned here is that the delta-lognormal relationship is specific to effluent results expressed as concentrations or *mass per unit volume* such as micrograms or milligrams per liter. The 99th percentiles mentioned for thermal in s. NR 106.56, Wis. Adm. Code, are NOT linked to the toxic substance approach in s. NR 106.05, Wis. Adm. Code, meaning the formulas in s. NR 106.05(5), Wis. Adm. Code, should NOT be used for evaluating temperatures. Thermal discharges are not assumed to show a delta-lognormal relationship because the temperature scales are artificial representations (defined by the Celsius or Fahrenheit scales) as opposed to more of an actual value represented by a mass per unit volume concentration. It may be that for a given discharge, temperature results fall into a bell curve using the definition and example shown on the next page, but the consideration of logarithms is totally inappropriate for temperature data because the results and relationships could be completely different depending on which scale is used, not to mention that logarithms do not work for temperatures at or below zero. As a result, a more conventional alternative is needed for the calculation of a 99th percentile for temperature.

bell curve

A symmetrical bell-shaped curve that represents the distribution of values, frequencies, or probabilities of a set of data. It slopes downward from a point in the middle corresponding to the mean value, or the maximum probability. Data that reflect the aggregate outcome of large numbers of unrelated events tend to result in bell curve distributions. The **Gaussian** or **normal distribution** is a mathematically well-defined bell curve used in statistics and in science generally.



Source: TheFreeDictionary (Farlex, Inc.) website, http://www.thefreedictionary.com/bell+curve

Fortunately, simpler and more appropriate methods of estimating the 99th percentile are available. First, if the results appear to form a bell curve (a normal distribution, in other words), the upper 99th percentile is calculated using the following formula:

$$99^{th}\ \text{Percentile} = \text{Mean} + (2.327 \times \text{standard deviation})$$

The mean and standard deviation can easily be calculated using a calculator or commands in Excel. If the data form a bell curve, this formula should give a reasonable estimate of the value below which 99% of the reported results in the database fall.

The reason the 99th percentile is even discussed at all is that when there are less than 100 results in a database, the 99th percentile is expected to be greater than the highest result. If there were exactly 100 results, the highest result of those 100 would be the 99th percentile, as the other 99 values (99/100 =

99%) are equal to or lower than that highest result. Therefore, the above formula represents a "projected" 99th percentile value. The language in the rule is, therefore, directed towards the smaller databases of 100 or fewer values. In those cases, the calculated or projected 99th percentile might be greater than the highest individual result, or it might not. It all depends on the variability of the data.

When there are more than 100 results, the 99th percentile is expected be less than the highest result. If there were 200 results in a database, the highest result would equal or exceed 199 out of the total of 200 results, or 99.5%. Depending on the variability of the data, the calculated or projected 99th percentile could still be greater than the highest individual result, but it becomes less and less likely as the number of values in the database increases.

The calculation of the 99th percentile should still be performed regardless of the size of the database. However, large datasets having more available data will likely result in the maximum value being the controlling value when applying the reasonable potential evaluation of s. NR 106.56, Wis. Adm. Code. With a smaller database, it is more likely that the calculated or projected 99th percentile will be greater than the maximum.

The 99th percentile formula for toxics is also used to project 99th percentiles of weekly or even monthly averages based on daily information. Also, the same formula should not be used for effluent temperatures. The thermal percentile calculation formula can be adjusted in a similar manner. The formula on the previous page is adjusted as follows to enable the user to estimate the 99th percentile on a weekly average basis based on daily discharge information:

99th Percentile (of n-day average) = u + [2.327 * ((SD^2/n)$^{0.5}$)]

Where:
- **u = mean of daily results**
- **SD = standard deviation of daily results (so SD^2 = variance of daily results)**
- **n = averaging period of estimate (Ex. n = 1 for 1-day 99th percentile) (Ex. n = 7 for 7-day 99th percentile)**

Using this formula, the 1-day 99th percentile would be used for evaluating the need for acute limits in permits. The greater of the 1-day 99th percentile and the daily maximum effluent temperature would be compared to the daily maximum (acute) limit to determine if that limit needs to be included in a permit. In turn, the 7-day 99th percentile would be used for evaluating the need for sub-lethal limits in permits. The greater of the 7-day 99th percentile and the maximum weekly average temperature would be compared to the weekly average (sub-lethal) limit to determine if that limit needs to be included in a permit.

Note: According to s. NR 106.52(11), Wis. Adm. Code, the weekly average temperature is calculated on a calendar week basis (Sunday – Saturday) and NOT on a rolling average basis. See Chapter 16 (pg. 111) for details.

As is the case with the 99th percentile calculations for toxic substances where a minimum database size is specified in ch. NR 106, Wis. Adm. Code (11 or more detected values), a minimum database size should be considered for thermal as well. A specific requirement regarding this is not in the rule, so a minimum database size will be recommended in guidance and could, therefore, be used as a guide in developing monitoring recommendations for permits or even permit applications in the future. The smaller that database, the more likely that variability (and therefore the 99th percentile) would be exaggerated. A recommended goal is to have at least 12 daily effluent values for a given month in order to calculate a 99th percentile for that month. Even if the database is smaller than 12 values, weekly averages could still be calculated and compared to sub-lethal limits (and daily maximum values could still be compared to acute limits). To increase the likelihood of an accurate representation of the database using the standard deviation, 12 or more daily results are preferred.

In terms of actual data, since limits are calculated and evaluated for reasonable potential on a monthly basis (a set of limits for January, another set for February, and so on), the effluent database should also be sub-divided by month. As a result, maximum and 99th percentile values should be calculated for each month of the year. NOTE: Limits shall be included in permits only during the months that the need is shown from the reasonable potential analysis. There is no requirement in the rule that limits be included in permits for all 12 months when reasonable potential is found to be an issue in 11 or fewer months of the year. If the databases are not sub-divided on a monthly basis, obviously the databases will be larger, but there would be a greater risk of the variability being exaggerated by seasonal differences. Certain industries may have operational changes at different times of the year which should be considered when analyzing a database. The goal here should be to <u>avoid</u> making permit decisions that are based on non-representative data, decisions which could take place if data that are indicative of operations that do not occur in certain times of the year are used in reasonable potential evaluations during such times. After all, this is a "reasonable" potential analysis (is there a reasonable potential for the effluent results to exceed a water quality-based limit?), so reasonable potential evaluations should recognize a reasonable database.

Therefore, the following considerations should be made when organizing a database:

1. Are there any periodic or seasonal changes in operations, or any other considerations, that warrant sub-dividing a database by season or even by month?
2. Do any changes in effluent flow translate into obvious changes in effluent temperature results (in a way, similar to the concept of #1 above)?
3. Are there any obvious outliers (single results that should be excluded form a database) that reflect results that are not representative of normal operations?

Any of these could be used to justify re-organizing a database other than just using all data in one database, which could be on the order of over 1,800 daily results or 260 weekly results (one result per day or per week over a 5-year permit term). The concept of making case-by-case modifications to the database to reflect changing effluent flow conditions is consistent with the authority to make case-by-case determinations of effluent flow pursuant to s. NR 106.53(2(d), Wis. Adm. Code. Regardless of all that, though, the 99th percentile vs. maximum value should be used to determine the need for acute or sub-lethal limits on a monthly basis in permits.

Database Example:

The attached example deals with the types of data analyses available for a facility with a large amount of effluent data. In this case, a power plant which discharges to the Mississippi River below the mouth of the Wisconsin River, daily maximum effluent temperature data are readily available from January 1999 through June 2010. Over that period, a total of 4,177 results are available.

Table 6.1 summarizes that data, showing a frequency analysis over 5-degree intervals, a graphical representation of that frequency analysis, and the statistical analysis of the data including the mean, standard deviation, and the 99th percentile as well as the maximum result. There appears to be two separate peaks or at least something not really representing the bell curve example from earlier in this Chapter. This suggests seasonal variation in the data.

Observe that the calculated 99th percentile is close to the actual maximum value. This, however, is not what would be expected in this case, because the highest result in this database is approximately the 99.94th percentile (1816/1817 = 0.9994). Because the database is large, one would expect the calculated 99th percentile to be closer to the 18th or 19th highest result (1817 – 18 = 1799, and 1799/1817 = 0.9901). Again, this may be the result of this apparently unusual distribution of data. Also, there was one unusual result that was excluded as being non-representative as it was 21 degrees above the next highest result; it was not even a warm-weather result as it was reported during the month of April, which makes it even more likely that it was non-representative. The potential for this seasonal variation is magnified even more when looking at the 7-day average results, where the calculated 99th percentile is 21 degrees less than the highest 7-day average.

Table 6.2 summarizes the data only for the month of July (1999 – 2009) and Table 6.3 summarizes the data only for the month of January (1999 – 2010), to illustrate the frequency analyses and statistics for a monthly database of daily values. In July (341 results), the graph more resembles the bell curve illustrate earlier, and the calculated 99th percentile, maximum, and even the 3rd and 4th highest results (99th percentiles) are closer to each other. In January (371 results), the graph resembles a bell curve, but the calculated 1-day 99th percentile is still several degrees below the maximum and 4th highest results (maybe because the curve is skewed a little towards the lower end). The maximum values in these two months are greater than the calculated 1-day 99th percentiles (as expected given the amount of data) and would be used to determine the need for acute limits in January and July. The highest weekly average values are also greater than the calculated 7-day 99th percentiles by several degrees in those

months and would be used to determine the need for sub-lethal limits in the months of January and July.

As expected, since all of these databases are fairly large (over 100 results), the tendency is toward the maximum 1-day and 7-day values to be greater than the calculated 99th percentiles and would, therefore, be used to determine the need for permit limits based on reasonable potential.

As a final example, both Tables 6.2 and 6.3 include the same statistical analyses, but only using the most recent year of data for January and July; meaning 31 values in each database instead of over 300 results. In both months, the calculated 1-day and 7-day 99th percentile values are greater than the maximum 1-day and 7-day results. Therefore, the 99th percentiles would theoretically be used to determine the need for permit limits. As expected, in smaller databases (less than 100 results) the calculated 99th percentiles are more likely to exceed the corresponding reported maximum values. The differences are minimal, but depending on the calculated limits themselves, they could result in a different basis for a permit recommendation.

Table 6. Frequency analysis of all data, daily monitoring from 1/1/1999 – 6/30/2010 (4177 results).

Temperature Increments (°F)			# of
from	through		Observations
36	40		2
41	45		19
46	50		149
51	55		326
56	60		602
61	65		443
66	70		363
71	75		333
76	80		340
81	85		293
86	90		285
91	95		404
96	100		331
101	105		143
106	110		26
111	115		5
116	120		1
121	135	(3 intervals)	0
136	140		1

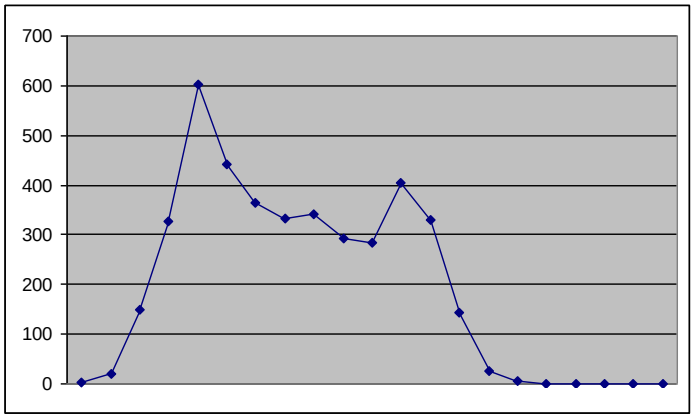


Figure 1. Frequency analysis data plot for the data provided in Table 7.

Mean	=	73.7
Standard deviation	=	16.3
99th percentile (calculated)	=	111.5 (1-day), 88.0 (7-day)
99th percentile (41st and 42nd highest results)	=	105 (1-day)
Highest reported result	=	138 (1-day), 109 (7-day)
Next highest result (assuming 138 is an outlier)	=	117 (1-day)

Table 7. July data ONLY, daily monitoring from 7/1/1999 – 7/31/2009 (341 values).

Temperature Increments (°F)		# of
from	through	Observations
56	60	0
61	65	0
66	70	0
71	75	0
76	80	1
81	85	6
86	90	45
91	95	88
96	100	113
101	105	68
106	110	18
111	115	2
116	120	0
121	125	0
126	130	0
131	135	0
136	140	0

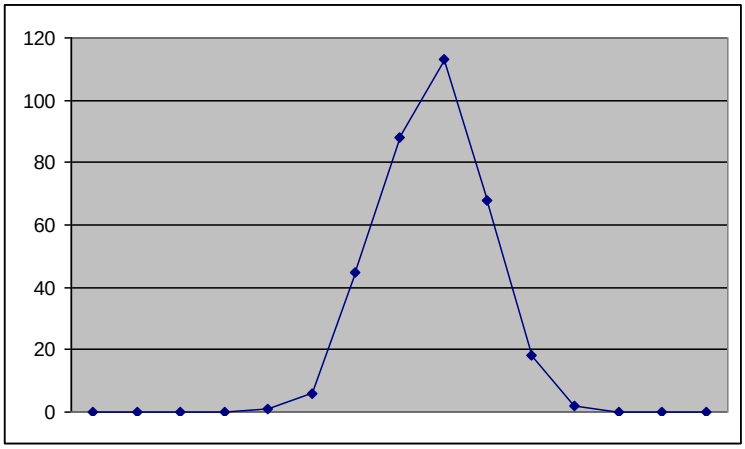


Figure 2. Frequency analysis data plot for the data provided in Table 8.

Mean	=	96.7
Standard deviation	=	5.6
99th percentile (calculated)	=	109.8 (1-day), 101.6 (7-day)
99th percentile (3rd and 4th highest results)	=	110 (1-day)
Highest reported result	=	111 (1-day), 106 (7-day)
2009 ONLY:		
Mean	=	88
Standard deviation	=	2.8
99th percentile (calculated)	=	94.6 (1-day), 90.5 (7-day)
Highest reported result	=	92 (1-day), 89 (7-day)

Table 8. January data ONLY, daily monitoring from 1/1/1999 – 1/31/2010 (371 values).

Temperature Increments (°F) from	through	# of Observations
36	40	1
41	45	9
46	50	75
51	55	119
56	60	118
61	65	40
66	70	6
71	75	2
76	80	1

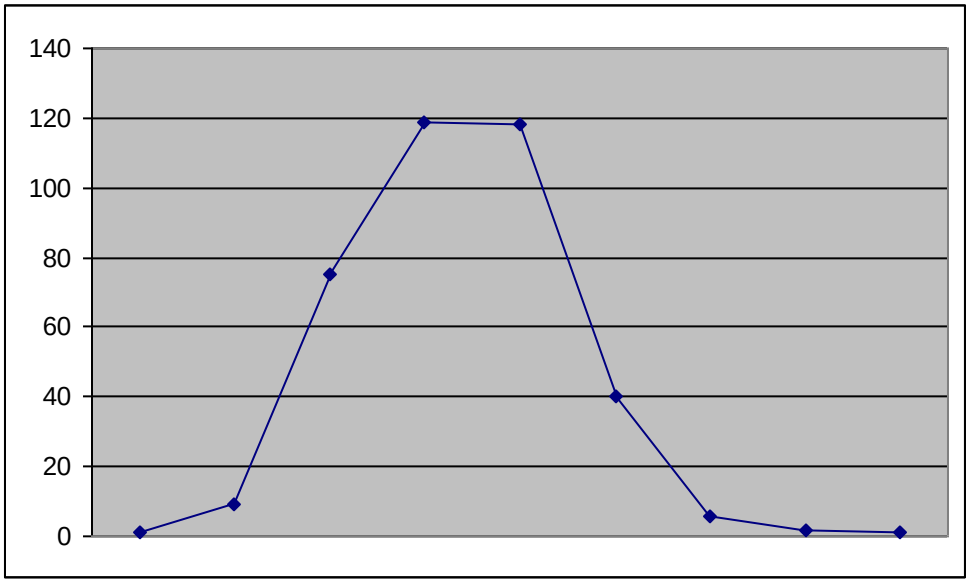


Figure 3. Frequency analysis data plot for the data provided in Table 9.

Mean = 55.0
Standard deviation = 5.2
99th percentile (calculated) = 67.2 (1-day), 59.6 (7-day)
99th percentile (4th highest result) = 70 (1-day)
Highest reported result = 76 (1-day), 65 (7-day)

2010 ONLY:

Mean = 54.8
Standard deviation = 3.7
99th percentile (calculated) = 63.5 (1-day), 58.1 (7-day)
Highest reported result = 62 (1-day), 57 (7-day)

Chapter 8 – Exemptions from 120 °F Effluent Limitations to Protect Human Health

Applicable Rule Provision(s): ss. NR 102.04(8)(c) & NR 106.56(8), Wis. Adm. Codes
Author: Bob Masnado
Last Revised: December 1, 2010

Chapter NR 102, Wis. Adm. Code, contains a water quality criterion of 120 °F for the protection of human health. The intention of this criterion was to prevent people from being scalded by short-term, accidental exposure to heated wastewater effluent. Although rare, swimmers, paddlers, skiers, and others are not always aware of the presence of an outfall and may incur adverse health effects if exposed to water temperatures in excess of the criterion. In comparison, Wisconsin state law follows the advice of the federal United States Consumer Protection Safety Commission which has recommended a maximum temperature of 104 °F for private hot tubs and whirlpools to protect humans (See s. DHS 172.19(4)(c), Wis. Adm. Code). The difference between the two criteria is that it is assumed the people entering a hot tub or whirlpool are doing so by choice and will be exposed for up to 20 minutes at a time.

Determination of Reasonable Potential:
Chapter NR 106, Wis. Adm. Code, requires the inclusion of a 120 °F daily maximum limitation for dischargers that have the reasonable potential to exceed the 120 °F criterion. Many wastewater treatment facilities that include any form of biological treatment will not exceed this temperature for fear of killing the microbial population necessary for effective treatment of organic matter. Previous research has found that wastewater treatment plants typically have effluents temperatures ranging from 50 to 70 °F and do not function well at temperatures exceeding 103 °F. As such, it is not expected that **municipal publicly-owned or privately-owned treatment plants** will exceed 120 °F, thereby eliminating the need for the 120 °F water quality criterion in most cases. It is also reasonable to expect that temperatures in lagoon systems, whether industrial or municipal, cannot exceed 120 °F in Wisconsin, given that maximum soil temperatures in the summer are below 100 °F and that the maximum air temperature ever recorded in the state is below 120 °F. In both cases, however, it is important to consider if the facility receives heated discharges, which - in turn - could result in an effluent temperature exceeding 120 °F. Therefore, some municipal POTWs and many **industrial facilities** may discharge wastewater at elevated temperatures.

Determination of reasonable potential is as simple as evaluating the representative effluent temperature data and identifying any record of a daily maximum value exceeding 120 °F. If a permitted facility reports any daily maximum value ≥120 °F, a daily maximum limitation of 120 °F shall be included in the WPDES permit for the month in which the reported exceedance occurred. The Temperature

Spreadsheets can be used to perform a reasonable potential evaluation to determine the need for public health temperature limits.
If a public health temperature limit is not recommended, the following text is recommended for the limit memo and/or permit factsheet:

> *"Upon review of representative effluent temperature data, there is no reasonable potential for wastewater effluent to be discharged in excess of 120°F. Pursuant to s. NR 106.56(8),Wis. Adm. Code, a daily maximum limitation of 120°F is not necessary to ensure the protection of human health."*

If a public health temperature limits are necessary, the following text is recommended for the limit memo and/or permit factsheet:

> *"Upon review of representative effluent temperature data, there is reasonable potential for wastewater effluent to be discharged in excess of 120°F during the month(s) of* ***ENTER MONTH(S)****. Pursuant to s. NR 106.56(8),Wis. Adm. Code, a daily maximum limitation of 120°F is necessary to ensure the protection of human health during those months, but is not necessary for the remainder of the year."*

Requesting an Exemption from a Human Health Limitation of 120 °F:
Section NR 106.56(8), Wis. Adm. Code, allows a permittee to demonstrate that heated effluent is not discharged in a manner that will pose a potential scalding threat to humans. Any permittee with a proposed 120 °F effluent limitation may make this request in writing so long as it includes the following information:

a. GPS Coordinates (latitude/longitude) of the outfall discharge port(s).
b. Estimated depth (feet) of the topmost portion of the outfall discharge port(s) under low-flow conditions in the receiving water.
c. Description of any physical barriers installed to prevent humans from coming in contact with the outfall discharge port(s).
d. Description of other factors the permittee believes should be considered by the Department in making its determination.

Department staff shall consider the information provided by the permittee as well as any other information readily available in making a determination of the possibility that humans could be exposed – even for short periods of time – to the heated effluent. The reader is reminded that the intent of the rule was to include the 120 °F limitation in the WPDES permit – erring on the side of human safety – unless a clear and compelling case was made that exposure to heated effluent is not likely. It is impossible to create guidance that will predict all possible exposure scenarios, but an exemption <u>should not be approved</u> if the design and/or location of the outfall is such that it will not clearly prevent exposure to humans involved in the following activities in the vicinity of the outfall structure:

a. Fishing where it is common practice for anglers to wade into the water from shore;
b. Swimming, snorkeling, or SCUBA;
c. Hunting of waterfowl by boat, canoe, or skiff;
d. Canoeing or kayaking;
e. Water skiing, jet skiing, or wind surfing.

Documentation of Exemption from a Human Health Limitation of 120 °F:
Any determination made to exempt a permittee from the 120 °F limitation must be supported by a clearly described explanation in the WQBEL memorandum.

Chapter 9 – Use of Monthly Qs Values

Applicable Rule Provision(s): s. NR 106.53, Wis. Adm. Code
Author: Jim Schmidt
Last Revised: August 12, 2010

Calculation of point source effluent limitations intended to address Wisconsin's thermal water quality standards requires representative low flow data in the case of discharges to streams. The provisions of s. NR 106.53(1)(a), Wis. Adm. Code, require the use of ¼ of the 7-day, 10-year low flow (7-Q_{10}) or ¼ of the 4-day, 3-year biologically-based low flow. Typically, a year-round low flow is used in the effluent limit calculation. However, since effluent limits are calculated and reasonable potential is evaluated on a monthly basis, the option is available to use seasonal or even monthly low flows. Stream flows are normally expected to be less variable on a seasonal or monthly basis compared to yearly. When also factoring wet vs. dry seasons, it is very likely that most, if not all, of the seasonal or monthly low flows will be greater than the year-round low flow, thus increasing the potential for relaxation of thermal limits based on seasonal or monthly low flows.

The source for low flow data is the USGS, whether for initial estimates of low flows, or low flow updates. If a permittee or group of permittees expresses interest in obtaining seasonal or monthly low flow data estimates on a site-specific basis, they will need to contact USGS directly. USGS will provide these types of estimates for a fee and will provide the data directly to the Department. At the time of publication of this guidance document, the USGS contact for low flow estimates is hydrologist Rob Waschbusch (Contact information below).

Rob Waschbusch, Hydrogeologist
U.S. Geological Survey
Wisconsin Water Science Center
8505 Research Water
Middleton, Wisconsin 53562
Phone: 608.821.3868
E-mail: rjwaschb@usgs.gov

Any permittee or official designee may submit and request use of alternative low flow data consistent with the provisions of s. NR 106.53(1), Wis. Adm. Code. For use by the Department, such new or modified low flow data must be summarized and provided to the Department directly by the USGS. A copy of all flow modification letters should be provided to the Permits Section to ensure that the Department's low flow database is accurate:
Water Quality Based Effluent Limits Coordinator

WY/3 – Permits Section
101 S. Webster St.
Madison, WI 53703

Chapter 10 – Request for Increased Q_s Value

Applicable Rule Provision(s): ss. NR 102.05(3), NR 106.53(1)(c)-(e), & NR 106.55(10), Wis. Adm. Codes
Author: Amanda Minks
Last Revised: August 27, 2010

Receiving water flow (Qs) is a variable in the WQBEL determination process that can significantly affect the calculated effluent limitation. As authorized under s. NR 106.53(c), Wis. Adm. Code, a permittee may request a modification of the Qs value if it can be demonstrated to the satisfaction of the Department that an adequate zone of passage exists in the receiving water such that aquatic life is protected in accordance with the conditions of s. NR 102.05(3), Wis. Adm. Code. This increased Qs value may be authorized for areas of rapid mixing and thermal dispersion, thereby reducing the extent of the mixing zone and providing aquatic life with unaffected vectors of travel.

REQUESTS FOR ALTERNATIVE MIXING ZONE:
Dischargers requesting an increased Qs should notify the wastewater permit staff assigned to their facility (i.e., Basin Engineer or Permit Drafter) prior to initiating any field data collection efforts. Wastewater staff should consult with Water Quality Modeling staff to determine if there are any special needs to demonstrate rapid and complete mixing of heat in the effluent prior to study initiation.

Two situations exist that may regularly lead to a successful demonstration for an increased Qs thus allowing an increase in the value used for WQBEL calculation. They are:

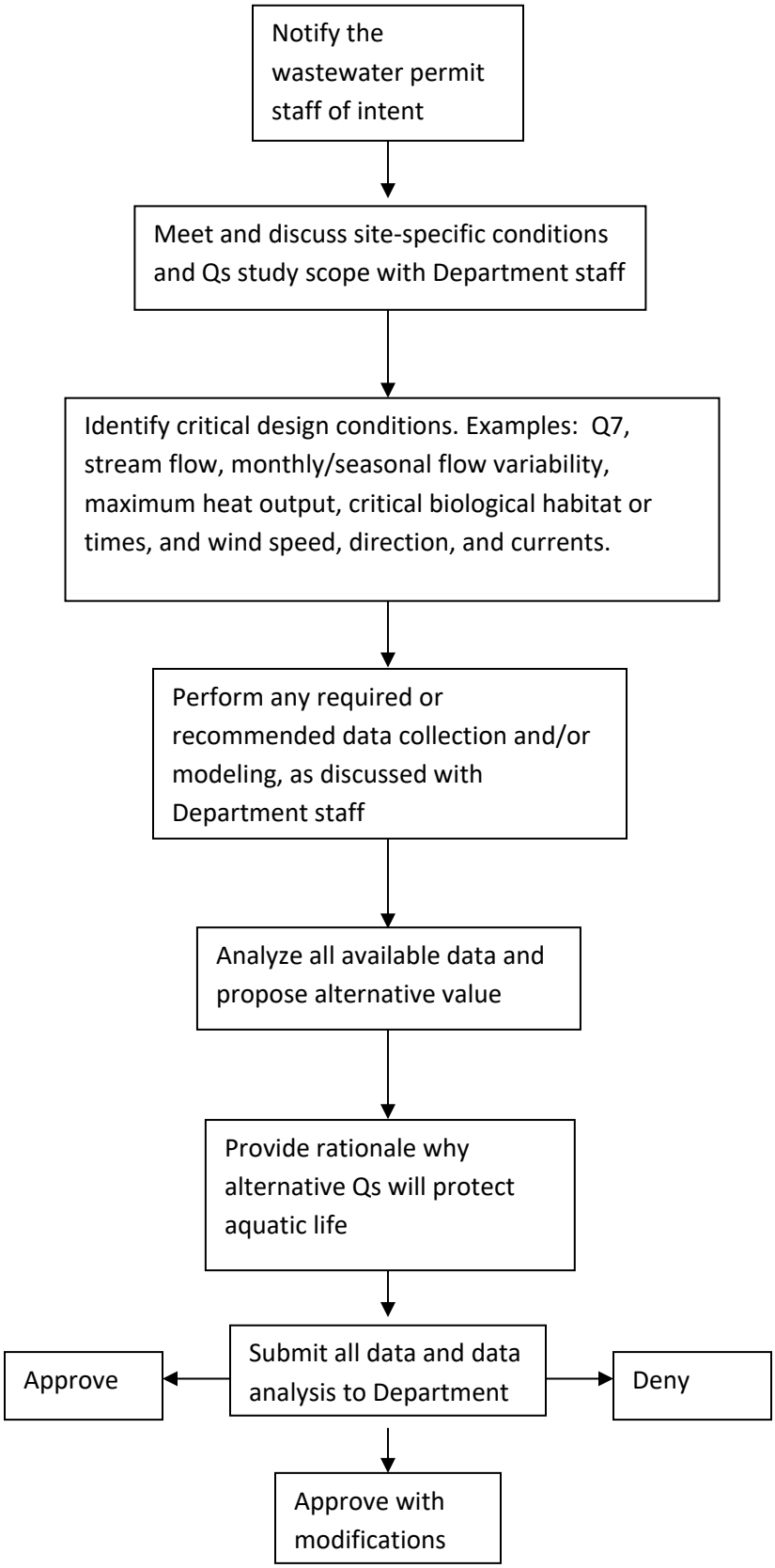
a. Discharge into the head race or tail race of a dam such that mixing of the heat in the effluent and the receiving water is rapid and complete a short distance from the dam. In this case, the maximum value will be lower of either: a) 100% of the 7-Q_{10} or the minimum flow allowed through the applicable Federal Energy Regulatory Commission (FERC) license for the dam.
b. Discharge from a multi-port diffuser with a port discharge velocity that prevents stationary occurrence of fish or aquatic life in the discharge a short distance from the outfall orifice. In this case, the maximum value cannot exceed 100% of the 7-Q_{10}.
c. All other situations where a permittee requests an increased Qs will require site-specific data to be compiled and submitted with an explanation as to why the increased Qs will still meet all of the mixing zone provisions of s. NR 102.05(3), Wis. Adm. Code. Information on other factors needed to make this demonstration may include:

    - Discharge temperature & volume,
    - Ambient receiving water temperature under critical conditions,
    - Receiving water flow information under critical conditions,
    - 2 and 3-dimensional thermal plume information under critical conditions,

- Receiving water bathymetry including depth and width in the mixing zone,
- Local meteorological data,
- Biological community information from the mixing zone area (i.e., species diversity, richness, presence of threatened & endangered species),
- Critical habitat areas, including those important for reproduction for fish and aquatic life including spawning and nursery areas.
- Map of all other discharges where mixing zones may overlap.

Note: Whenever any water quality modeling or plume mapping is conducted, it is strongly recommended that the study design be discussed in advance with a Department water quality modeler. See Chapter 15 (pg. 109) of the Guidance for further water quality modeling information.

FLOW DIAGRAM FOR REQUESTING INCREASED QS VALUE



DEPARTMENT ACTIONS:

The Department must consider the information provided in support of a request for increased Qs. Possible decisions include an approval, disapproval, or approval with modifications. Regardless of the outcome of the analysis, a written notification of the Department's decision should be clearly documented and should be provided to the applicant.

Approved requests for increased Qs to flowing receiving water cannot exceed:

a. 100% of the 7-Q_{10}, or
b. The minimum flow allowed through the applicable Federal Energy Regulatory Commission (FERC) license for the dam.

Decisions to disapprove or approve increased Qs with modification should consider the following factors as well as others that are deemed appropriate:

a. Evidence of damage to aquatic life or critical habitat at the requested Qs value,
b. Absence of an adequate passageway for movement of aquatic life,
c. Absence of a convincing and otherwise satisfactory rationale where needed to explain any information submitted by the applicant,
d. Failure to provide sufficient information to form the basis for the requested Qs.

Note: if a request for increased Qs is denied for one or more of these reasons or for a reason not listed, the discharger may still apply for an AEL. For further information on AEL protocol, see Chapter 12 (pg. 69) of the Guidance.

Chapter 11 – Evaluation of Dissipative Cooling for Domestic Treatment Works

Applicable Rule Provision(s): s. NR 106.59, Wis. Adm. Code
Author: Duane Schuettpelz, Tom Mugan, & Amanda Minks
Last Revised: August 15, 2013

Introduction

Dissipative cooling (DC), by definition in s. NR 106.59, Wis. Adm. Code, is the cooling effect associated with heat loss to the ambient water, the atmosphere and the surrounding environment. The primary objective of establishing temperature limitations is to ensure there is no point in the receiving water where elevated effluent temperature will result in lethality or otherwise significantly impair the existence of a balanced fish and aquatic life community. Further, effluent limitations will also be established so that heat discharged in effluent does not create a barrier to the movement of organisms within the surface water. Under conditions of rapid mixing and the loss of heat to the atmosphere and surrounding environment, the effects of temperature from these discharges will be negligible.

Section NR 106.59, Wis. Adm. Code, contains requirements for determining effluent temperature limitations applicable to permittees subject to WPDES permits under ch. NR 210, Wis. Adm. Code (municipal POTWs). Under ss. NR 106.59 (3) and (5), Wis. Adm. Code, acute effluent temperature limitations are established for existing and new facilities respectively. These limits are not subject to a DC demonstration. DC can be used to drop sub-lethal effluent temperature limits from the WPDES permit, however, pursuant to ss. NR 106.59 (4) and (6), Wis. Adm. Code. Demonstrations in these two sections are similar in concept except that studies for new and re-located discharges need to be more predictive whereas existing discharges can make their demonstration based on current conditions.

This guidance provides the process that the Department plans to follow in accounting for DC while reissuing permits to municipal facilities and what considerations the Department may use in determining whether DC at a specific site is sufficient to meet the applicable standards. Under the rule, a determination will depend on information submitted by the permittee demonstrating there is sufficient turbulence and mixing and heat loss within a short distance of the discharge. Temperature reduction can also occur as a result of downstream tributaries and the receiving water flowing into a larger stream.

How Dissipative Cooling Fits Into the Permitting Process

Pursuant to ss. NR 106.59(4)(e) and NR 106.59(6)(e), Wis. Adm. Codes, the Department must request public comments when the Department determines that sub-lethal temperature limits are not required based on a dissipative cooling evaluation. It is recommended that the specific request for comment occur in conjunction with the overall comment period for the permit. Therefore, dissipative cooling demonstrations should be completed and submitted to the Department prior to permit reissuance.

If the information submitted by the permittee along with information available to the Department does not provide enough evidence of DC so as to preclude the need for a sub-lethal effluent limitation, the WPDES permit should be reissued with sub-lethal limitations with a compliance schedule if necessary and appropriate. No specific request for comment is required for these cases.

A WPDES permit holder may request a dissipative cooling decision be re-evaluated based on new data collected during the permit term. If the Department concludes that DC is appropriate, permit modification is required to drop the sub-lethal (weekly) thermal limits from the permit. Permit modification is required to allow for a public comment period for the DC decision. If the information submitted is insufficient to demonstrate dissipative cooling, no further action is required by the Department, and the applicant will be required to meet the requirements of the compliance schedule. To avoid permit modifications, it is strongly recommended that sufficient data be collected prior to permit reissuance. Additionally, time will not be given in a compliance schedule to collect these data. This action would be outside of the requirements specified in the compliance schedule.

Future WPDES Permit Reissuance

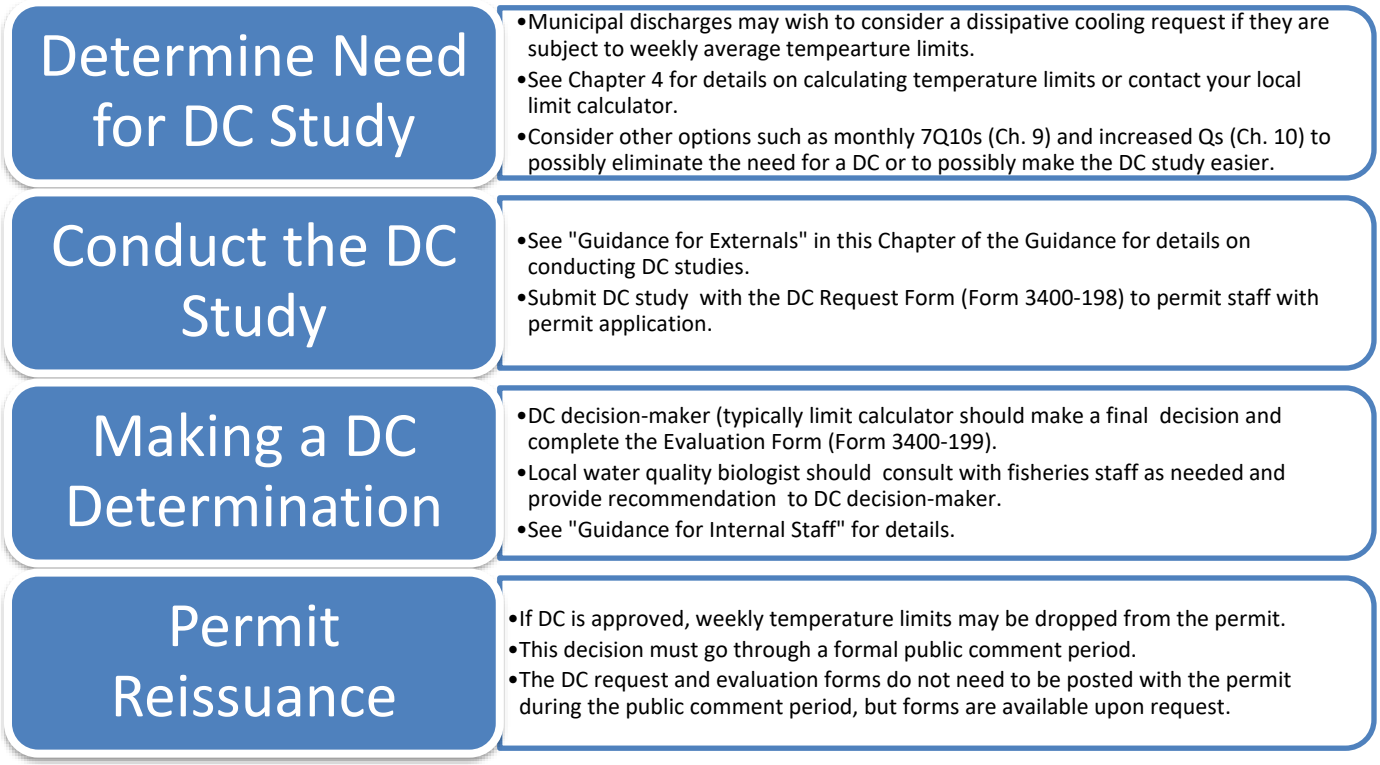
Dissipative cooling requests must be re-evaluated every permit reissuance. The permittee is responsible to submit an updated DC request prior to permit reissuance. Such a request must either include:

a) A statement by the permittee that there have been no substantial changes in operation of, or thermal loadings to, the treatment facility and the receiving water; or
b) New information demonstrating DC to supplement the information used in the previous DC determination. If significant changes in operation or thermal loads have occurred, additional DC data must be submitted to the Department.

The Department must review and make a final determination on the DC re-evaluation. If DC is approved, the Department must make a specific request for public comments on this decision as part of the public notice period.

Logic Diagram:

The following logic diagram is meant to describe the overall process for requesting, and making decisions on, DC. Additional guidance is provided in subsequent sections of this guidance for internal staff and externals. Example DC requests are also included in this Chapter of the guidance. If you have questions about DC, contact your local permit staff or email DNRThermal@Wisconsin.gov.



Documentation Requirements

There are documentation requirements for a DC evaluation, both for applicants requesting DC and for WQBEL calculators or other WDNR staff making these decisions. These documents are designed to ensure that the DC requirements specified in s. NR 106.59, Wis. Adm. Code, are met, and allows for consistent decision-making and record keeping.

Any applicant that requests DC should submit a "Dissipative Cooling Request Form", Form 3400-198, to the Department. This form has been sent to all municipal discharges and will also be sent to municipal discharges with their permit application (See Chapter 18, pg. 117 for details). The Department should receive the "Dissipative Cooling Request Form" at the time the permit application is submitted for the permit issuance/reissuance. If this form is not submitted to the Department, DC should not be granted.

> *Note: The "Dissipative Cooling Request Form" should include all evidence- both affirmative & negative. Furthermore, completing this form does not mean the DC will be granted, but rather that all required and relevant information pertaining to DC has been properly submitted to the Department.*

Once the "Dissipative Cooling Request Form" is submitted by the applicant, the Department should review this form using the "Dissipative Cooling Evaluation Checklist", Form 3400-199, to properly document DC decisions and justification. This form should be completed by the staff member evaluating

the DC request, typically the WQBEL calculator. Upon completion, a copy of this form and the written description used to justify DC should be saved in SWAMP and submitted to the wastewater thermal lead for tracking.

The DC forms are available to Department staff at \\central\watershed\ThermalImplementation, and in the forms catalog. The DC Request form is available to externals at http://dnr.wi.gov/topic/surfacewater/thermal.html. It is recommended that you download these forms from these locations to ensure that you have the most up-to-date version of them as the forms are subject to change.

Guidance for Internal Staff

As previously mentioned, the local limit calculator will likely be the primary staff person responsible for evaluating and deciding on DC requests. Upon DC request submittal, the limit calculator should briefly review the request to verify its completeness. The following questions may be useful when determining whether or not the DC request is complete or not:

- Did the permittee complete the DC Request Form?
- Was ambient temperature data submitted to the Department as part of the DC request?
- Was a temperature profile study completed as part of the DC request?
- Is effluent temperature data available for the discharge?

Answering the above questions affirmatively is indicative that the DC request is complete. If insufficient data has been submitted, the permittee should be notified that additional information will be needed to process the DC request. If data is not available to make a dissipative cooling determination prior to permit reissuance, sub-lethal temperature limits must be included in the WPDES permit. If sufficient data is submitted to the Department during the permit term to warrant DC approval, permit modification must occur to drop these limits from the permit. This action should occur prior to temperature limits taking effect to avoid permit compliance issues.

Once a completed request has been submitted to the Department, the limit calculator should provide a copy of the request to the local water quality biologist for review. The water quality biologist is responsible for reviewing the DC request make one of the following recommendations to the limit calculator to aid in the final decision-making process:

- Heated effluent from the discharge is not having an impact on the fish and aquatic life in the receiving water
- Heated effluent from the discharge may have a marginal impact but does not pose an overall concern to the fish and aquatic life community in the receiving water
- Heated effluent from the discharge may cause an impact on the fish and aquatic life in the receiving water and poses a concern to the aquatic life community in the receiving water

- Heated effluent from the discharge is causing an impact on the fish and aquatic life in the receiving water
- Unsure

The water quality biologist should consult with fisheries staff when making this recommendation if the DC determination has the potential to impact gamefish populations. Once the limit calculators receive the water quality biologist recommendation, they should have sufficient information to successfully complete the Evaluation Form (Form 3400-199), and make a final determination of the DC request. Sections NR 106.59(4)(c) and NR 106.59(6)(c), Wis. Adm. Codes, describe information that the Department should consider when evaluating dissipative cooling requests. This includes:

1. POTENTIAL FOR EXCEEDING THE APPLICABLE SUB-LETHAL CRITERIA. *Guidance:* Temperature profile data can be used to determine the extent at which the sub-lethal criterion is exceeded. This extent should include horizontal and vertical distribution within the receiving water. If the sub-lethal criterion is exceeded in a significant portion of the receiving water, dissipative cooling may not be suitable. The size of the sub-lethal exceedance zone that is considered to be "significant" will vary depending on the size of the receiving water, the distribution of this exceedance zone within the receiving water, and the potential biological uses of the receiving water section in question. Data should be collected during the critical months when sublethal limits are being triggered unless it is unsafe to collect data at this time in which case the Department may consider similar data from adjacent months.

2. PHYSICAL CHARACTERISTICS OF THE RECEIVING WATER. *Guidance:* Physical characteristics that should be described by the DC requester include bottom substrate type, depth of the water column at the point of discharge, physical configuration of the outfall in relation to the surface water, discharge velocity at the end of the discharge pipe, and flow pattern of the receiving water above and below the discharge point. The purpose of this data is to get a general sense of the stream energy and shear stress within the receiving water. These forces do not need to be quantified, but they are important to consider when determining the likelihood of rapid mixing, heat loss, and dissipation. Photographs and in some cases videos can be very helpful

   Substrate textures are responsive to and indicative of shear stress, among other things. As stream energy and shear stress increase, the likelihood that rapid mixing and heat loss is occurring also increase. Channel roughness resulting from rocky or gravel substrates are indicative of high shear stress systems, thus indicating rapid heat loss. Although this relationship is generally true there are some complicating factors such as sediment supply, which can lessen this relationship. Therefore, it is important to consider water column depth when determining the likelihood of rapid heat loss resulting from shear stress. For example, if a system has a shallow water column and gravel substrate, it is more likely that rapid heat loss is occurring in that system. If, on the other hand, a gravel substrate is present with a large water column depth, there may be other competing forces involved in the fate and transport of these sediments, making rapid heat loss less likely.

Effluent flow and flow direction can also spur rapid heat loss and mixing due to the increased velocity in the system. If the effluent flow is significantly greater than the receiving water flow, rapid mixing may occur. This influence will likely be quantified in a temperature profile study.

3. OTHER THERMAL MIXING ZONES. *Guidance:* If multiple thermal loads overlap such that the total loadings preclude the presence of a zone of free passage and/or create a significant zone where the sub-lethal criterion is exceeded, dissipative cooling should not be approved. If the size of the thermal loads decline over time, the permittee may wish to revisit dissipative cooling to determine in the decline was sufficient to warrant DC.

4. VARIABILITY IN EFFLUENT TEMPERATURE. *Guidance:* Additional temperature profile data should be submitted by the applicant where there is significant variability of effluent temperatures from the POTW, or when a significant portion (>50%) of the heat load from the POTW comes from industrial sources. These data should reflect typical and peak effluent temperature conditions and their distribution within the receiving water. The Department should consider the frequency of the peak heat loads being discharged when evaluating DC. If DC is successfully demonstrated during peak discharge conditions, DC should be approved. DC may also be approved if peak conditions occur infrequently, and these occurrences are not believed to cause a significant impact to fish and aquatic life within the receiving water.

5. DIFFERENCE BETWEEN AMBIENT RECEIVING WATER TEMPERATURES AND REPRESENTATIVE EFFLUENT TEMPERATURES. *Guidance:* The biological community in the receiving water may experience heat or cold shock if the effluent temperature is significantly different than the seasonal ambient temperature. These extreme temperature gradients can also cause an observable barrier to upstream/downstream movement of organisms. If rapid heat loss and/or rapid mixing do not occur in the system, heat and cold shocking are more likely to occur. The Department should consider the temperature differential between the ambient water temperature and the receiving water temperature after the heated effluent is added, and the distance necessary for the receiving water to return to near-ambient conditions. Ambient water temperature for these purposes can be defined as the temperature of the waterbody outside the zone of influence of discharges.

6. ATTAINMENT STATUS OF THE BIOLOGICAL COMMUNITY. *Guidance:* It is recommended that the regional water quality biologist be contacted to determine the attainment status of the receiving water's biological community in response to the heated discharge. It is the responsibility of the regional water quality biologist to utilize the current assessment protocols to determine what the applicable biological community is. If evidence suggests that the heat from the discharge is causing or contributing to nonattainment of the Designated Uses in the receiving water, the dissipative cooling evaluation should not be approved. The Designated Uses in question should be based on the codified Designated Uses of the receiving water. If these codified Uses are out-of-date, it is recommended that a Use Attainability Analysis be conducted to determine what the appropriate Uses for the receiving water are. The facility may collect additional in-stream

and biological data to help complete a Use Attainability Analysis to update the Designated Use of the receiving water. A project plan including quality assurances should be approved by the Department prior to any biological data collection. Codification will likely be required before a Use Attainability Analysis can be used to make permitting decisions. For additional information on the Department's Use Attainability Analysis process contact the Designated Uses Coordinator in the Water Evaluation Section.

7. THREATENED AND ENDANGERED SPECIES. *Guidance:* If there are known or suspected threatened or endangered species present in the receiving water, Department staff should contact the Water Quality Standards Specialist in the Water Evaluation Section to determine the potential impacts the thermal discharge has on these species. If the thermal load from the municipality has the potential to adversely affect the threatened or endangered species, the dissipative cooling request should be denied.

As previously mentioned, a copy of the Evaluation Form (Form 3400-199) should be saved in SWAMP and submitted to the wastewater thermal lead for tracking once a final decision has been made:

Guidance for Externals

Prior to collecting data for DC, point sources may wish to contact their local limit calculator to ensure that they trigger sub-lethal temperature limits, and that other compliance options such as monthly 7Q10s (Chapter 9) and increased Qs (Chapter 10) will be insufficient to drop these temperature limits out. In some cases, these alternative compliance options may be simple solutions to address temperature concerns. Dissipative cooling is frequently a straight-forward compliance option, but does require some amount of effluent and in-stream temperature data collection. If dissipative cooling cannot be successfully demonstration, municipal POTWs may wish to pursue more complex options for flexibility such as alternative effluent limits for temperature (see Chapter 12).

DC Submittal Requirements

Site-specific data will be required to successfully determine DC. Data for DC demonstrations should be collected during the critical periods when sub-lethal (weekly) temperature limits are required. Typically, critical periods occur in the transition times from warmer summer temperatures to cooler winter temperatures. It is recommended that applicants submit the following data for these critical months:

1. PHYSICAL CHARACTERISTICS OF THE RECEIVING WATER

   The rule requires the submittal of "physical characteristics of receiving water or outfall that encourage rapid heat dissipation." Physical characteristics that should be described include depth of the receiving water at the outfall location, physical configuration of the outfall in relation to the surface water, discharge velocity at the end of the discharge pipe, and flow

pattern of the receiving water above and below the discharge point. The bottom substrate of the receiving water, excluding material artificially placed in the stream, should also be described. In most cases a narrative description and visual evidence will be sufficient to meet the requirements of this section.

2. CHARACTERISTICS OF THE EFFLUENT

   The applicant should quantify the variability in effluent temperature and flow. It should also be determined what proportion of the heat load is coming from industrial rather than residential sources.

3. CHARACTERISTICS OF THE MIXING ZONE

   The size and distribution of the mixing zone should be quantified using in-stream temperature and conductivity data. This data will be used to determine the exceedance potential of sub-lethal criteria. It is recommended that in-stream temperature data be compared to the applicable sub-lethal criteria to quantify the extent of the exceedance. Mixing zone data should be collected during typical conditions for municipal discharges without a significant heat load from industrial sources. If significant heat load fluctuations occur throughout the critical period or a significant portion of discharged heat comes from industrial sources, mixing zone data should be collected to capture typical and maximum mixing zone conditions when effluent temperatures are highest.

The following data must also be submitted to the Department *if available*. The applicant is not required to collect this data if unavailable.

1. BIOLOGICAL CHARACTERISTICS

   The rule requires the submittal of any available "information on biological quality of plant and animal community of receiving water (species composition, richness, diversity, density, distribution, age structure, spawning incidence)" (NR 106.59 (4) (b) 1., Wis. Adm. Code). Additionally, documentation of the presence of any state or federally listed threatened or endangered species is required. The latter information will usually be available from the Department. In some instances, the Department may have information on other biological species present in the receiving water. If the Department is concerned about the thermal impacts on the biological community in the receiving water, the Department may request that biological data in addition to physical data be collected by a qualified person for the dissipative cooling request. A project plan should be approved by the Department prior to biological data collection.

2. OTHER THERMAL LOADS

   The applicant should identify other thermal loads to the immediate receiving water, if present. The applicant is not required to collect temperature data from the other thermal loads. However, the

Department may consider the cumulative heat load when making dissipative cooling determinations.

Guidance for In-Stream Data Collection

The goal of data collection is to demonstrate DC by describing the properties of the thermal plume within the receiving water including the temperature distribution and spatial distance relative to the stream, among other things. Temperature profiles, conductivity measurements, dye studies, water quality modeling and other analyses can be used to characterize mixing zones. Typically, temperature profiles are sufficient for dissipative cooling studies. Temperature profiles are straight-forward and can be done with a temperature probe. Wastewater operators, consultants, or water action volunteers can collect these data. If you are interested in receiving training to collect in-stream temperature data visit http://watermonitoring.uwex.edu/wav/monitoring/index.html. Training is only required for volunteers without previous monitoring experience; however, it is available to any interested party.

Safety should always be a top priority when conducting in-stream temperature profiles. Data should only be collected when it is safe to do so. If certain months are unsafe due to ice, flow, or other conditions, the permittee may consider collecting data in adjacent months when it is safe to enter the receiving water, or may wish to install data loggers to capture data during critical months when it is unsafe to collect these data via grab samples. The person(s) collecting these data are responsible for ensuring their safety. Safety protocols you may wish to follow include: wearing proper gear including waders and personal floatation devices, receiving proper training, and working in pairs to collect these data, among other things.

Temperature profiles, and other DC studies, should be performed during critical periods when weekly temperature limits are required. Data should be collected to reflect typical conditions that exist during these months and, possibly, extreme events that occur such as low stream flow conditions, high discharge temperatures relative to the ambient stream temperature, etc. Frequently, critical periods occur in the fall or winter due to low ambient stream flows and high discharge temperatures relative to the stream. October and November seem to be the most common months to trigger weekly limits in municipalities. Prior to data collection, the permittee should determine their critical months when limits are triggered. It is recommended that, at minimum, the DC requester collect temperature profiles and conductivity measurements in addition to the qualitative physical characteristics data (as described above) during these critical months. This combined submittal will provide qualitative and quantifiable data to support a DC demonstration.

Temperature profile studies are used to capture the temperature pattern and distribution in the thermal mixing zone. Temperature profile studies should be designed to collect temperature data at the surface of the water column and width depth. Frequently, transects are used to perform temperature profiles. Transects should represent the vertical and horizontal extent of the plume, as well as any significant morphological changes that occur in the stream such as abrupt change in depth, stream flow, stream direction, substrate, emergent features, etc. Once transects have been selected, temperature readings should be measured recorded at the surface and with depth.

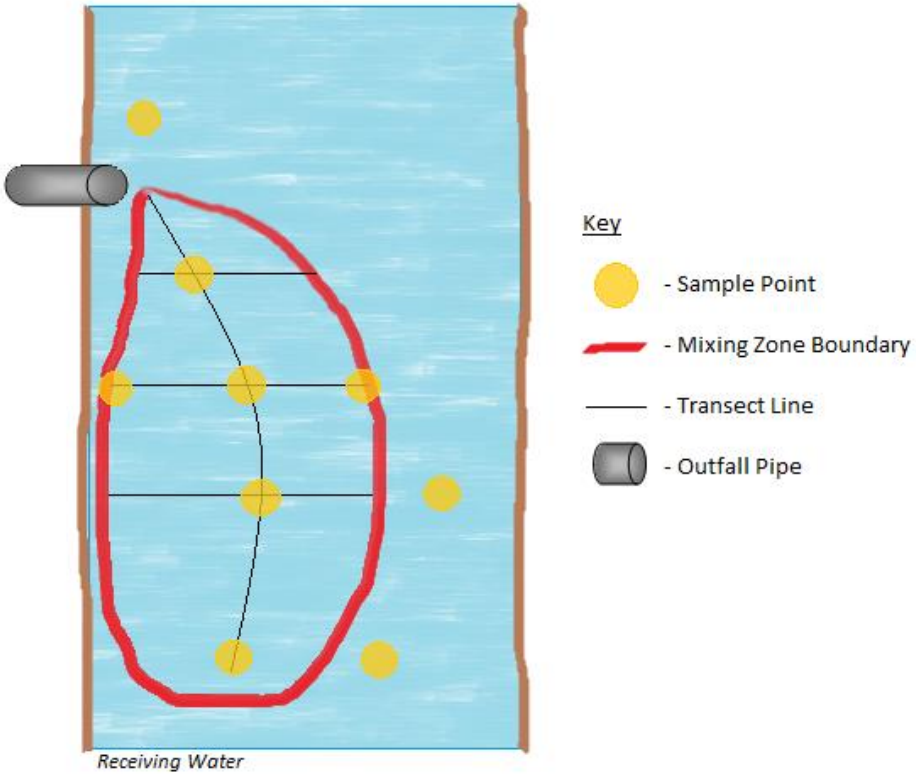


Figure 4. Example of transect layout and sampling point distribution with respect to the plume.

Recorded information should include temperature readings, depths at which temperature readings occurred, and observation distance from the discharge source. It is also *strongly* recommended that conductivity be recorded with every temperature reading. This will help further validate the pattern of the mixing zone relative to the stream. Upstream ambient temperature and conductivity (if applicable) readings should also be recorded for comparison purposes. If possible, temperature profile studies should measure and record the width of the stream. Because each plume is unique, it may be advantageous to work with a basin engineer or specialist to develop the scope of the temperature profile study and appropriate transect lines.

Complex situations may require dye studies or continuous temperature monitoring in addition to temperature profile data. Dye studies allow POTWs to visually see the discharge mixing zone. Dye studies can be difficult to perform, however, as the dye injection rate must be constant throughout the study. Dye studies also only gather qualitative data, rather than quantitative data. For these reasons, dye studies are not recommended and should only be performed in situations where the extent of the mixing zone cannot be easily ascertained. If a dye study is performed, it is strongly recommended that visual documentation be collected throughout the study and be submitted to the Department. It is also recommended that a brightly colored dye be selected, preferably not blue or green as these colors can be difficult to see. Of the dyes available, Rodamine WT is commonly used. It is important to check any

dye used to validate that it is safe for the environment. Discuss the use of other dyes with Basin Engineers or other DNR staff. For more information on dye studies visit http://www.ecy.wa.gov/programs/eap/mixzone/mixzone.html.

Continuous temperature monitoring may be appropriate in complex situations where the thermal load and/or stream flow is highly variable. An applicant may also choose to collect temperature data continuously if limits are triggered in several months. Data loggers should be placed at several locations within the stream to reflect the mixing zone, the edge of the mixing zone, the portion of the stream that may be affected by the thermal plume if the load were to increase. A detailed discussion of data loggers is available in Chapter 2 (pg. 14) of this Guidance.

Considering Historical Data

In some cases, historical temperature data may be available. These data can be submitted to the Department for consideration to help support a dissipative cooling demonstration. Historical data can be considered if it was collected within the past 10 years, and is representative of current discharge conditions. If historical data are submitted to the Department, the applicant should provide an approximate effluent heat load when these samples were collected. A site map of the sampling locations with respect to the outfall should also be provided.

Example DC Requests

The following section provides two examples of successful dissipative cooling studies that have been completed. The first example is for the Warrens WWTF, which is an effluent dominated scenario, and the second example is the Stoughton WWTF, which discharges to the Yahara River and has a Qs:Qe of about 2:1.

Warrens Dissipative Cooling Study

Background:

On October 9, 2012, DNR central office (Amanda Minks, Ashley Beranek and Steve Jaeger) and district (Pat Oldenburg and Kurt Rasmussen) staff met with Brian Knoepker, the operator for Warrens, and performed a dissipative cooling study for the Village of Warrens discharging to Apple Creek. These studies would normally be performed by the discharger. Since the use of dissipative studies are beginning to be used as part of the new thermal rule and development of guidance is ongoing, Department staff wanted experience in doing the study and were interested in seeing the rate of temperature drop for a case with no dilution. Because of the small size of the stream and easy access, the study could have been performed by two people. The study demonstrated that the length of stream potentially exceeding sub-lethal criteria for October would be 135 feet.

Need for Temperature Limits:

Effluent limits for temperature for Warrens were calculated using the default stream classification of warm water fish and aquatic life with the annual 7Q10 of 0.0 cfs for Apple Creek. The Warrens WWTF discharges at the headwaters of Apple Creek, and is the sole discharger within this stream segment. Based on slightly over two years of effluent temperature data collected by the facility, Warrens would get weekly temperature limits for October and November. Representative weekly average temperatures exceeded calculated weekly average limits by 2°F for October and 4°F for November. If the designated use of Apple Creek was modified from the default classification of warm water fish and aquatic life to its attainable use of limited forage fish, no temperature limits would be required give the effluent temperature data available. See the December 28, 2006 report “Stream Classification of Apple Creek, Monroe County, Wisconsin” by Cindy Koperski for details.

Figure 1 illustrates the measured effluent temperatures plotted against the calculated monthly effluent limits. The October limit is triggered by higher effluent temperatures seen in the 2010 data but the November limit would have been triggered by either year of data.

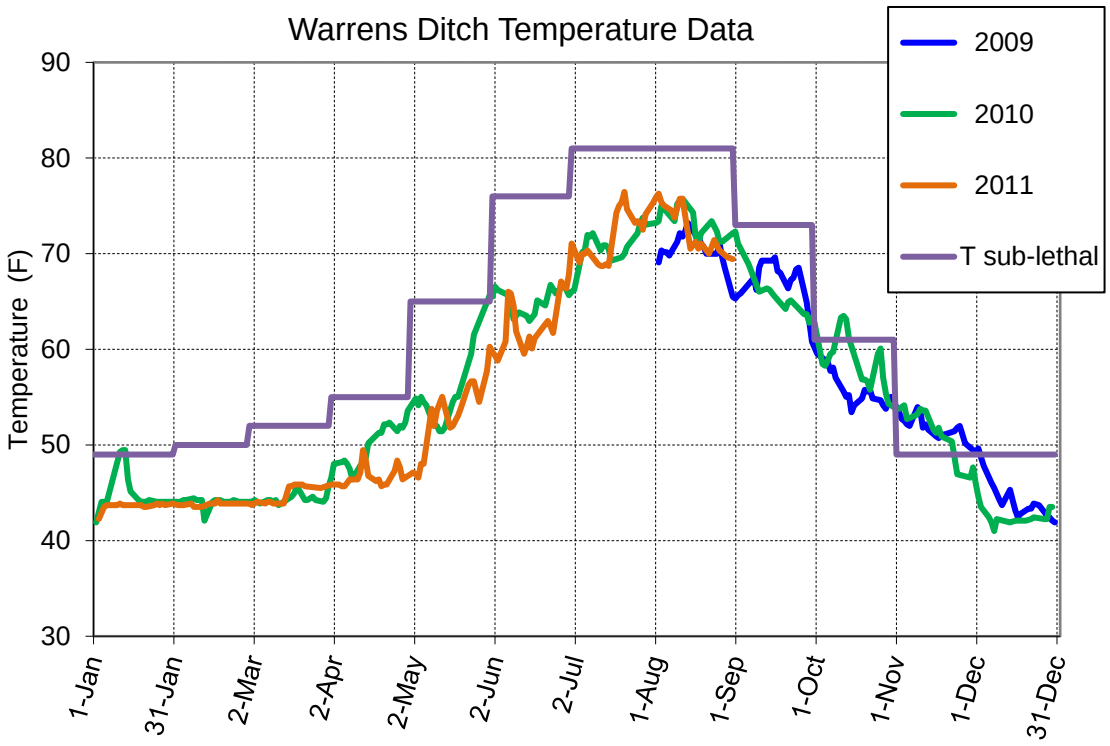


Figure 5. Measured Effluent Temperature Plotted Against Calculated Effluent Limits.

Physical Conditions:

At the mouth of the outfall, the bottom substrate of Apple Creek was primarily gravel (Figure 2). This substrate was only present at the mouth of the outfall, and quickly changed to a mixture of sand and silt, with some organic matter deposits. Organic deposits within the stream appeared to be natural debris from the surrounding woodland and not from the discharge. There was not a considerable flow coming from the outfall pipe at the time the study was conducted.

The stream downstream of the discharge averaged about 5 feet wide and about 6 inches deep. An occasional debris obstruction caused a few sections to be somewhat deeper (Figure 3).

Figure 6. Warrens WWTF outfall location into Apple Creek.

Figure 7. Image of Apple Creek downstream of outfall. Temperature data is being collected by WDNR staff Kurt Rasmussen and Amanda Minks.

In Stream Temperature Measurements:

The October 9, 2012 dissipative cooling study was conducted from 10:00 to 11:00 AM. Air temperature was 46°F and there was no stream flow upstream of the outfall. There was a light rain immediately prior to the study and it was misting during the study but extremely dry conditions for most of the summer caused upstream wetlands to dry out and the rain was not sufficient to cause any flow upstream of the discharge.

Effluent temperature was 59.4°F at the treatment plant and 58.5°F at the outfall, indicating some heat loss from the effluent pipe prior to discharge.

In stream temperature and conductivity was measured roughly every 20 feet for the first 300 feet below the outfall. Since the stream is shallow with no upstream dilution, measurements were taken near the center of the stream cross section. Locations were measured using a 100 meter tape that showed both feet and meters. Adjustments were made to the sampling location where stream access was made difficult by trees or debris. The temperature drop needed for October was met well within the first 300 feet. Further measurements were continued downstream to see if temperature was leveling off and for possible future comparison with studies done at other sites. One last measured sampling location was taken at 100 meters (328 ft) and then further locations were estimated by pacing off 30 feet at a time to a total distance of just under 600 feet.

Figure 4 shows the measured stream temperature and conductivity. Stream temperature dropped 2°F from the outfall temperature within 135 ft. If credit is given for the measured 0.9 F temperature loss in the pipe, a total 2°F drop would have occurred 55 ft downstream of the outfall. Stream temperature had decreased 5.6°F from the outfall to the end of the study and did not appear to be leveling off significantly.

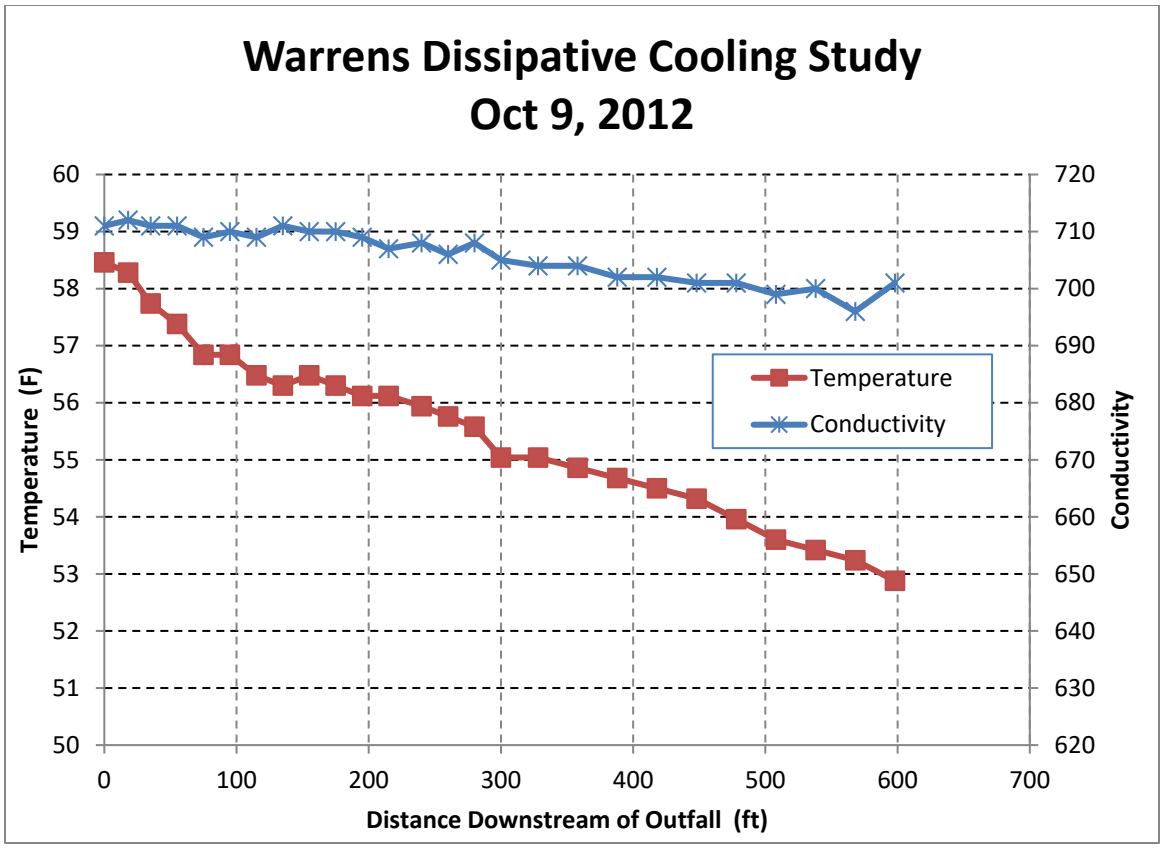


Figure 8. Measured In Stream Temperature and Conductivity.

Stoughton Dissipative Cooling Study

Data Collection

Temperature data were collected on October 19, 2010 along a transect in the middle of the mixing zone. This zone was visually approximated based on the stream current and the distribution of modest amounts of foam associated with the discharge. Five sampling points were selected along this transect. These points were selected based on changes in the stream morphology such as an abrupt change in depth, stream flow, stream direction, substrate, emergent features, etc. At these sample locations two temperature measurements were collected: surface and at the midpoint with depth. The sampling at depth was selected to indicate if the heated discharge floated or if there was rapid mixing and dispersion of the heat throughout the water column. The total water depth and the distance from the outfall source were also recorded at each sampling point. In order to compare the temperature of the mixing zone to the ambient temperature, surface and mid-depth samples were collected upstream of the discharge.

Table 9. Raw data collected during the temperature profile study performed on October 19, 2010.

Temperature Profile Data Collected			
distance from outfall	**surface temp (°F)**	**temp at mid-depth (°F)**	**depth (in)**
ambient	54.5	54.5	28.7
outfall	64.04	x	x
10 ft	60.26	58.28	24.4
17 ft	56.66	55.58	29.5
25 ft	55.76	55.58	32.3
33 ft	55.94	55.4	34.3

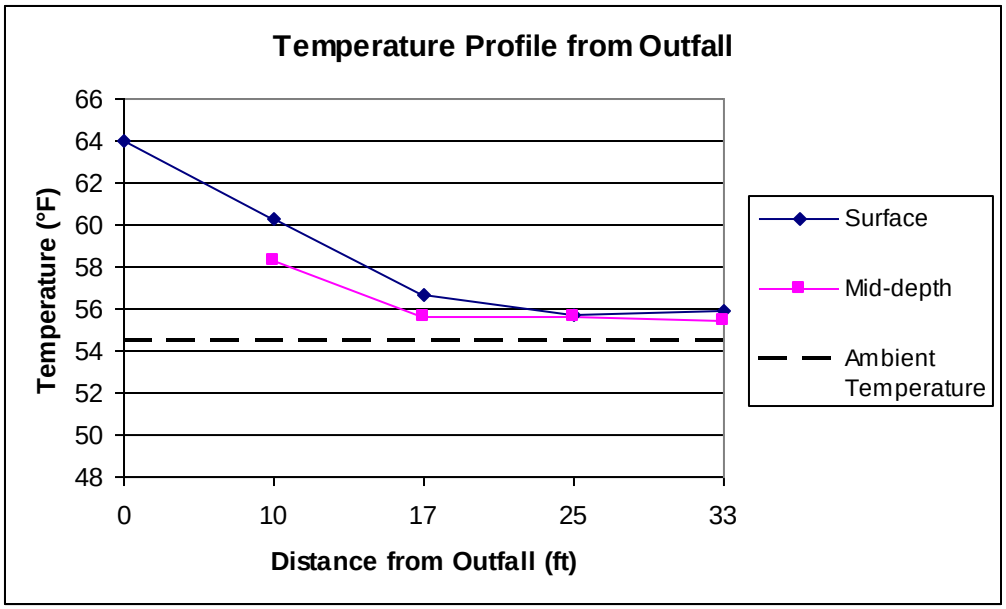


Figure 9. Change is surface and mid-depth temperature with distance from outfall source.

Discussion of Results

The ambient temperature of the stream on October 19, 2010 was 54.5°F. There was no thermal stratification in the stream prior to the discharge. The discharge temperature was approximately 10°F warmer than the ambient stream temperature, at 64°F. These data indicate that the majority of the outfall heat was lost during the rapid mixing and turbulent flow that occurred within 17 feet from the discharge point. Up to this distance, surface water temperature was greater than the water temperature at mid-depth. The greatest stratification was observed closest to the outfall, where at 10 feet the surface water was approximately 3.8°F warmer than the mid-depth temperature. At 33 ft., there was no sizeable difference between the surface and the mid-depth temperatures, indicating that this system diffuses and disperses heat throughout the upper half of the water column or more. Eighty-five percent of the temperature differential was lost from the system in less than 33 ft from the outfall. At this distance the temperature of the mixing zone was only 1.4°F warmer than the ambient stream temperature. Therefore, the temperature of the water within the mixing zone is less than or equal to the ambient water temperature plus 5°F at a point not more than approximately 5 stream widths downstream from the outfall.

Visual Evidence

a.  b. 

Figure 10. Turbulent flow of discharge as it enters Yahara River.

Figure 11. Side-view of outfall and concrete structure supporting high exit velocity.

Figure 12. Mixing Zone and discharge foam associated with mixing zone.

Submittal of the DC Request Form and Use of the Evaluation Checklist

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State of Wisconsin
Department of Natural Resources
PO Box 7921, Madison WI 53707-7921
dnr.wi.gov

Dissipative Cooling Request

Form 3400-198 (R 1/12)

Notice: Pursuant to ss. NR 106.59(4) and (6), Wis. Adm. Code, this application must be completed for dissipative cooling (DC) evaluation of a publicly operated treatment works (POTW) discharge as related to weekly average temperature limits. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

Facility Information

Facility Name	Contact Name
Stoughton Wastewater Treatment Facility	Amanda Minks
Telephone Number	**Email**
(608) 264-9223	amanda.minks@wisconsin.gov
This operation is (check one): ○ New or relocated outfall, or ◉ Existing outfall	WPDES Permit No. WI-000000

Consultant Information (if consultant performed DC analysis)

Company Name	Preparer Name		
Telephone Number	**Email**		
Mailing Address	**City**	**State**	**ZIP Code**

DC Submittal Information

This is a summary. Also see ch. NR 106.59, Wis. Adm. Code, and applicable Thermal Guidance. For each item, check the appropriate box. If information is attached, a column is provided for the applicant to write the page numbers where this information can be found.

Items REQUIRED to Include in the Submittal	Included?	Page Number (if applicable)
1. **Physical Description:** A written description of the physical characteristics of the receiving water or outfall. [s. NR 106.59(4)(a)(1) or 106.59(6)(a)(1), Wis. Adm. Code] *Note: It is recommended that a schematic drawing of location and outfall also be submitted.*	◉ Yes	
2. **Thermal Loading:** A written description of the presence or absence of other thermal loads or discharges of heated water to the receiving water in the vicinity of this outfall (upstream and downstream). [s. NR 106.59(4)(a)(2) or 106.59(6)(a)(2), Wis. Adm. Code]	◉ Yes	
3. **Temperature Data:** The minimum and maximum known effluent temperature for each calendar week for each previously permitted outfall over the past two years. [s. NR 106.59(4)(a)(3) or 106.59(6)(a)(3), Wis. Adm. Code] Must provide if available.	○ Yes ○ Some data available, but not to full extent (explain) ◉ Not available	
4. **Site-Specific Conditions:** For more information on this section see s. NR 106.59(4)(b) or 106.59(6)(b), Wis. Adm. Code. Must provide if available. *Examples:* *Biological quality- Species composition, richness, diversity, density, distribution, age, presence/absence of threatened and endangered species, etc.* *Physical characteristics- Bottom substrate of surface water, physical configuration of outfall, discharge velocity, mixing zone, etc.*	◉ Yes ☐ Biological quality ☒ Physical characteristics ☐ Min and max temperatures of the receiving water upstream of outfalls ○ Not available	
Additional Items that May Be Included in the Submittal	**Included?**	**Page Number (if applicable)**
1. **Data Collection:** If temperature and/or plume data are not available, these data may need to be collected through a dye or temperature profile study. See Thermal Guidance document for additional information.	◉ Yes ☐ Dye study ☒ Temperature profile ☐ Other ○ No	
2. **Visual/photographic information:** It is recommended that photographic or other visual documentation of the outfall and receiving water accompany any DC submittal.	◉ Yes ○ No	
3. **Other supporting information.**	○ Yes ◉ No	

Data Collection (if applicable)
Describe any studies performed to justify dissipative cooling.

Type of study	☐ Dye study ☒ Temperature profile ☐ Other
Time of Year: Month when study was performed	☐ Jan ☐ Apr ☐ Jul ☒ Oct ☐ Feb ☐ May ☐ Aug ☐ Nov ☐ Ma ☐ Jun ☐ Sep ☐ Dec
Outfall flow conditions *at time of study*	☐ High ☒ Average ☐ Low
Waterbody flow conditions *at time of study* Water flow conditions were low at time of study compared to average.	◉ Yes ○ No

Written description of study results. Written description can also be attached.
See Attached.

Justification for DC: Check ALL that apply. Justification and rationale used to reach this justification should be included in the written description (included on next page or attached to this document), as required in ss. NR 106.59(4) or (6), Wis. Adm. Code.

Physical Evidence of DC:

- ☐ Non-unidirectional waters
  - ☐ Exit velocity such that rapid mixing of effluent occurs
  - ☐ Loss of heat to the atmosphere
  - ☐ Heat disperses rapidly and does not persist in water column at significant distances
  - ☐ Ambient temperature of waterbody does not increase greatly (less than or equal to 3°F) at a point more than a few hundred feet from the outfall
- ☒ Unidirectional waters
  - ☒ Exit velocity such that rapid mixing of effluent occurs
  - ☒ Rough bottom substrates present resulting in turbulent flow
  - ☐ Loss of heat to the atmosphere
  - ☒ Thermal mixing zone does not extend more than 25% of the cross-sectional area or more than 50% of the width of the receiving stream
  - ☒ Zone(s) of free passage exist for fish and aquatic life
  - ☒ Ambient temperature of waterbody does not increase greatly (less than or equal to 5°F) at a point more than 5 to 10 stream widths downstream of outfall

Biological Evidence of DC:

- ☐ Discharge does not impede migration of organisms
- ☐ No observed difference between communities in and outside of discharge
- ☐ No presence of threatened or endangered organisms

Other Information:

- ☒ Multiple thermal effluent discharges do not exist
- ☐ Other

Written Description as required in s. NR 106.59(4) or (6), Wis. Adm. Code: All required written descriptions as well as justification for dissipative cooling should be included. See table on page 1, administrative code, and/or applicable Thermal Guidance for more information. Written description and justification may also be attached.

Ambient Stream Characteristics- The outfall from the Stoughton Wastewater Treatment facility flows into the Yahara River (1/4 7Q10=5.25cfs) at a rate of 2.56cfs, resulting in a Qs:Qe ratio of 2.05. At and near the outfall, this stream is unidirectional and has a bottom substrate of gravel and rock. The River at this location is approximately 100 feet wide. During the winter months this area has ice accumulation at the surface of the water column. At this stream segment, the Stoughton Wastewater Treatment discharge is the only thermal discharge in the area. Therefore, additional thermal loadings are not present in this portion of the Yahara River.

Discharge Characteristics- Effluent temperature data have not yet been gathered to meet the specifications of NR 106.59(4)(a)(3) or NR 106.59(6)(a)(3). However, a grab sample was collected on October 19, 2010 and determined that the effluent temperature was 65° F. This temperature is likely to remain fairly consistent, as operations do not change significantly and slight operational variations would likely cause only gradual, seasonal changes in the temperature of the outfall. The effluent flows by gravity into the Yahara River, where it rapidly mixes and disperses into the stream (see Figure 2). A concrete structure is in place to prevent scouring of the bank caused by the discharge (Figure 3). Dilution and dispersion of heat is further promoted by turbulent flow at the mouth of the outfall structure due to the discharge velocity and the gravel and rocky substrate. There are no other emergent features associated with the discharge or mixing zone.

Mixing Zone Characteristics- An in-field evaluation of the mixing zone was performed on October 19, 2010. The mixing zone was visualized by the foam associated with the discharge (Figure 4). The mixing zone was further described during a temperature profile. Based on these data and observations, the mixing zone disperses effluent along the near-shore area, and does therefore not take up the full stream width. Because the mixing zone does not disperse throughout the entire stream width, zones of free passage are extremely likely to exist. Based on this visual analysis, the mixing zone is also not likely to exceed 25% of the cross-sectional area, or 50% of the width of the stream.

As previously mentioned, a temperature profile study was conducted in the mixing zone (see data collection section for details on specific methods and results). This study determined that heat is dissapated rapidly in the mixing zone so that 85% of the heat is lost within 33 feet downstream from the discharge point. At this distance, the temperature of the mixing zone was only 1.4°F warmer than the upstream ambient temperature. There was also no observed difference in the temperature with depth at this distance from the outfall. Therefore, it was concluded that diffusion and dispersion was effectively throughout the water column at this distance.

Additional information can be found in the Rule Order on the Thermal Standards, the Guidance for Implementation of Wisconsin's Thermal Water Quality Standards, and the frequently asked questions page. These resources are available at: http://dnr.wi.gov/org/water/wm/wqs/thermalrulesrevisions.htm.

The Preparer and the Owner Certify the Following:

- I am familiar with the specifications submitted for this application, and I believe all applicable items in this checklist have been addressed.
- I have completed this document to the best of my knowledge and have not excluded pertinent information.
- I certify that the information in this document is true to the best of my knowledge.

Signature of Preparer	Date Signed

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State of Wisconsin
Department of Natural Resources
PO Box 7921, Madison WI 53707-7921
dnr.wi.gov

Dissipative Cooling Evaluation Checklist

Form 3400-199 (R 1/12)

Notice: This checklist is meant to be a tool to help Water Quality-Based Effluent Limitation (WQBEL) calculators analyze dissipative cooling (DC) requests made by publicly operated treatment works (POTWs) under ss. NR 106.59(4) or (6), Wis. Adm. Code. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records Law (ss. 19.31-19.39, Wis. Stats.).

Facility Information

Permittee Name	This DC evaluation is (check one):
Stoughton Wastewater Treatment Facility	(•) Original DC Proposal or ( ) Updated DC Proposal
This operation is (check one):	WPDES Permit No.
( ) New or relocated outfall, or (•) Existing outfall	WI-000000

Submitted Information

Physical Characteristics:

Type of Receiving Water	( ) Non-unidirectional water (•) Unidirectional water	Comments Yahara River
Waterbody Type	( ) Cold water fishery (•) Warm water sport fishery ( ) Warm water forage fishery ( ) Limited aquatic life ( ) Wetland ( ) Other _____	Comments
Substrate	( ) Rocky (•) Gravel ( ) Sand ( ) Silt ( ) Unknown ( ) Other _____	Comments Some rocks present as well
Emergent Features	( ) Rocks ( ) RipRap (•) Structure ( ) None ( ) Other _____	Comments
Ambient Temperature Data	(•) Available ( ) Not available	Comments October 2010 sampling event.

Operation Characteristics:

Multiple Discharges	( ) There are multiple discharges that may contribute thermal loads (•) There are NOT multiple discharges	Comments
Availability of Effluent Temperature Data	( ) Available ( ) Month(s) only (explain) _____ ( ) 12 months of representative data (as defined in NR 106.59(4 or 6) (3) (•) Not Available	Comments
Temperature Profile of Thermal Plume	( ) Data available (•) Zone of free passage identified ( ) Zones of free passage present (•) Zones of free passage absent ( ) No data available	Comments
Mixing Zone Characteristics	(•) Visual/photographic information ( ) Dye study ( ) No data available	Comments

Biological Characteristics:

Discharge Impacts on Migration of Organisms	○ Impeded ○ Not impeded ◉ Unknown	Comments
Difference Between Communities in and Outside of Discharge	○ Observed ○ Not observed ◉ Unknown	Comments
Threatened or Endangered Organisms	○ Present; information source? ○ Not present; information source? ◉ Unknown	Comments

Additional Support:

Does regional staff or basin engineer support physical evidence of DC?	○ Yes ◉ No ○ Not Obtained *If contacted, please attach written response from basin engineer.*	Comments
Does regional fisheries biologist support evidence of DC?	○ Yes ◉ No ○ Not Obtained *If contacted, please attach written response from basin engineer.*	Comments
Did preparer or other DNR staff visit the site or is such person(s) familiar with the site so as to verify and substantiate the information in the submittal?	◉ Yes ○ No	Comments During October sampling event.

Additional Feedback

Given that a zone of free passage is present in this system and the heat rapidly mixes and dissipates, the DC demonstration is sufficient to drop weekly limits from the permit.

Additional written documentation provided? ○ Yes ◉ No (if yes, written document should be attached)

DC Conclusion

Based on the available information, dissipative cooling for this operation is (check one):

- ○ Approved
- ○ Not enough evidence
- ○ Not approved

Additional Justification (if needed)

Signature of Preparer	Date Signed

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Chapter 12 – Alternative Effluent Limitations for Temperature

Applicable Rule Provision(s): s. NR 106 Subchapter VI, Wis. Adm. Code
Author: Steve Jaeger & Amanda Minks
Last Revised: August 15, 2013

Permittees may request an alternative effluent limit for temperature (AEL) under ch. NR 106 Subchapter VI, Wis. Adm. Code, to demonstrate that the default effluent limitations for temperature determined under Subchapter V are more stringent than necessary to protect fish and aquatic life. AELs can only be used to adjust temperature limits based on fish and aquatic life; they cannot be used to adjust the public health temperature limit of 120°F.

AEL requirements under Subchapter VI are essentially the same as federal 316(a) demonstrations under the Clean Water Act which are regulated under 40 CFR 125 H. Much of the wording for NR 106 Subchapter VI, Wis. Adm. Code, is taken from these regulations. The federal regulations have been used nationwide for over 35 years and there is a long history of demonstrations, approvals or denials, and court rulings.

An October 2008 EPA memo from James Hanlon, Director of Wastewater Management at EPA headquarters to their regional water division directors[3] identifies EPA's recent concern about consistency of these demonstrations nationwide and describes the review that EPA will undertake for these demonstrations. To ensure Wisconsin AELs are within the keeping of 316(a) demonstrations and Clean Water Act requirements, WDNR has agreed to work collaboratively with EPA during the review and approval process.

Wisconsin has only recently begun making final decisions of AEL demonstrations, and relies heavily on federal guidance and previous 316(a) decisions to assist Department staff in the decision-making process. Unfortunately, federal guidance on these demonstrations is outdated, last modified in 1977. This guidance synthesizes the Department's understanding of federal requirements and EPA's guidance at this time. This guidance will be updated as more information is gathered from putting limits based on Subchapter VI and some Subchapter V options into permits, comments from permittees, EPA, the public and possible legal actions. Changes will be made to this guidance as needed, most likely as revisions to this Chapter.

[3] "Implementation of Clean Water Act Section 316(a) Thermal Variances in NPDES Permits (Review of Existing Requirements)"; EPA memo from James A Hanlon; Director Office of Wastewater Management to Water Division Directors, Regions 1 – 10; October, 28, 2008

When can AELs be useful? An AEL can be useful for two general cases:

- When the permittee for either an existing or new discharge can demonstrate that the calculations in Subchapter V are overly conservative when applied to their discharge and that alternative limits will not cause injury to the balanced indigenous fish and aquatic life population.

- For existing dischargers only, an AEL can be used to show that even if there is previous appreciable harm, the overall fish and aquatic life community will be protected despite the discharge.

> "That despite the occurrence of previous appreciable harm, alternative effluent limitations for temperature will ensure the protection and propagation of the representative, important species and a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into receiving the discharge, taking into account of the interaction of the thermal component with other pollutants and the additive effect of other thermal discharges."

It should be noted that the default equations for calculating temperature limits for discharges to inland lakes, Great Lakes and, to a somewhat lesser extent, Great Lakes Harbors contain fairly conservative assumptions. It is likely that, in many cases, dischargers will be able to show that larger mixing zones can be used without affecting sensitive areas or that consideration of mixing of the discharge with the receiving water will result is faster temperature drops in the receiving water than predicted by the equation.

Comparison of AELs in ch. NR 106 Subchapter VI, Wis. Adm. Code, to options under Subchapter V, Wis. Adm. Code

In many cases, there are other options under Subchapter V of NR 106, Wis. Adm. Code, which a permittee should examine first before pursuing a more complicated AEL demonstration under Subchapter VI. These include the use of monthly 7Q10s (Chapter 9, pg. 53 of this Guidance) and a request for an increased Qs due to rapid mixing (Chapter 10, pg. 55).

Additional options within NR 106 Subchapter 5, Wis. Adm. Code, for relief from the default calculations include:

- Limitations based on site-specific mixing zone analysis (Chapter 10 pg. 55 of Guidance, s. NR 106.55(10), Wis. Adm. Code)
- Limitations based on installations of diffusers and other mechanical devices (s. NR 106.55(11), Wis. Adm. Code)
- Limitations based on water quality models (Chapter 15 pg. 109 of Guidance, ss. NR 106.55(13) and NR 106.58, Wis. Adm. Codes)

The last three Subchapter V options refer directly or indirectly to the mixing zone considerations in s. NR 102.05((3), Wis. Adm. Code. It is suggested that these Subchapter V options be used for more obvious cases, when possible. Typically, these options do not require significant biological considerations, making them easier and more readily discernible in many cases. However, it is not clear how EPA, other interested parties or even the courts will react to these demonstrations and in potentially controversial cases it may be preferable to utilize the AEL option under Subchapter VI as this will likely be more scientifically defensible.

Process

Details of how to conduct AELs can be found in EPA's 1977 Guidance[4]. In spite of its age, it is still referenced by EPA in the previously referenced memo from EPA Headquarters to the Regions. In addition, consultants for large industries should be familiar with the process and requirements because the long history of 316(a) demonstrations nationwide.

The Department strongly encourages that point sources submit a study plan along with a Notice of Application for an AEL (See Appendix C, pg. 186) to the Department prior to data collection. This study plan should identify the type of AEL demonstration being developed, the data parameters and collection methods being used, data analysis protocols, and other relevant information about the study. Review and discussion of the study plan will help to verify that data collection efforts are being conducted in a scientifically-defensible manner, and that sufficient data are being collected to meet the needs of the project. Permittees may use historical data to help support an AEL demonstration. This data should be reviewed for accuracy and relevancy.

Final AEL studies should be submitted to the Department with the permit application. Therefore, permittees should engage the Department well in advance of permit reissuance. See page 88 for additional details about the permitting process.

Communication

AELs can involve a considerable amount field work, biological investigations and computer modeling. It is important to have good communication within the Department as well as with the permittee and EPA. AELs involve a combination of engineering and biological evaluations. It is important that these two aspects be addressed together from the beginning of the process. For example, the identification of biologically sensitive locations and times is needed to determine the degree of sophistication, worst case modeling scenarios and other details of the data gathering and modeling effort.

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[4] "Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements", US EPA Office of Water Enforcement Permits Division, May 1, 1977.

The permit drafter is responsible to coordinate communication within the Department to ensure that the correct decisions are being made, and decisions can be made as expeditiously as possible. The following guidance provides a suggested communication strategy that permit drafters should engage in:

1. Within the Department:
    - Communication is necessary between the permit drafter, water quality biologist, fisheries staff, water quality standards specialist, and the person reviewing the thermal analysis and modeling, if different from the permit drafter. Communication between these staff should occur as soon as possible, preferably prior to a study plan submittal.
        - Fish Management has requested that all correspondence be directly with the local fish manager and include their immediate supervisor in these discussions. See the attached issue brief (pg. 90) for roles of fisheries staff in AEL demonstrations and how to best reach out to these staff.
        - A water quality standards specialist will have knowledge of the temperature water quality standards, and the level of protection afforded to the fish and aquatic life community through these standards. Contact the Water Evaluation Section Chief to determine which water quality standards specialist will be assigned to the AEL project in question.
2. With EPA:
    - All significant communication regarding AEL demonstration should be sent or cc'd to the EPA Region 5 Branch Specialist for section 316(a). EPA staff should also be invited to pertinent meetings with AEL requestors. Completed AEL decisions must be sent to EPA for review. At the time of publication, the EPA contact was:

      Mark Ackerman
      Thermal Standards Expert
      ackerman.mark@epa.gov
      US EPA, Region 05
      77 W. Jackson Blvd.
      Mail Code: WN16J
      Chicago, IL 60604-3507
      Phone: (312) 353-4145

3. With Permittees:
    - The permit drafter is responsible for being the primary point of contact for the permittee. If meeting need to be set up between the permittee, their consultant, or EPA and the Department, the permit drafter should work to set this meeting up.

Permittee Communication:

- As previously stated, it is strongly suggested that the permittee submit a study plan for Department comments and approval before any field work, modeling or other studies have begun. Chapter NR 106 Subchapter VI, Wis. Adm. Code, specifies that identification of RIS

needs to be approved by the Department. EPA's federal regulations go farther and require strict approval for the RIS and the study plan.

Unique issues related to dischargers to small streams:

Historically, AEL/316(a) demonstrations have been performed on large waterbodies, such as the Mississippi River, not small waterbodies like streams. The use of AELs for discharges to small streams will likely have a unique set of challenges, and it is strongly encouraged to engage the Department and EPA early in the process, as these issues will take time and effort to address. To gain AEL approval in these systems, the permittee will likely need to demonstration that although some amount of appreciable local harm may occur from the heated effluent, a balanced indigenous population is maintained in the direct receiving water, and the Subchapter V temperature limits are more stringent than necessary to protect and maintain this balanced indigenous community.

In the past, dischargers to the Great Lakes and large rivers have been able to show that even though there are areas near their discharge that exceed criteria, there are many miles of similar near shore habitat nearby that serve the same biological need that are not affected by the discharge and therefore a balanced indigenous population is still maintained.

Although the Department feels this approach is consistent with past precedent, AEL studies on small receiving waters have yet to be submitted to the Department for review and approval. Additional guidance will be developed as more experience is gained with these types of demonstrations.

Permit requirements

Final AEL requests should be submitted as part of the permit application. If not, or if the request was not approved, the limits from ch. NR 106 Subchapter V, Wis. Adm. Code, should be included in the permit along with a compliance schedule if necessary and appropriate. Although the compliance schedule will solely be based on the time needed to comply with the Subchapter V, Wis. Adm. Code, limit, permittees may use this time to complete an AEL demonstration in addition to meeting the requirements of the compliance schedule. If an AEL demonstration is submitted to the Department prior to the final temperature limit taking effect, the Department may modify the permit to reflect the AEL, if appropriate.

AEL approval:

As identified in the communication section of this guidance, there is several staff that needs to be involved in AEL demonstrations. Once a final decision has been agreed upon, a letter should be drafted by the water quality standards specialist to the permit drafter. The content of this letter will vary depending on the scope of the demonstration, and the evidence used in the decision making process. An example letter is enclosed on page 94 for reference.

Compliance Schedule:

Section NR 106.75, Wis. Adm. Code, states that a permittee can receive a compliance schedule to meet the limits determined through an accepted AEL. No compliance schedule for temperature can exceed the permit term, however. The Department does not anticipate that compliance schedules will usually be needed to comply with an AEL. In many cases a successful AEL demonstrations will result in showing the existing discharge will not have an adverse environmental effect and a compliance schedule would not be needed.

Limits expressed as BTUs or BTU/hr:

Limits based on total heat added in terms of total BTUs for each day or peak rate of heat rejection in BTU/hr have been allowed in place of temperature limits for dischargers in other states, and in Wisconsin. Only alternative effluent limits for temperature may be expressed as BTUs. Alternative effluent limits may be expressed as BTU limits if these limits are sufficiently protective of the balanced indigenous community of the receiving water. It is up to the discharger to make the demonstration fit the type of effluent limits they are requesting.

Permit Reissuance:

Because of the dynamic nature of ecosystems, and as required by federal regulations, AEL demonstrations must be re-evaluated upon permit reissuance. Although previously collected data can be used to make a demonstration, data collection throughout the permit term will likely be necessary to sufficiently demonstration the continuation of an AEL.

ISSUE BRIEF- Fisheries Staff Role in Implementing Thermal Standards in WPDES Permits

DATE: 10/30/2012

PREPARED BY: Amanda Minks and Steve Jaeger

ISSUE STATEMENT: Wisconsin's thermal water quality standards were promulgated in October 2010 to protect fish and aquatic life as well as human health from heated effluent. Heat is a unique pollutant in that thermal sensitivity and distribution can vary significantly from site to site. When implementing these standards in WPDES permits, WDNR can account for thermal site-specific conditions to ensure that WPDES permit requirements are sufficiently protective of our waters, without being overly restrictive on our WPDES permit holders. Two flexibility options, specifically, are alternative mixing zones and alternative effluent temperature limits. Both of these options must be demonstrated and requested by the WPDES permit holder, and require biological considerations as part of the demonstration. To ensure the validity of biological assertions made during these demonstrations, fisheries staff should, at minimum, provide expertise on the receiving water and study. The purpose of this issue brief is to clearly define the role of fisheries staff for these requests, and identify a process to manage expectations between the wastewater and fisheries staff.

RECOMMENDATION: It is recommended that the regional fishery expert and direct supervisor be contacted by the permit drafter or other applicable wastewater staff when an alternative mixing zone or alternative effluent temperature limit project is conducted. This contact should identify the type of demonstration being made, and what the role of the fisheries biologist will be (as outlined below). Additionally, a timeframe should be established between the fisheries and wastewater staff.

BACKGROUND:

<u>General Implementation Procedures:</u>

Wastewater staff will be the primary contact for alternative mixing zone and alternative effluent temperature limit studies. Wastewater staff will be responsible for:

1. Engaging fisheries staff in these projects,
2. Informing fisheries staff on the type of demonstration being made and fisheries role in the project,
3. Facilitating the dialogue between fisheries and WPDES permit holders, as needed, and
4. Ensuring that all necessary steps in the decision process are completed prior to public notice of the permit.

Fisheries Role:

1. Identify the primary FM contact information for the project: name, address, phone and e-mail address.

2. Identify other FM staff that may participate in the project or review of the submitted information.
3. FM becomes generally familiar with the type and scope of project, the project location, and the legal requirements for the demonstration.
4. FM provides any available fisheries data collected in the study area.
5. FM reviews and provides feedback on the demonstration, expressing agreement or disagreement with the study's conclusions.

Although estimating workloads for these demonstrations is difficult, we approximate that 80-120 hours of fisheries staff time will be spent per AEL demonstration, and 40 hours will be spent per alternative mixing zone study. We anticipate that 1-2 alternative effluent temperature limit studies and 5-7 alternative mixing zone demonstrations will be conducted per year from 2012-2017, primarily focusing in the Great Lakes Basin.

Alternative Mixing Zones

Chapter NR 106.53, Wis. Adm. Code, defines a default mixing zone for calculating, and determining the need for, thermal limits in permits. A WPDES permit holder can also request an alternative mixing zone size to make these permitting decisions. To successfully demonstrate that an alternative mixing zone is appropriate, applicants must demonstrate to the Department that all of the provisions in s. NR 102.05(3), Wis. Adm. Code, are upheld. This would include general information about the mixing zone including its physical size, shape, and positioning, taking into account seasonal/temporal variability that may exist. This request may also include biological considerations such as:

- Biological community information from the mixing zone area (i.e., species diversity, richness, presence of threatened & endangered species), and
- Critical habitat areas, including those important for reproduction for fish and aquatic life including spawning and nursery areas.

If biological justification is submitted to the Department, the applicable wastewater staff (permit drafter and/or basin engineer) should contact the regional fisheries biologist. The regional fisheries biologist would be responsible for answering the following questions in a reasonable timeframe, given their background knowledge and the information submitted in the request:

1. Has the receiving water in question previously had adverse biological effects due to heat?
2. Are there critical habitat areas of concern within the alternative mixing zone?
3. Based on your experience, do you feel that an alternative mixing zone for temperature would adversely impact spawning or nursery areas, migratory routes, or mouths of tributary streams?
4. Do you support the conclusions of the alternative mixing zone request?
5. Other comments.

We estimate that these questions can reasonably be answered within 2 weeks of receiving the alternative mixing zone demonstration. These answers should be provided, in writing, to the permit

drafter and/or basin engineer. If challenged, the biologist may be called to provide testimony on their evaluation.

Alternative Effluent Limits for Temperature

In accordance with ch. NR 106 - Subchapter VI, 40 CFR Part 125, and Section 316(a) of the federal Clean Water Act, thermal dischargers may apply for alternative effluent limitations (AEL) for temperature based on the demonstration that a proposed effluent limitation is more stringent than necessary to protect aquatic life. In accordance with federal regulations, there are two demonstrations that can be used to support an AEL. First, the applicant could show a ***lack of prior appreciable harm***. In this evaluation type, the applicant uses current and historical field studies to show that the existing thermal discharge has not had a historical impact to the biological community, and will ensure the protection and propagation of the balanced, indigenous community in the receiving water. The second AEL demonstration type is call the ***protection of representative important species***. In this demonstration the applicant must show that the thermal discharge will ensure the protection and propagation of representative important species using predictive studies based on modeling, literature review, and field and laboratory bioassay data.

AEL studies are complex and can be costly and time-consuming for facilities. Therefore, fisheries staff time will be required at multiple points in this process. Compared to an alternative mixing zone demonstration, significantly more staff time will be required for AEL studies.

1. AEL plan approval- In order to avoid wasting resources, the Department works with an AEL applicant to approve the AEL plan prior to data collection. This ensures that all necessary data will be collected by the applicant and submitted to the Department.

   Fisheries Role: Review the AEL plan and provide comments and/or to the applicable permit drafter. If a balanced, indigenous community or representative important species list is submitted to the Department, this list must be approved by the regional fisheries biologist. Additionally, the fisheries biologist should inform the permit drafter and/or basin engineer of any biological and/or thermal data available in the study area, and identify if the receiving water in question has previously had adverse biological effects due to heat. The regional fisheries biologist may be called upon to answer specific fisheries-related questions from either Department staff or the AEL applicant.

2. AEL report review- Once the approved AEL plan has been completed, a final report will be submitted to the Department for review and approval.

   Fisheries Role: Review the AEL report and provide comments and/or concerns to the applicable permit drafter. Participate in the overall decision process to determine if the proposed AEL is biologically protective of the balanced, indigenous community and/or representative important species within the receiving water.

3. If a Department AEL decision challenged, the biologist may be called to provide testimony on their evaluation and experience with this project.

We estimate that this review will take 2-4 weeks for the fisheries biologist to complete and will likely require 80-120 staff hours.

Example AEL Approval Letter:

CORRESPONDENCE / MEMORANDUM **State of Wisconsin**

DATE: August 29, 2012
TO: Steve Jaeger - CO
FROM: Amanda Minks - CO

SUBJECT: Approval of the alternative effluent temperature limit for the Point Beach Nuclear Plant (WI-0000957)

The Point Beach Nuclear Plant (PBNP) is an existing facility pursuant to s. NR 106.71(3), Wis. Adm. Code, and discharges heat and other pollutants to Lake Michigan north of Two Rivers, Wisconsin. In order to protect fish and aquatic life in Lake Michigan, temperature limits were calculated for PBNP pursuant to ch. NR 106- Subchapter V, Wis. Adm. Code (see 8/22/2012 Addendum to the Temperature and Arsenic Water Quality-Based Effluent Limitations for NextEra Energy Point Beach, LLC). This evaluation determined that temperature limits are triggered by PBNP for all months given the protocols specified in Subchapter V. In accordance with Ch. NR 106 - Subchapter VI, 40 CFR Part 125, and Section 316(a) of the federal Clean Water Act, PBNP requested alternative effluent limitations (AEL) for temperature based on a demonstration that the calculated effluent temperature limits are more stringent than necessary to protect fish and aquatic life.

This demonstration entitled *"Point Beach Nuclear Plant Evaluation of the Thermal Effects Due to a Planned Extended Power Uprate"* was prepared by EA Engineering, Science, and Technology and submitted to the Department May 11, 2009. There were three main conclusions made in this report:

1. The historic heat load of 7,094 MBTU/hr discharged from PBNP did not cause appreciable harm to the balanced, indigenous community of shellfish, fish, and wildlife in and on Lake Michigan.
2. The thermal plume resulting from the current heat load of 8,273 MBTU/hr increased the areal extent of the thermal plume but the elevated temperatures are still confined to the upper 6 feet of the water column except in the immediate vicinity of the discharge.
3. The current heat load will assure the protection and propagation of the representative, important species.

In order to demonstrate a lack of appreciable harm, this study:

1. Referenced a previous 316(a) demonstration submitted by PBNP in October, 1975 (Point Beach Nuclear Plant – Demonstration for a thermal standard variance, WEPCO, 1975), which was approved by the Department June 30, 1976.
2. Presented summaries of other 316(a) demonstrations from other power plants discharging to Lake Michigan
3. Presented new modeling analysis to show the extent of the thermal plume
4. Updated their biological analysis to account for changes in Lake Michigan biota.

No further action was taken by the Department to validate the 1975 316(a) demonstration in this decision-making process.

Additional biological data was submitted in the 2009 alternative effluent limit report to compare the current biological condition of the receiving water to the biological monitoring results submitted from the previously approved study. After review, the Department has concluded that the 2009 biological monitoring data was collected using protocols consistent with 316(b) guidance, and agrees that the main discrepancies in the 1978 and 2009 reports are more likely the result of lake-wide fish population trends, and are less likely to be the result of the thermal plume.

The 2009 alternative effluent limit demonstration presented results from hydrodynamic modeling to predict the extent of the thermal plume resulting from the increased thermal discharge. A three-dimensional thermal model of the PBNP discharge was developed using the Environmental Fluid Dynamic Computer Code developed at the Virginia Institute of Marine Science and revised by EPA and Tetra Tech. The model was validated with measured plumes from 1973.

Size and direction of the PBNP plume is affected by the magnitude and direction of the Lake Michigan along-shore current. Model predictions were run with currents of 0.1 ft/sec, 0.2 ft/sec and 0.3 ft/sec. Water temperatures along the shore of Lake Michigan vary naturally due to wind and upwelling events. The modeling performed shows the increase due to the heated discharge from the PBNP.

For the summer model predictions with along-shore currents of 0.2 ft/sec, the area of water elevated more than 1°C increased by 28% to 1170 acres, extending approximately 1.8 miles down shore and a maximum of 1.5 miles offshore. The area of the 2°C contour increased 24% to 390 acres and the area of the 5°C contour increased 41% to 44 acres or roughly a circle with a diameter of 1900 feet.

The plume for the faster 0.3 ft/sec along-shore currents affected smaller areas but extended further down shore. The model predictions with along-shore currents of 0.1 ft/sec produced larger areas but were directed more offshore. Differences in along-shore current velocity have a greater effect on the areas of the 1°C and 2°C temperature increases than the areas of larger temperature increases.

The representative important species list used in this report included gizzard shad, channel catfish, common carp, spottail shiner, yellow perch, burbot, alewife, mottled sculpin, lake trout, lake whitefish, bloater, and rainbow smelt. This report also discussed several invertebrates including *Diporeia*, *Mysis*, and *Gammarus* in addition to these fish species. This list of representative important species was approved by Steve Hogler, WDNR fisheries biologist, on August 14, 2012. The Department also confirms the upper lethal and avoidance temperature ranges are reasonable compared to peer-reviewed studies used by the Department when deriving the thermal water quality standards for surface waters. After reviewing the available temperature data and the temperature preferences of the representative important species, there appears to be portions of the mixing zone that will not be suitable for all life stages of these species. Although the discharge plume may cause some negative impacts to the fish

community of the immediate area or to the localized ecology of the area, the Department has concluded that the thermal plume created at 8,273 MBTU/hr will cause minimal impacts to the fish and invertebrate communities on the representative important species list.

In conclusion, the Department agrees that the discharge at the maximum heat load of 8,273 MBTU/hr is protective of the balanced, indigenous community of shellfish, fish, and wildlife in and on Lake Michigan and that no temperature limit is needed. Other factors such as threatened and endangered species and cumulative impacts from other thermal and pollutant mixing zones, were considered as part of this decision, but determined to not be applicable to this demonstration. This decision will be re-evaluated by the Department upon permit reissuance. Additional data should be submitted with the next permit application to continue to justify an alternative effluent limit to the Department.

If there are any questions or comments, please contact Amanda Minks at (608) 264-9223.

Sincerely,

Amanda Minks
Water Quality Standards Specialist
CC: Kelley O'Connor- NER
Tom Mugan- WT/3
Mike Lemcke- WT/3
Bob Masnado- WT/3

Chapter 13 – Site-specific Ambient Temperatures

Applicable Rule Provision(s): s. NR 102.26, Wis. Adm. Code
Author: Jim Schmidt
Last Revised: December 21, 2010

Note: Modification of water quality criteria to reflect site-specific ambient temperature values is not the same as developing "site-specific water quality criteria." Development of site-specific water quality criteria is controlled by the provisions of s. NR 102.27, Wis. Adm. Code, and the resultant values require formal promulgation by the Natural Resources Board, Wisconsin Legislature, and U.S. Environmental Protection before they can be used to develop water quality-based effluent limitations.

Acute and sub-lethal thermal water quality criteria in Tables 2 through 5 of s. NR 102.25, Wis. Adm. Code, are associated with "default" monthly ambient temperatures. As part of the thermal standards rule development, these ambient temperature values were derived from reviewing available data at historical continuous monitoring stations distributed throughout the state. In lieu of these "default" values, the Department may authorize the use of alternative site-specific ambient temperature data to establish the applicable criteria for a particular water body segment. Requests for using values other than the "default" values must be consistent with the requirements of s. NR 102.26(1), Wis. Adm. Code.

> *Note: The rule refers to the owner or operator of a facility subject to regulations under ch. NR 102, Wis. Adm. Code, but it may also be possible for an external party to request a recalculation if appropriate data are available.*

Development of Site-Specific Ambient Temperatures – Section NR 102.26(1), Wis. Adm. Code

Par. (a) The request must include a demonstration to show that the ambient temperatures in s. NR 102.25, Wis. Adm. Code, do not apply to the water body in question.

Par. (b) This paragraph discusses what must be contained in this demonstration:

Subd.1 Data must be collected using a continuous recorder or a similar device that takes readings at least once an hour. Monthly data sets may be missing no more than 10 days of data between the months of December through February (subd. 1.i.) and may be missing no more than 5 days of data between the months of March through November (subd. 1.ii.)

Subd. 2 Data must be collected for each month in which site-specific ambient temperatures are requested.

Subd. 3 Data must be collected at any time more recent than October 1987 in order to represent current data.

Subd. 4 Data must be collected for at least 2 consecutive years, in order to provide a better representation of seasonal variability across years.

Par. (c) Daily average temperatures must be calculated from the data in par. (b).

Par. (d) Monthly averages (calendar months) must be calculated as a geometric mean from the daily averages in par. (c).

Par. (e) The geometric mean monthly averages must be organized and reported by month, meaning separate values for each month of each of the 2+ years required under par. (b)(4).

Par. (f) Geometric means of all the monthly averages for each month must be calculated and provided.

EXAMPLE: At a hypothetical site, calculated monthly averages for the month of July are:

2008 74.7°F
2009 77.0°F
2010 72.2°F

Those results should be reported as well as the calculated geometric mean of those three values, which would be 74.6°F. Since the criteria are expressed in the rule to the nearest whole number, **75** would be used as the geometric mean for July in this example.

Par. (g) Alternative methods of developing and calculating site-specific ambient temperatures may be used if they are representative of the above procedure. Any alternative suggestions must be approved by the Department.

Approval of Site-Specific Ambient Temperature Values:

All data submitted in support of an alternative ambient value request should be provided to the *Water Evaluation Section* for review and approval. An approval memo will be prepared that summarizes the final analysis and documents the applicable water quality criteria to be used in consideration of water quality-based effluent limitations. In determining the applicable criteria, Department staff will use the following guidance associated with ss. NR 102.26(2) and (3), Wis. Adm. Codes. NOTE: If data are already available from previous years for the site or basin in question, the results of any new data may be added to the already-existing database in order to update a site-specific ambient temperature value. In these

situations, decisions made by the Department whether to add or replace data shall be made in consideration of the language in par. (b) above.

Use of Site-Specific Ambient Values to Establish Acute Criteria – Section NR 102.26(2), Wis. Adm. Code

The applicable acute criteria will be consistent with the values found in Table 6 of Subchapter II of Chapter NR 102, Wis. Adm. Code. Using the approved monthly average site-specific ambient temperatures, staff will identify the appropriate inland water body designation/type or Great Lakes location and use the corresponding value found in Table 6. That table contains criteria for the following water body designations/types:

Inland Waters

1. **Cold** - this applies inland rivers and streams formally designated as *cold water communities* of managed as Class I and Class II Trout Waters.
2. **Warm** – this applies to all inland rivers and streams not designated as either *cold water communities* or *limited forage fish communities*. (Note: Criteria are the same for waters designated as *warm water sport fish* and *warm water forage fish communities*)
3. **LFF** – this applies to all inland waters formally identified as *limited forage fish communities* in Chapter NR 104, Wis. Adm. Code.
4. **N Lake & S Lake** – this applies to all inland lakes that are north or south of US Highway 10 which runs from Prescott to Manitowoc, respectively. (Note: Criteria are different for N Lake vs. S Lake)

Great Lakes Waters

1. **SGB & NGB** – this applies to southern or northern Green Bay with the Brown County line serving as the demarcation point. (Note: Criteria for northern and southern Green Bay are different)
2. **NLKMI & SLKMI** – this applies to northern or southern Lake Michigan with the mouth of the Milwaukee River serving as the demarcation point.
3. **LKSUP** – this applies to all waters of Lake Superior except Chequamegon Bay.
4. **CB** – this applies to all waters of Chequamegon Bay which is differentiated from Lake Superior by a line straight west of Chequamegon Point.

In all of these waters, criteria increase as ambient temperatures increase. For example, if the site-specific ambient temperature for the month of May was 60^{o}F, the modified acute criteria using Table 6 in s. NR 102.26, Wis. Adm. Code, would be as follows:

- Cold = 72^{o}F
- Warm = 82^{o}F
- LFF = 84^{o}F
- N Lake & S Lake = 83^{o}F (criteria happen to be the same whether north or south of Highway 10 at an ambient temperature of 60^{o}F, this isn't the case for all ambient conditions)

- SGB (south of the Brown County line) = 82°F
- NGB (north of the Brown County line) = 76°F
- NLKMI & SLKMI = 74°F
- LKSUP = 74°F
- CB = 74°F

Use of Site-Specific Ambient Values to Establish Sub-Lethal Criteria – Section NR 102.26(3), Wis. Adm. Code

The applicable sub-lethal criteria will be consistent with the provisions of sub. 3 as follows:

Par. (3)(a) Staff will use Table 7 in Subchapter II of Chapter NR 102, Wis. Adm. Code, to determine the appropriate **raw** sub-lethal criteria depending on the location and/or classification of the water body in question. Monthly raw criteria in Table 7 are based upon default ambient conditions for each month of the year.

Note: The values in Table 7 are NOT final criteria to be used to derive sub-lethal water quality based effluent limitations.

The designated use/water types in Table 7 are not necessarily the same as those listed in Table 6 representing the acute criteria. Instead, the following designations/water types are used:

i. **C** - this applies inland rivers and streams formally designated as *cold water communities* of managed as Class I and Class II Trout Waters.
ii. **W-L** – "Large" *warmwater sport fish* or *warmwater forage fish communities* with unidirectional flow and a 7-Q_{10} $\geq$200 cfs. . (Note: Criteria are identical for both)
iii. **W-S** – "Small" *warmwater sport fish* or *warmwater forage fish communities* with unidirectional flow and a 7-Q_{10} <200 cfs. . (Note: Criteria are identical for both)
iv. **LFF** – this applies to all inland waters formally identified as *limited forage fish communities* in Chapter NR 104, Wis. Adm. Code.
v. **NIL & SIL –** this applies to all inland lakes that are north or south of US Highway 10 which runs from Prescott to Manitowoc, respectively. (Note: Criteria are different for NIL vs. SIL)
vi. **MR** – this applies to the waters of the Mississippi River*
vii. **RR** – this applies to the waters of the Rock River*
viii. **UWR** – this applies to waters of the Upper Wisconsin River above the Petenwell Dam near State Highway 21.*
ix. **LWR** – this applies to waters of the Lower Wisconsin River below the Petenwell Dam near State Highway 21.*

x. **LFR** – this applies to waters of the Lower Fox River below the Lake Winnebago outlet.*

xi. **SGB & NGB** – this applies to southern or northern Green Bay with the Brown County line serving as the demarcation point. (Note: Criteria for northern and southern Green Bay are different)

xii. **SLM & NLM** – this applies to northern or southern Lake Michigan with the mouth of the Milwaukee River serving as the demarcation point.

xiii. **LS** – this applies to all waters of Lake Superior except Chequamegon Bay.

xiv. **CB** – this applies to all waters of Chequamegon Bay which is differentiated from Lake Superior by a line straight west of Chequamegon Point.

* The sub-lethal values identified for the Mississippi, Rock, Wisconsin and Fox Rivers are for the mainstem and backwaters areas of the rivers. They do not apply to tributaries to these rivers.

Par. (3)(b)1 If the raw sub-lethal criterion from Table 7 is less than the site-specific ambient temperature for any given month, the sub-lethal criterion shall be increased to be equal to the site-specific ambient temperature.

Par. (3)(b)2 If the raw sub-lethal criterion from Table 7 is greater than the acute criterion for any given month as determined in s. NR 106.26(2), Wis. Adm. Code, the sub-lethal criterion shall be decreased to be equal to the acute criterion.

Par. (3)(b)3 Using either the raw sub-lethal criteria or the modified sub-lethal criteria from subds. 1. and/or 2., final sub-lethal criteria shall be calculated by performing a fifth-order polynomial regression of the twelve monthly criteria using the procedure described in sub. (2)(c).

The various modifications available as well as the polynomial regression are illustrated using the following example:

Example: Modified sub-lethal criteria evaluation for a small warm water stream (7-Q_{10} < 200 cfs)

Month	DNR-Approved Site-Specific Ambient Temp. (example)	Acute Criterion from NR 102 Table 6, Column 3	Raw Sub-Lethal Criterion from NR 102 Table 7 (Column W-S)	Modified Sub-Lethal Criterion from s. NR 102.26(3)(b)	Reason for Modification (see footnotes below)
Jan	38	77	50	50	No change
Feb	44	78	50	50	No change
March	48	79	54	54	No change
April	51	80	65	65	No change
May	59	82	70	70	No change
June	66	84	72	72	No change

July	76	86	74	76	(1)
Aug	76	86	78	78	No change
Sept	70	85	87	85	(2)
Oct	64	84	54	64	(1)
Nov	52	80	50	52	(1)
Dec	43	78	50	50	No change

Footnote Key:

i. Raw sub-lethal criterion is less than the site-specific ambient temperature for the indicated month(s), the modified sub-lethal criterion is increased to be set equal to the site-specific ambient temperature, from s. NR 102.26(3)(b)1, Wis. Adm. Code.

ii. Raw sub-lethal criterion is greater than the acute criterion for the indicated month(s), the modified sub-lethal criterion is decreased to be set equal to the acute criterion, from s. NR 102.26(3)(b)2, Wis. Adm. Code.

No change – No reason to modify the raw sub-lethal criteria based on the comparisons in ss. NR 102.26(3)(b)1 or 2, Wis. Adm. Code.

The modified sub-lethal criteria from s. NR 102.26(3)(b), Wis. Adm. Code, in the example table above is used with the fifth-order polynomial regression mentioned above to determine the final sub-lethal criteria. To generate a trendline in Excel, use the following steps:

1. Create a spreadsheet with two columns of data. The first column represents the months of the year numbered from 1 through 12. The second column contains the modified sub-lethal criteria generated using the example above.

2. From the Excel Menu Bar at the top of the page, **Select** *Insert.*
   Select *Chart* from the menu drop-down box.
   Select *Line* from the Chart Type menu and choose one of the charts with lines and points.)
   Click Next

3. *Data range* = Select the data range by holding down the left mouse button and dragging the mouse over the array of cells containing the Modified Sub-Lethal Water Quality Criteria. You will select all 12 data points in the column.
   Click Next

4. A *Chart Options* screen will appear and you can add titles, labels and other information if desired.
   Click Finish

5. The chart will then be displayed on the spreadsheet.
   Right-click anywhere on the line itself in the chart.

6. A small menu should pop up.
   Select *Add Trendline.*

7. Select the *Type* tab at the top of the page.
   Click on *Polynomial*.
   Enter "5" for the *Order.*
   Click *OK*

8. A curve will now be super-imposed over the columns in your chart that contained the points corresponding to the modified criteria. This curve represents the final sub-lethal criteria resulting from the fifth-order polynomial regression.
   Right-click anywhere on the new curve (Do not select the original line, the discrete points or any part of the gridlines).
   Left-click on *Format Trendline*
   Select the *Options* tab at the top of the page.
   Select *Display Equation on Chart* near the bottom of the pop-up box.
   Click *OK* This will display the polynomial regression curve directly on the chart.

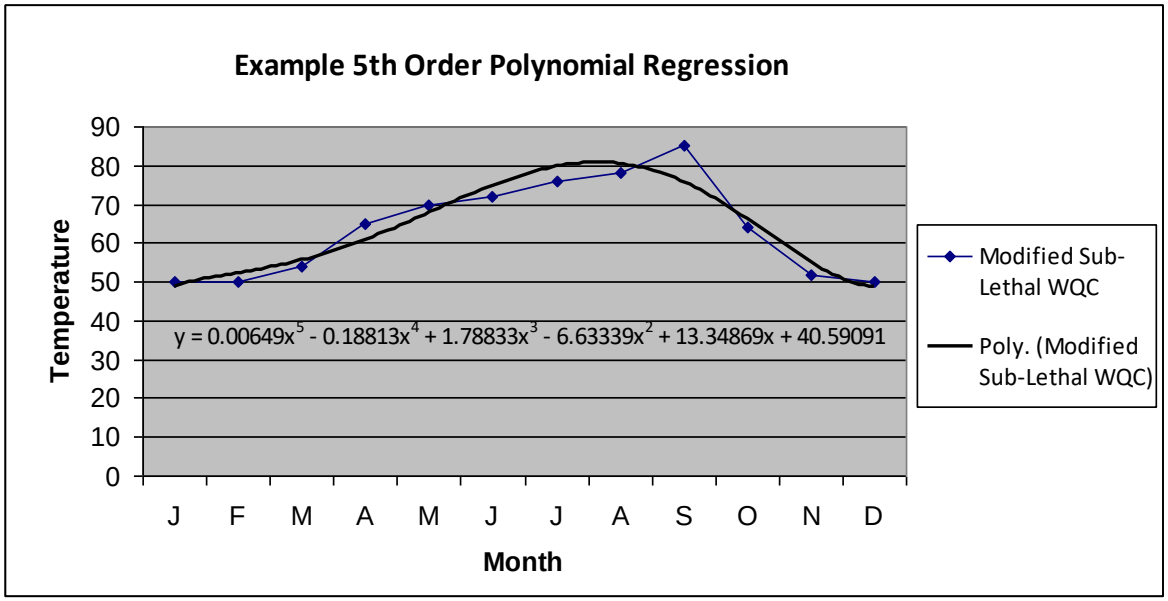
Determination of the final sub-lethal criteria for each month can be done roughly "by eye" by selecting the approximate value on the trendline that intersects with each of the monthly points. For a more accurate value, the "y" value for each month can be calculated using the regression equation derived for the data. When using the equation, x = the number for each month of the year (from step 1 above). If the calculated results don't appear to match the "by eye" results, it is probably due to rounding in the equation. **Right-click** on the equation displayed on the chart and **left-click** on *Format Data Labels.* In the pop-up menu, **click** on *Number.* **Click** on *Number* again in the pop-up menu and change the decimal places to a higher number than what was displayed in the equation. This was done in the example here by changing to 5 decimal places. The new equation is displayed and you will have to change the values in the equation for your calculated criteria.

The example on the next page illustrates the data series, chart line, calculated regression curve and equation, and the calculated criteria for each month. The final sub-lethal criteria from this table example would then be used to calculate weekly average effluent limitations for each month of the year.

SEE NOTE FOLLOWING THE EXAMPLE REGARDING AN ADDITIONAL ADJUSTMENT FOR WATERS CLASSIFIED AS WARM WATER.

FIFTH-ORDER POLYNOMIAL REGRESSION EXAMPLE

Month	Month #	Modified Sub-Lethal WQC		Final Sub-Lethal WQC
Jan	1	50		49
Feb	2	50		52
Mar	3	54		56
Apr	4	65		61
May	5	70		68
Jun	6	72		75
Jul	7	76		80
Aug	8	78		81
Sep	9	85		76
Oct	10	64		67
Nov	11	52		56
Dec	12	50		50



NOTE: Where a site is being evaluated for new site-specific ambient values, if it is determined that criteria need to be revised based upon new ambient values AND the site is classified as warmwater sport fish, an additional adjustment may be needed to the calculated criteria based upon revisions made to Tables 2 or 3 of ch. NR 102, Wis. Adm. Code. This potential adjustment affects waters classified as "Warmwater – Large" or "Warmwater – Small" in Table 2, as well as the Mississippi, Rock, Wisconsin, and Lower Fox River in Table 3.

Prior to the final version of ch. NR 102, Wis. Adm. Code, that became effective in October of 2010, U.S. EPA commented that the criteria in February through May were not protective of spawning requirements for what they called "cool water" fish species. The previous draft version of ch. NR 102, Wis. Adm. Code, including Tables 2, 3, and the resulting link from Table 7 (raw default monthly criteria) were based upon spawning temperatures for the more "traditional" warmwater fish species. Based upon the EPA comments, Tables 2 and 3 were revised as summarized below:

Month	Prior Draft Sub-Lethal Criteria in NR 102 (°F)	Final Sub-Lethal Criteria in NR 102 (°F)
February	52	50
March	55	52
April	61	55
May	68	65

Since the raw monthly criteria in Table 7 were not adjusted based on the changes in the final sub-lethal criteria, the process for calculating criteria using the above approach with the fifth-order polynomial was not changed. However, if the application of that procedure results in temperature criteria for any of these four months that are greater than the final criteria summarized in the above table, the criteria should be revised downward and set equal to the criteria in that table (50 for February, 52 for March, etc.). This insures that the sub-lethal criteria for warmwater sport fish communities based upon ambient temperatures will also be protective of spawning concerns for cool water species.

Chapter 14 – Site-specific Water Quality Criteria for Temperature

Applicable Rule Provision(s): s. NR 102.27, Wis. Adm. Code
Author: Jim Schmidt
Last Revised: August 11, 2010

Unlike Chapter 13 (pg. 97) which involves the use of site-specific ambient temperatures to modify water quality criteria that are already promulgated, Chapter 14 is provided to guide how to approach the absolute revision of water quality criteria on a site-specific basis on the premise that the codified criteria are not appropriate for the protection of a resident aquatic life community.

The authority to derive site-specific criteria and the associated processes are already available for toxic substances and a similar approach is also available for the development of site-specific thermal criteria. The primary distinction between modification of criteria based on local ambient temperature (Chapter 13, pg. 97) and the development of formal site-specific criteria is the manner in which the approvals are obtained. In the case of the modified criteria (Chapter 13, pg. 97), the Department may approve the changes without promulgating them. In the case of site-specific criteria, approval is obtained by formal promulgation according to the procedures in Chapter 227, Wis. Stats., including approvals by the Natural Resources Board as well as the Wisconsin Legislature. Further, according to Federal regulations, site-specific criteria changes must also be approved by the U.S. Environmental Protection Agency (EPA) before those criteria can be used to calculate water quality-based effluent limitations. This suggests a more involved and comprehensive approach compared to the modification of criteria in response to site-specific ambient temperatures.

> *Note: Site-specific criteria development may be initiated for reasons to seek relief from promulgated criteria **OR** to evaluate whether or not more stringent criteria are necessary to protect the site-specific fish and aquatic life community.*

According to s. NR 102.27(1), Wis. Adm. Code, site-specific criteria development shall include all of the following:

Par. (a) There must be a showing that data used to derive the water quality criterion in ch. NR 102, Wis. Adm. Code, for a particular water body do not apply to a specific water segment or water body.

Par. (b) Any site-specific criteria shall be developed in consideration of the guidance provided in Chapter 3.7 of EPA's Water Quality Standards Handbook, Second Edition (1994). That guidance is summarized later in this Chapter.

Par. (c) Information must be provided that shows the site-specific criterion is consistent with the development guidelines in subsection (2), also summarized below.

Par. (d) Any other information necessary to derive site-specific criteria must be provided.

In Chapter 3.7 of EPA's Water Quality Standards Handbook, Second Edition, three procedures are available or potential site-specific criteria development:

The **Recalculation Procedure** is used to account for relevant differences between the relative sensitivities of aquatic organisms in the national dataset and the sensitivities of organisms that occur at a particular site. Relevant factors may include:

a. Sensitive species used to develop the promulgated criteria may not be present at a site
b. Endangered or threatened species may be present warranting more stringent criteria
c. Evidence of the loss of certain species may cause an unacceptable impact on commercially, recreationally or ecologically important species.

There is a limited range of natural environmental conditions may result in a more narrow mix of species than would normally be expected on a national (or in the case of Wisconsin, a statewide) basis.

This approach is discussed further in Appendix L of the EPA Water Quality Standards Handbook: http://water.epa.gov/scitech/swguidance/standards/handbook/index.cfm. The result of the Recalculation Procedure would involve a recalculation of acute or chronic toxicity criteria for toxic substances in Chapter NR 105, Wis. Adm. Code, for example, but for thermal criteria this may involve a simpler re-determination of the temperature changes that would represent a water quality criterion. The concepts are similar, though, in that information on the presence or absence of relevant species is used to recalculate a water quality criterion.

1. The *Water Effect Ratio Procedure* takes into account differences between the toxicity of a chemical or parameter in laboratory dilution water and in water from the site in question. The relevance of this specific approach for thermal conditions is unclear at this time, but if information can be made available which suggests this approach can be applied, the authority exists to do so.

2. The *Resident Species Procedure* combines the elements of both the Recalculation and Water Effect Ratio Procedures. This procedure accounts for differences in resident species sensitivity, differences in biological availability, and/or differences in toxicity (or other relevant adverse effects) associated with the variability of physical and chemical characteristics of water at a specific site compared to laboratory conditions. Similarly, the relevance of this procedure for developing site-specific thermal criteria is unclear.

The development guidelines for site-specific criteria are contained in s. NR 102.27(2), Wis. Adm. Code. This subsection states that using site-specific information the same approach used to develop the existing criteria in s. NR 102.25, Wis. Adm. Code, could be used to re-calculate site-specific criteria, a process that is similar in concept to EPA's Recalculation Procedure. However, alternative methods for

developing site-specific criteria may also be used if it can be shown that the alternative methods will protect against acute and sub-lethal impacts in the fish and aquatic life community at that site (par. (b)). Criteria developed using alternative methods are also subject to Department review and the rule-making process before they can be applied on a site-specific basis (par. (c)).

A permittee or other party wanting to develop a site-specific criterion should notify the Department of Natural Resources in advance to ensure that the study design is supported by the conditions of both s. NR 102.27, Wis. Adm. Code, as well as the federal Clean Water Act. Staff in the Water Evaluation Section will review all information provided in support of a site-specific criterion effort and will recommend approval or disapproval through appropriate management channels. Permittees will be notified in writing of the Department's recommendation. Promulgation of proposed site-specific criteria modifications shall undergo the formal rulemaking process outlined in Chapter 227, Wis. Stats., and will be subject to approvals by the Natural Resources Board, the Wisconsin Legislature, and U.S. EPA before they can be used to calculated water quality-based effluent limitations on a site-specific basis.

Chapter 15 – Water Quality Models

Applicable Rule Provision(s): s. NR 106.58[5], Wis. Adm. Code
Author: Amanda Minks & Steve Jaeger
Last Revised: August 27, 2010

Thermal models are an important tool that can be used to quantify thermal plume dispersion and distribution, thermal mixing, and heat loss in the environment, among other things. Situations where modeling may be required by the Department include, but are not limited to, the evaluation of dissipative cooling for municipal POTWs (Chapter 11, pg. 59), requests for Alternative Effluent Limitations authorized in s. NR106.72, Wis. Adm. Code (Chapter 12, pg. 69), and requests for use of alternative Qs values (Chapter 9 and 10, pgs. 53 and 55, respectively).

Not all applications or permits within these, or other, categories will require the use of thermal modeling. Therefore, use of thermal modeling should always be considered on a case-by-case basis. Specific cases where thermal modeling may be appropriate include:

1. New sources not yet discharging,
2. Facilities that have not been discharging heat effluent for a sufficient period of time to allow evaluation of the effects of the effluent,
3. Facilities that were not able to quantify the impact of the thermal discharge due to other water quality conditions or parameters,
4. Major changes in the facilities operational mode, or
5. Facilities that have not been able to quantify thermal plume under critical design conditions including, but not limiting to, facilities with variable discharge, or facilities discharging a thermal plume that may impact sensitive areas or discharge during biologically sensitive time periods.

There have been a myriad of thermal models developed that may be used to satisfy the needs of the applicant. Selection of appropriate model and appropriate data collection will depend on the type of demonstration being proposed (refer to Chapter 10, pg. 55 for details), the specific biological concerns and the properties of the discharge and receiving water. Often a simple model like CORMIX can be used to predict the mixing achieved close to the discharge. More detailed, three-dimensional finite element models, like MIKE 21, MIKE 3 or EFDC U.S. EPA Version 1.01, may be needed where:

a. Far field effects are important such as when there is concern about sensitive areas downstream, or

[5] Other provisions in the law allow thermal models to be used to fulfill, at least in part, their demonstration requirements.

b. To address the effects of dynamically changing discharge or receiving water conditions. For example, a combination of both types of models has been used for large dischargers to the Great Lakes.

Once modeling is deemed by the applicant and the Department to be appropriate and a specific model has been agreed to, modeling and data collection for modeling should be carefully planned in order to achieve appropriate, usable results. A modeling plan should include:

a. Definition of problem
b. Selection of model and specifics on how it will be used
c. Determination of critical design conditions
    - Q7,10 stream flow for discharges
    - Monthly or seasonal stream flow variability
    - Maximum heat output of discharge
    - Wind speed, wind directions, and current activity that impact plume distribution
    - Critical biological habitat and time periods
d. Design of data collection
e. Conditions to be sampled
f. Data collected
g. Model calibration, validation, evaluation
h. Prediction runs / design conditions
i. Discussion of model merits and disadvantages

Plans for modeling and associated data collection should be submitted and discussed with the Department for approval prior to beginning any field work. Permittees should contact the wastewater field staff responsible for the WPDES Permit (i.e., Basin Engineer/Wastewater Specialist) to begin this dialogue as early as possible.

Additional Information for DNR Staff

To ensure that a comprehensive study plan is developed, wastewater permit staff should share all modeling study proposals with Regional Fisheries and Water Resources Biologists as well as appropriate water quality modeling staff in the Central Office. These personnel provide a beneficial resource to identify and clarify model and data collection elements that should be incorporated into a modeling project.

Chapter 16 – Compliance with Thermal Limitations

Applicable Rule Provision(s): s. NR 106.62, Wis. Adm. Code
Author: Mike Hammers & Tom Mugan
Last Revised: August 15, 2013

Compliance with Thermal Limits: Consistent with the definition of "daily maximum effluent temperature" (s. NR 106.52(4), Wis. Adm. Code), WPDES permits will require permittees to report the highest effluent temperature measured during the calendar day at a monitoring frequency specified by the permit. Compliance is demonstrated when the reported daily maximum effluent temperature is equal to or less than the daily maximum effluent temperature limit.

Consistent with the definition of "weekly average effluent temperature" (s. NR 106.52(10), Wis. Adm. Code), the daily maximum temperatures required to be reported by the permittee in the WPDES permit will be used to calculate the weekly average. The applicable weekly average temperature limit will be compared to the weekly averages of the reported daily maximum temperatures for compliance determinations. Compliance is demonstrated when the weekly average effluent temperature is equal to or less than the weekly average effluent temperature limit. Compliance must be demonstrated with weekly average effluent temperature limits regardless of the effluent temperature monitoring frequency required by the permit.

At this time, the SWAMP database evaluates compliance with weekly average limits using the average results reported for days 1-7, 8-14, 15-21 and 22-28. If SWAMP flags an exceedance of the weekly average temperature limit, monitoring results reported by the permittee should be reviewed to verify that the average of daily maximum effluent temperature values collected during the calendar week exceeds the weekly average limit.

Compliance Schedules: A compliance schedule for effluent temperature limits may be included in the permit issued to an existing facility (ss. NR 106.62 and NR 106.75, Wis. Adm. Codes). A compliance schedule may not be included in the permit of a new facility. That is, temperature limits become effective on the effective date of the new facility's permit (s. NR 106.60, Wis. Adm. Code). Pursuant to s. NR 106.52 (7), Wis. Adm. Code, a "new facility" is a new point source facility or discharge that commences operation after October 1, 2010, the effective date of the thermal rule.

Considered together, ss. NR 106.60 and 106.75, Wis. Adm. Code, could be interpreted as authorization to include a compliance schedule in the permit of a new facility for an alternative effluent temperature limit is that is established pursuant to subch. VI. However, s. NR 106.75, Wis. Adm. Code, makes the use of compliance schedules discretionary. Therefore, this guidance recommends that compliance schedules not be granted to a new facility under any circumstances. To do otherwise would conflict with 40 CFR 122.47 and would invite objections from EPA.

Compliance schedules for effluent temperature limits shall be as short as reasonably possible and shall not extend beyond the expiration date of the permit (ss. NR 106.56 (12)(b), NR 106.62, and NR 106.75, Wis. Adm. Codes). Keep in mind that to be consistent with federal regulations, a compliance schedule must be an enforceable sequence of actions or operations leading to compliance with the effluent temperature limit and a compliance schedule shall not allow more than one year between interim compliance dates (40 CFR Parts 122. 2 and 122.47).

Factors that may be considered when establishing the length of a compliance schedule include:

1. Whether steps are needed to modify or install treatment facilities, operations or other measures and the time those steps would take.

2. Whether there is a need to acquire a substantial amount of property to accommodate the needed modifications.

3. Whether there is a need to develop an extensive financing plan and obtain financing for treatment plant upgrades.

4. Whether a diffuser or other mechanical device used to ensure rapid mixing of effluent with the receiving water will be installed.

5. Whether, for those permittees with effluent temperature limits due to the lack of representative effluent temperature data, the permittee requires one to two years to collect representative effluent temperature data needed by the Department to determine the permittee's ability to comply with effluent limitations. Note that a compliance schedule must include more than just additional time to collect data to redo a reasonable potential analysis. Data collection may be part of the compliance schedule, but not the sole requirement. Subsequent actions must be specified in the compliance schedule that will lead to compliance with the effluent temperature limit.

6. Whether the permittee requires time to collect additional information to establish alternative effluent limits pursuant to subch. VI in response to the Department's determination that sufficient information was not available prior to permit issuance.

An example compliance schedule is provided (see Chapter 18, pg. 117) for an industrial discharger that lacks representative effluent temperature data at the time of permit reissuance, and therefore has twelve daily maximum and weekly average effluent temperature limits in its permit when issued, and will likely require additional treatment to be constructed or installed, such as closed-looped cooling devices, to comply with any limit that is determined by the Department to be unnecessary after the collection of representative effluent temperature data.

A second compliance schedule example is provided in Chapter 18 (pg. 117) for a municipal discharger that lacks representative effluent temperature data at the time of permit reissuance and will require time to collect the data necessary to determine the permittee's ability to comply with the effluent temperature limits and installation of effluent cooling technology to meet effluent temperature limits.

Chapter 17 – Limitations Subject to Drop

Applicable Rule Provision(s): s. NR 106.56(12), Wis. Adm. Code
Author: Mary Ryan & Bob Masnado
Last Revised: May 13, 2013

A comprehensive history of effluent temperature data is the best means to ensure a robust determination of reasonable potential to exceed a calculated effluent limitation. However, many WPDES permittees have not collected effluent temperature data in a manner to accurately describe the temperature maxima over time. In the absence of these data, s. NR 106.56(12), Wis. Adm. Code, requires the inclusion of effluent limitations when there is a reasonable potential to exceed such limitations.

The collection of effluent temperature data consistent with the minimum data requirements identified in Chapter 2 (pg. 14) is believed to be sufficient to determine the representative heat load over the course of all four seasons. If those requirements are not met, the permit should be prepared with language (Example 1) that indicates any effluent limits included in the permit are subject to drop if, and when, new data are provided that indicate there is no reasonable potential to exceed the calculated limitations. A permit modification is required to remove the temperature limits and schedule from the permit.

Limitations that are subject to drop should be coupled with a compliance schedule that provides sufficient time for the collection of representative effluent temperature data needed by the Department to determine the permittee's ability to comply with the effluent temperature limits (see Chapter 16, pg. 111). This guidance does not standardize that time frame because data collection needs can vary from one discharger to the next. When the data set is populated to meet the minimum data requirements, Department staff should once again evaluate reasonable potential and determine whether or not the limitations should be maintained or dropped from the permit.

If a decision is made to drop the limitations, the permit drafter should send a letter to the permittee indicating that the limitations are not necessary with a brief statement on the outcome of the reasonable potential analysis. A copy of the correspondence with the permittee should be attached to the permits database (SWAMP). A permit modification is required to remove the temperature limits and schedule from the permit.

Example 1: Recommended text of WPDES Permit Language for Temperature limitations that are determined to be unnecessary

1.1.1.1 Effluent Temperature Limitations

NOTE TO PERMIT DRAFTER:

Select Option 1 below (and delete Option 2) if the permittee has completed at least one year of temperature monitoring and the WQBEL memo specifies 'Temperature, Max' limits based on that monitoring. Note: two years of data collection may be necessary if the effluent temperatures are highly variable.

Select Option 2 below (and delete Option 1) if the permittee has not completed at least one year of temperature monitoring and the WQBEL memo specifies 'Temperature, Max' limits that may be determined to be unnecessary following collection of at least one year of data. Note: two years of data collection may be necessary if the effluent temperatures are highly variable.

OPTION 1 'Temperature, Max' Limits and Schedule

Limits for Temperature, Maximum: The effluent limitations for "Temperature, Maximum" become effective on **Enter Effective Date Of Limit** as specified in the Schedules section. Monitoring is required 3X/week upon permit reissuance. Daily maximum temperatures shall be reported so that applicable daily maximum limits can be compared to the reported daily maximum temperatures and applicable weekly average limits can be compared to the weekly averages of the reported daily maximum temperatures.

FYI TO PERMIT DRAFTER - You have the option of copying/pasting the temperature limits table from the WQBEL Memo into the space provided below when numerous temperature limits are recommended. If choosing this option remember to enter the monitoring requirement for 'Temperature Maximum' (3X/week) into SWAMP when drafting the permit. The temperature limits can be entered after the permit is issued as displayed in the WQBEL memo. ATTENTION: Delete the following header if you choose to enter all temperature monitoring requirements and limits into SWAMP when drafting the permit.

[HEADER]- Effluent Limitations for 'Temperature Maximum' (Effective per the Schedules section):

[Insert WQBEL memo here]

OPTION 2 per NR 106.56(12), Wis. Adm. Code, Representative Data Unavailable

Determination of Need for Effluent Limits: The effluent limitations for "Temperature, Maximum" become effective on **Enter Effective Date Of Limit** as specified in the Schedules section. Monitoring is required 3X/week upon permit reissuance. Daily maximum temperatures shall be reported so that applicable daily maximum limits can be compared to the reported daily maximum temperatures and applicable weekly average limits can be compared to the weekly averages of the reported daily maximum temperatures. After completion of at least one year of temperature data collection the permittee may request that the Department makes a determination of the need for limits under s. NR 106.56, Wis. Adm. Code. Within 60 days of such request the Department will make that determination. If the Department determines that effluent limitations are unnecessary based on the procedures in s. NR

106.56, the Department shall notify the permittee that the limitations are not necessary pursuant to s. NR 106.56, Wis. Adm. Code. A permit modification will be required to remove the temperature limits and schedule from this permit. If after reviewing the data, the Department determines that effluent limitations for "Temperature, Maximum" are necessary based on the procedures in s. NR 106.56, Wis. Adm. Code, the requirement to meet the effluent limitations according to the Schedules section will not be removed nor will the monitoring frequency be reduced. Permittees may then wish to pursue a re-evaluation of the limits based on ch. NR 106 – 'Subchapters V and VI Effluent Limitations for Temperature' or s. NR 102.26 – Site Specific Ambient Temperature. If the re-calculation of limits results in revisions to the temperature limits, a permit modification will be required to include the revised limits in the permit.

FYI TO PERMIT DRAFTER - You have the option of copying/pasting the temperature limits table from the WQBEL Memo into the space provided below when numerous temperature limits are recommended. If choosing this option remember to enter the monitoring requirement for 'Temperature Maximum' (3X/week) into SWAMP when drafting the permit. The temperature limits can be entered after the permit is issued as displayed in the WQBEL memo. ATTENTION: Delete the following header if you choose to enter all temperature monitoring requirements and limits into SWAMP when drafting the permit.

[HEADER]- Effluent Limitations for 'Temperature Maximum' (Effective per the Schedules section):

[Insert WQBEL memo here]

Chapter 18 – SWAMP Guidance for Department Staff

Author: **Mary Ryan & Mike Hammers**
Last Revised: **May 13, 2013**

NOTICE TO READER: The Department regularly updates SWAMP to maintain contemporary tools for staff involved in the issuance of WPDES permits. Following the effective date of the Thermal Standards in October 2010, several tools were incorporated into SWAMP as listed below:

a. An updated permit application cover letter for thermal consideration and an optional Thermal Letter;
b. Standard thermal requirements (footnotes, compliance schedules and standard requirements) in the permit templates;
c. Updated public notice document to indicate approval of dissipative cooling (note: the public notice document will be updated next year to include info on thermal variances and other re-evaluated thermal limits) ; and
d. Updated Fact Sheet for thermal requirements

The following sections of this Chapter are intended to provide the staff with tools that will assist in the issuance, reissuance, and modifications of WPDES permits as related to implementation of the thermal water quality standards.

The guidance found in this Chapter is also stored in the SWAMP folder on the Department's Watershed File Service.

Section 18.1. IMPLEMENTATION of Thermal Rules

Introduction: The thermal rules (ch. NR 102 Subchapter II and ch. NR 106 Subchapters V & VI, Wis. Adm. Codes) became effective October 1, 2010 for permittees with discharges to surface water. The following recommendations are provided to assist staff with implementation.

The permit application cover letter includes an explanation of the thermal rules and information about collecting temperature data via DMRs rather than via the permit application. It is recommended that the permit application cover letter be sent 21 months in advance of permit expiration to inform those permittees of the need for temperature monitoring. If it is the permit drafter's preference to send out permit application letters to permittees 12 months in advance of permit expiration then the Thermal Letter (available at the Documents tab in SWAMP) should be sent 21 months prior to permit expiration to provide an explanation of the thermal rules and information about collecting temperature data. Both the permit application cover letter (thermal attachment) and the Thermal Letter include a monitoring frequency of 3X per week for temperature monitoring, however this frequency could be reduced or increased depending on the amount of data needed to determine the reasonable potential for exceeding daily max and/or weekly average temperature limits.

Qs:Qe Ratios: Please note that when Qs:Qe is > 20:1 for warm water and limited forage fish waters (unidirectional flow) and > 30:1 for cold waters (unidirectional flow), the permittee's effluent will only need to be evaluated for the Public Health limit of 120 degrees F (daily max) per s. NR 106.55(6) – Table 1, Wis. Adm. Code. In these situations a water quality evaluation will not be needed for acute (daily max) and sub-lethal (weekly avg.) water quality criteria as described in s. NR 102.25, Wis. Adm. Code. Hence you may use discretion in specifying a reduced frequency for monitoring requirements other than 3X per week in the Thermal Letter or Permit Application Cover Letter (whichever letter is sent regarding temperature requirements) for these permittees.

Dissipative Cooling (POTWs): Whether you are sending the Thermal Letter or the Permit Application Cover Letter to address the new temperature rules, please include the Dissipative Cooling (DC) information and checklist if the permittee is a POTW subject to weekly average (sub-lethal) limits. As discussed above the DC evaluation will not be necessary if the permittee is only subject to the Public Health limit of 120 degrees F (daily max). Other situations where the DC evaluation may not be necessary include an adequate Qs:Qe ratio that allows for obvious dissipation of the thermal load and where a POTW discharges to a Limited Aquatic Life stream and does not have then potential to exceed 86 degrees F (The maximum temperature for LAL waters is 86 degrees F per s. NR 102.245, Wis. Adm. Code, which most POTWs will not exceed unless an industrial contributor is impacting their effluent temperature). Discharges to lakes may need a case-by-case review to determine if a DC evaluation is needed. If you are unsure of the need for a DC evaluation, please contact the Limit Calculator for assistance. Chapter 11 (pg. 59) of the Thermal Guidance discusses implementation of Dissipative Cooling and states that we expect many permittees will provide the Department with available information that will allow a determination to be reached that there is sufficient DC to eliminate the need for sub-lethal limits. The Dissipative Cooling Request form is available at http://dnr.wi.gov/topic/surfacewater/thermal.html.

Implementation Recommendations for Thermal Rules

Status of Permit	**Recommendations**
Permits with Upcoming Permit Expiration Dates	Send permit application letter 21 months prior to permit expiration. Or if the permit drafter prefers to send the permit application cover letter one year prior to permit expiration then send the Thermal Letter 21 months prior to expiration and then send the Permit Application Letter one year prior to expiration without the Thermal Attachment. These letters are designed to provide information about reporting temperature data on DMRs (for all permittees with a surface water discharge) and about Dissipative Cooling (POTWs only as applicable). Enter 'Temperature, Max' monitoring in SWAMP for the current permit as described in the permit application cover letter or as described in the Thermal Letter (if the Thermal Letter was mailed to the permittee) prior to batch generation of the DMRs by David Argall for the upcoming quarter. Reissue permit per WQBEL Memo. If the WQBEL memo recommends 'Temperature, Max' limits, include the limits along with the standard temperature footnotes♦ and compliance schedule♦♦ available in SWAMP. Note: If there are no 'Temperature, Max' limits recommended in the WQBEL memo then include 'Temperature, Max' monitoring in the 4th year of the permit as needed for determining whether temperature WQBELs are to be included in the next permit reissuance.
Permits Currently Being Drafted for Reissuance	Include 'Temperature, Max' limits in the draft permit per the WQBEL Memo along with the standard temperature footnotes♦ and a compliance schedule♦♦ to achieve the new temperature limits. The compliance schedule should account for collection of a total of one year of temperature data based on when the permittee started

	monitoring temperature as part of their permit application requirements. Note: If there are no 'Temperature, Max' limits recommended in the WQBEL memo then include 'Temperature, Max' monitoring in the 4th year of the permit as needed for determining whether temperature WQBELs are to be included in the next permit reissuance.

***Standard Temperature Footnotes:** The standard temperature footnotes in SWAMP are shown below:

*Choose the checkbox in SWAMP labeled "Temp Monitoring & Limits" to insert the following two footnotes for 'Effluent Temperature Monitoring' and 'Effluent Temperature Limitations'.

*Choose the checkbox in SWAMP labeled 'POTW Dissipative Cooling' to insert the Dissipative Cooling footnote below when the WQBEL memo for a POTW recommends weekly average temperature limits.

1) Effluent Temperature Monitoring

For manually measuring effluent temperature, grab samples should be collected at 6 evenly spaced intervals during the 24-hour period. Alternative sampling intervals may be approved if the permittee can show that the maximum effluent temperature is captured during the sampling interval. For monitoring temperature continuously, collect measurements in accordance with s. NR 218.04(13), Wis. Adm. Code. This means that discrete measurements shall be recorded at intervals of not more than 15 minutes during the 24-hour period. In either case, report the maximum temperature measured during the day on the DMR. For seasonal discharges collect measurements either manually or continuously during the period of operation and report the daily maximum effluent temperature on the DMR.

FYI: Include this monitoring footnote if temperature monitoring is required in the 4th year of the permit.

2) Effluent Temperature Limitations

NOTE TO PERMIT DRAFTER: – Select Option 1 below (and delete Option 2) if the permittee has completed at least one year of temperature monitoring and the WQBEL memo specifies 'Temperature, Max' limits based on that monitoring. Select Option 2 below (and delete Option 1) if the permittee has not completed at least one year of temperature monitoring and the WQBEL memo specifies 'Temperature, Max' limits that may be determined to be unnecessary following collection of at least one year of data:

OPTION 1 'Temperature, Max' Limits and Schedule

Limits for Temperature, Maximum: The effluent limitations for "Temperature, Maximum" become effective on **Enter Effective Date Of Limit** as specified in the Schedules section. Monitoring is required 3X/week upon permit reissuance. Daily maximum temperatures shall be reported so that applicable daily maximum limits can be compared to the reported daily maximum temperatures and applicable weekly average limits can be compared to the weekly averages of the reported daily maximum temperatures.

FYI TO PERMIT DRAFTER - You have the option of copying/pasting the temperature limits table from the WQBEL Memo into the space provided below when numerous temperature limits are recommended. If choosing this option remember to enter the monitoring requirement for 'Temperature Maximum' (3X/week) into SWAMP when drafting the permit. The temperature limits can be entered after the permit is issued as displayed in the WQBEL memo. ATTENTION: Delete the following header if you choose to enter all temperature monitoring requirements and limits into SWAMP when drafting the permit.

[HEADER]- Effluent Limitations for 'Temperature Maximum' (Effective per the Schedules section):

[Insert WQBEL memo here]

OPTION 2 per s. NR 106.56(12), Wis. Adm. Code, Representative Data Unavailable

Determination of Need for Effluent Limits: The effluent limitations for "Temperature, Maximum" become effective on **Enter Effective Date Of Limit** as specified in the Schedules section. Monitoring is required 3X/week upon permit reissuance. Daily maximum temperatures shall be reported so that applicable daily maximum limits can be compared to the reported daily maximum temperatures and applicable weekly average limits can be compared to the weekly averages of the reported daily maximum temperatures. After completion of at least one year of temperature data collection the permittee may request that the Department makes a determination of the need for limits under s. NR 106.56, Wis. Adm. Code. Within 60 days of such request the Department will make that determination. If the Department determines that effluent limitations are unnecessary based on the procedures in s. NR 106.56, Wis. Adm. Code, the Department shall notify the permittee that the limitations are not necessary pursuant to s. NR 106.56, Wis. Adm. Code. A permit modification will be required to remove the temperature limits and schedule from this permit. If after reviewing the data, the Department determines that effluent limitations for "Temperature, Maximum" are necessary based on the procedures in s. NR 106.56, Wis. Adm. Code, the requirement to meet the effluent limitations according to the Schedules section will not be removed nor will the monitoring frequency be reduced. Permittees may then wish to pursue a re-evaluation of the limits based on ch. NR 106 – 'Subchapters V and VI Effluent Limitations for Temperature' or s. NR 102.26 – Site Specific Ambient Temperature. If the re-calculation of limits results in revisions to the temperature limits, a permit modification will be required to include the revised limits in the permit.

FYI TO PERMIT DRAFTER - You have the option of copying/pasting the temperature limits table from the WQBEL Memo into the space provided below when numerous temperature limits are recommended. If choosing this option remember to enter the monitoring requirement for 'Temperature Maximum' (3X/week) into SWAMP when drafting the permit. The temperature limits can be entered after the permit is issued as displayed in the WQBEL memo. ATTENTION: Delete the following header if you choose to enter all temperature monitoring requirements and limits into SWAMP when drafting the permit.

[HEADER]- Effluent Limitations for 'Temperature Maximum' (Effective per the Schedules section):

[Insert WQBEL memo here]

3) Dissipative Cooling Demonstration – POTW Weekly Average Limits

If weekly average effluent temperature limitations are needed, the permittee may submit all additional necessary information with a request that the Department account for dissipative cooling of the effluent pursuant to s. NR 106.59, Wis. Adm. Code. If the Department determines that weekly average effluent limitations for temperature are not necessary based on dissipative cooling the Department shall modify the permit to remove the weekly average effluent limitations pursuant to s. NR 106.59(4)(e), Wis. Adm. Code. Monitoring frequency shall be [**Enter Frequency – (recommend Weekly or case-by-case as documented)**] and the remainder of the permit schedule for weekly average temperature limits shall be discontinued at that time. If after reviewing the data the Department determines that weekly average effluent limitations for temperature are still necessary because the thermal load from the effluent is not adequately dissipated, the requirement to meet the effluent limitations according to the permit schedule will not be removed and the monitoring frequency specified in the permit shall continue to apply. A re-evaluation of the limits may then be requested pursuant to ch. NR 106 – 'Subchapters V & VI Effluent Limitations for Temperature' or s. NR 102.26 – Site Specific Ambient Temperature.

♦♦*Standard Compliance Schedules*

Standard Compliance schedules in SWAMP are shown below for permittees with one year of collected temperature data and WQBELs (1A & 1B) and for permittees without one year of temperature data (2A, 2B & 2C)

NOTE: Compliance schedules should be granted on a case-by-case bases and strive to achieve compliance with temperature limits as soon as possible. These standards compliance schedules are simply meant to be a tool for permit drafters to help make these determinations. See Chapter 16 (pg. 111) for more details on compliance schedules.

1A: SWAMP Picklist Option titled 'Temp Limits Compliance' - Use for Industrial (and Municipal facilities not subject to a Dissipative Cooling Evaluation) with 'Temperature, Maximum' limits based on at least one year of reported temperature data.

Temperature Limits Compliance

This compliance schedule requires the permittee to achieve compliance by the specified date.

Required Action	Date Due
Preliminary Compliance Report: Submit a preliminary compliance report indicating alternatives to achieve the final temperature limits. Informational Note: Refer to ch. NR 106 Subchapters V & VI or s. NR 102.26, Wis. Adm. Code, for information regarding re-evaluation of limits.	Permit effective date plus 12 months
Action Plan: Submit an action plan for complying with all applicable effluent temperature limits**.**	Permit effective date plus 24 months
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	Permit effective date plus 30 months
Initiate Actions: Initiate actions identified in the plan.	Permit Effective Date plus 36 Months
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	Permit Effective Date plus 48 Months

1B: SWAMP Picklist Option titled 'Temp Limits Compliance & Diss Cooling Eval' - Use for Muni's subject to weekly average temperature limits based on at least one year of reported temperature data=

Temperature Limits Compliance and Dissipative Cooling Evaluation

This compliance schedule requires the permittee to achieve compliance by the specified date.

Required Action	Date Due
Preliminary Compliance Report: Submit a preliminary compliance report indicating alternatives to achieve the final temperature limits. Informational Note: Refer to the Surface Water subsection titled "Dissipative Cooling Demonstration – POTW Weekly Average Limits" regarding requests for Department consideration of dissipative cooling per s. NR 106.59, Wis. Adm. Code, as well as re-evaluation of the limits pursuant to ch. NR 106 Subchapters V & VI or s. NR 102.26, Wis. Adm. Code.	Permit effective date plus 12 months

Action Plan: Submit an action plan for complying with all applicable effluent temperature limits.	Permit effective date plus 24 months
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	Permit effective date plus 30 months
Initiate Actions: Initiate actions identified in the plan.	Permit Effective Date plus 36 Months
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	Permit Effective Date plus 48 Months

2A: SWAMP Picklist Option titled 'Temp Limits (Industrial Fac)' – Use for industrial facilities without at least one year of 'Temperature, Maximum' monitoring data.

Temperature Limits (Industrial Facilities)

This compliance schedule requires the permittee to achieve compliance by the specified date.

Required Action	Date Due
Report on Effluent Discharges: Submit a report on effluent temperature with conclusions regarding compliance. If the Department determines that because of data variability, 24 months of monitoring data is required to determine the need for temperature limits, the Department will so notify the permittee in writing and all dates in the permit schedule will be extended by 12 months. Informational Note: Refer to the Surface Water subsection regarding 'Determination of Need for Effluent Limits' for information concerning a Department determination on the need for limits and pursuing re-evaluation of limits per ch. NR 106 Subchapters V & VI or s. NR 102.26, Wis. Adm. Code.	Permit effective date plus 12 or 13 months
Action Plan: Submit an action plan for complying with all effluent temperature limits that remain following the Department's review for necessity**.**	Permit effective date plus 24 months
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	Permit effective date plus 30 months
Initiate Actions: Initiate actions identified in the plan.	Permit Effective Date plus 36 Months
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	Permit Effective Date plus 48 Months

2B: SWAMP Picklist Option titled 'Temp Limits (Muni Fac w/o Diss Cooling)' – Use for muni's without at least one year of 'Temperature, Maximum' monitoring data and no applicable weekly average temperature limits subject to a dissipative cooling evaluation.

Temperature Limits (Municipal Facilities)

This compliance schedule requires the permittee to achieve compliance by the specified date.

Required Action	Date Due
Report on Effluent Discharges: Submit a report on effluent temperature with conclusions regarding compliance. Informational Note: Refer to the Surface Water subsection regarding 'Determination of Need for Effluent Limits' for information concerning a Department determination on the need for limits and pursuing re-evaluation of limits per ch. NR 106 Subchapters V & VI or s. NR 102.26, Wis. Adm. Code.	Permit effective date plus 12 or 13 months
Action Plan: Submit an action plan for complying with all effluent temperature limits that remain following the Department's review for necessity**.**	Permit effective date plus 24 months
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	Permit effective date plus 30 months
Initiate Actions: Initiate actions identified in the plan.	Permit Effective Date plus 36 Months
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	Permit Effective Date plus 48 Months

2C: SWAMP Picklist Option titled 'Temp Limits & Dissipative Cooling Evaluation' – Use for muni's without at least one year of 'Temperature, Maximum' monitoring data and with recommended weekly average Temperature limits subject to a Dissipative Cooling Evaluation

Temperature Limits and Dissipative Cooling Evaluation

This compliance schedule requires the permittee to achieve compliance by the specified date.

Required Action	Date Due
Report on Effluent Discharges: Submit a report on effluent temperature with conclusions regarding compliance. Informational Note: Refer to the Surface Water subsections regarding 'Determination of Need for Effluent Limits' and 'Dissipative Cooling	Permit effective date plus 12 or 13 months

Demonstration – POTW Weekly Average Limits' concerning requests for Department determination on the need for limits and follow-up procedures for demonstration of dissipative cooling per s. NR 106.59, as well as re-evaluation of the limits pursuant to ch. NR 106 Subchapters V & VI or s. NR 102.26, Wis. Adm. Code.	
Action Plan: Submit an action plan for complying with all effluent temperature limits that remain following the Department's review for necessity.	Permit effective date plus 24 months
Construction Plans: Submit construction plans (if construction is required for complying with effluent temperature limits) and include plans and specifications with the submittal.	Permit effective date plus 30 months
Initiate Actions: Initiate actions identified in the plan.	Permit Effective Date plus 36 Months
Complete Actions: Complete actions necessary to achieve compliance with effluent temperature limits.	Permit Effective Date plus 48 Months

Permit Drafting Instructions - WQBELs and Compliance Schedule

Include the WQBEL(s) in the permit with a compliance schedule to attain compliance with the limits by a specified date and the option to request re-evaluation of limits per s. NR 102.26 and ch. NR 106 – 'Subchapters V & VI Effluent Limitations for Temperature'.

1. If the permittee has not collected at least one year of 'Temperature, Maximum' date, the Compliance Schedule may require collection of a total of one to two years of effluent data (2 years for industrial facilities if effluent temperature is highly variable – refer to Chapter 3, pg. 22) to determine the permittee's ability to comply with the effluent limitations and determine what cooling technologies are required to achieve compliance.
2. Upon submittal of the effluent data, the permittee may request that the Department make a determination of the need for temperature limits under s. NR 106.56, Wis. Adm. Code. Within 60 days of such request the Department shall make that determination.
3. If the effluent limits are not necessary the Department shall notify the permittee in writing that the limits and permit schedule have been invalidated and monitoring shall be [Enter the Monitoring Frequency – (recommend weekly or case-by-case as documented)]. A permit modification will be required to remove the temperature limits and schedule from the permit.
4. If the Department determines that effluent temperature limits are necessary the Department shall notify the permittee in writing that the limits and permit schedule will remain in effect and monitoring frequency will not be reduced. This written notification may reference options included in the permit schedule for a re-evaluation of limits based on s. NR 102.26 or NR 106 – 'Subchapters V & VI Effluent Limitations for Temperature' (see the code cites listed below):

Wis. Administrative Code Sections Regarding Evaluation of Temperature Limits
NR 106.53(1)(a) Receiving Water Flow Rates (1/4 7-dayQ10) Using Monthly Flow Rates (see Chapter 9 pg. 53 of the Thermal Guidance)
NR 106.53(1)(c)-(e) Adequate Passage for Aquatic Life or Rapid Mixing or Modified Qs (see Chapter 10 pg. 55 of the Thermal Guidance)
NR 106.55(5) Limitations for Discharges to Storm Sewers (as applicable)
NR 106.55(10) Limitations Based on Site-Specific Mixing Zone Analysis
NR 106.55(11) Limitations Based on Installation of Diffusers
NR 106.55(13) Limitations Based on Water Quality Models
NR 106.56(8) Limit for the Protection of Public Health (as applicable)
NR 106.59(4) Sub-Lethal Limitations for Existing POTW Outfalls (Dissipative Cooling)

NR 106.59(6) Sub-Lethal Limitations for New POTW Discharges or Re-Located Outfalls (Dissipative Cooling)
NR 106.59(8) Permit Reissuance - Continued Consideration of Dissipative Cooling
NR 106.72 Application for Alternative Effluent Limitations for Temperature

Note: Other sections of the Wisconsin Administrative Code may also be reviewed to determine if a request for evaluation of temperature limits is appropriate as shown below:

Other Wis. Administrative Code Sections Regarding Evaluation of Temperature Limits
NR 102.26 Site-Specific Ambient Temperature*
NR 106.54 (4) Calculation of Effluent Temperature Limitations Based on Real-Time Data
NR 106.55(8) Limitations for Discharges with Fluctuating Effluent Flow Rates

* If ambient monitoring is selected, include ambient monitoring on the DMR per s. NR 102.26, Wis. Adm. Code

5. If a permittee wishes to pursue re-evaluation of effluent temperature limits under ch. NR 106 – 'Subchapters V and VI - Effluent Limitations for Temperature' the request should be submitted within 4 months (or other timeframe as applicable) of the Department's determination of the need for effluent temperature limits. (FYI: A request for a determination on site specific ambient temperature under s. NR 102.26, Wis. Adm. Code, requires that the permittee submit 2 years of data.) Following re-evaluation of effluent temperature limits the Department shall send written notification to the permittee either approving or denying revised temperature limits. If revised effluent temperature limits are denied, the limits and compliance schedule remain in effect and it may be possible for the permittee to obtain an administrative review pursuant to s. 227.42, Wis. Stats. or a judicial review pursuant to s. 227.52, Wis. Stats. If the revised effluent temperature limits are approved, the permit shall be modified and public noticed per ch. NR 203, Wis. Adm. Code.

Compliance Schedules

For permittees with one year of collected 'Temperature, Maximum' data and WQBELs see 1A & 1B below.

For permittees without one year of 'Temperature, Maximum' data see 2A, 2B & 2C below:

> **1A**: SWAMP Picklist Option titled 'Temp Limits Compliance' - Use for Industrial (and Municipal facilities not subject to a Dissipative Cooling Evaluation) with Temperature Max limits based on at least one year of reported temperature data.

1B: SWAMP Picklist Option titled 'Temp Limits Compliance & Diss Cooling Eval' - Use for Muni's subject to weekly average temperature limits based on at least one year of reported temperature data

2A: SWAMP Picklist Option titled 'Temp Limits (Industrial Fac)' – Use for industrial facilities without at least one year of Temperature Max monitoring data.

2B: SWAMP Picklist Option titled 'Temp Limits (Muni Fac w/o Diss Cooling)' – Use for muni's without at least one year of Temperature Max monitoring data and no applicable weekly average temperature limits subject to a dissipative cooling evaluation.

2C: SWAMP Picklist Option titled 'Temp Limits & Dissipative Cooling Evaluation' – Use for muni's without at least one year of Temperature Max monitoring data and with recommended weekly average Temperature limits subject to a Dissipative Cooling Evaluation

Section 18.2 PERMIT DRAFTING INSTRUCTIONS – ADDITIONAL REQUIREMENTS

The permit may also include other temperature requirements as described below.

Mussel Control (optional): Permit requirements for mussel control may be included in the permit per s. NR 106.55(6)(c), Wis. Adm. Code, which allows for short-term excursions from the temperature limitation for the purposes of zebra or other mussel control if approved by the Department and authorized in the permit on a case-by-case basis.

Standard Requirements: The Surface Water Requirements section of Standard Requirements includes 'Effluent Temperature Requirements' that cover calculation of the Weekly Average Temperature, Cold Shock and the Rate of Change Temperature Standard. A checkbox is available at the Input screen titled 'Electric Generating Facility' for including language regarding Energy Emergency Events.

Example Thermal Letter

Note: The *Thermal Letter* is also stored in the SWAMP folder on the Watershed File Service (W Drive} and is available at the SWAMP Documents tab.

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor
Matthew J. Frank, Secretary

101 S. Webster St.
Box 7921
Madison, Wisconsin 53707-7921
Telephone 608-266-2621
FAX 608-267-3579
TTY Access via relay - 711

Date_____

Permittee Name
Address
City Name, WI Zip code

Subject: Thermal Regulations - Water Quality Rules for Temperature

Dear Permittee:

Wisconsin's water quality rules for temperature became effective on October 1, 2010 as detailed in ch. NR 102 Subchapter II – Water Quality Standards for Temperature and ch. NR 106 Subchapters V and VI– Effluent Limitations for Temperature, Wis. Adm. Code. This letter provides information about implementation of the water quality rules for temperature at your facility.

Temperature Monitoring & DMR Reporting: Please start monitoring your effluent on [Enter Month & Year] to determine the maximum temperature during the day. A column to record the maximum temperature will be included on your DMRs. At least one year of effluent temperature monitoring is needed to determine if your facility's wastewater discharge is subject to temperature limits. This temperature monitoring is in addition to the monitoring associated with the application process for permit reissuance. Pursuant to s. 283.37(5), Wis. Stats., the Department may require the permittee to submit information in addition to that supplied on the permit application.

If your permit is reissued prior to collecting the full 12 months of temperature data, the reissued permit will include temperature limits and monitoring requirements. The limits may be removed from the permit by way of a permit modification based on the outcome of the evaluation of your daily maximum

temperature data. The temperature monitoring requirements to be included on your DMR are outlined below. Please see the "Thermal Attachment" included with this letter.

Required Temperature Monitoring – See the Thermal Attachment

Outfall(s)	
Parameter	Temperature Maximum
Units	Degrees Fahrenheit
Frequency	3 times per week
Sample Type	Multiple Grab* or Continuous*
Comments	*Report the maximum temperature measured during the day on the DMR. For seasonal discharges collect measurements either using multiple grab or continuous methods during the period of operation and report the daily maximum effluent temperature on the DMR.

INSTRUCTIONS TO DRAFTER: *Include the following Dissipative Cooling information for permits issued to publicly or privately owned domestic sewage treatment works per s. NR 106.59, Wis. Adm. Code, if the permittee may be subject to sub-lethal (weekly average) limits and include the 'Dissipative Cooling Request Form' following the 'Thermal Attachment'*. (If you are unsure of the need for a DC evaluation, please contact the Limit Calculator for assistance.) If Dissipative Cooling is not applicable to the permittee then delete the following paragraph on Dissipative Cooling and delete the 'Dissipative Cooling Request Form' following the 'Thermal Attachment'. Retain the information on 'Evaluation of Temperature Limits' below for all permittees with a surface water discharge.

Dissipative Cooling Information: You may request that the Department consider the cooling of the effluent through dissipation of heat to the environment when determining the need for weekly temperature limits pursuant to s. NR 106.59, Wis. Adm. Code. As part of your request for consideration of dissipative cooling you must submit the 'Dissipative Cooling Request Form' which is available for download at http://dnr.wi.gov/topic/surfacewater/thermal.html. We encourage you to submit your request as soon as possible. The Thermal Guidance - Chapter 11 (available at http://dnr.wi.gov/topic/surfacewater/thermal.html) includes additional information on Dissipative Cooling. An example 'Dissipative Cooling Request Form' is enclosed for reference.

Evaluation of Temperature Limits: If after calculating temperature limits it is determined that your facility is subject to limits, you should be aware that you may request evaluation of temperature limits based on the following sections of the Wisconsin Administrative Code cited below (as applicable). Refer to the specified section in the Wis. Adm. Code to determine the information that must be submitted to initiate such a request or contact your DNR representative.

Wis. Administrative Code Sections Regarding Evaluation of Temperature Limits
NR 106.53(1)(a) Receiving Water Flow Rates (1/4 7-dayQ10) Using Monthly Flow Rates (see Chapter 9 pg. 53 of the Thermal Guidance)
NR 106.53(1)(c)-(e) Adequate Passage for Aquatic Life or Rapid Mixing or Modified Qs (see Chapter 10 pg. 55 of the Thermal Guidance)
NR 106.55(5) Limitations for Discharges to Storm Sewers (as applicable)
NR 106.55(10) Limitations Based on Site-Specific Mixing Zone Analysis
NR 106.55(11) Limitations Based on Installation of Diffusers
NR 106.55(13) Limitations Based on Water Quality Models
NR 106.56(8) Limit for the Protection of Public Health (as applicable)
NR 106.59(4) Sub-Lethal Limitations for Existing POTW Outfalls (Dissipative Cooling)
NR 106.59(6) Sub-Lethal Limitations for New POTW Discharges or Re-Located Outfalls (Dissipative Cooling)
NR 106.59(8) Permit Reissuance - Continued Consideration of Dissipative Cooling
NR 106.72 Application for Alternative Effluent Limitations for Temperature

Other Code Sections

Other sections of the Wisconsin Administrative Code may also be reviewed to determine if a request for evaluation of temperature limits is appropriate as shown below.

Other Wis. Administrative Code Sections Regarding Evaluation of Temperature Limits
NR 102.26 Site-Specific Ambient Temperature*
NR 106.54 (4) Calculation of Effluent Temperature Limitations Based on Real-Time Data
NR 106.55(8) Limitations for Discharges with Fluctuating Effluent Flow Rates

* If you are interested in ambient monitoring, contact your DNR Field Representative for DMR revisions relative to ambient data collection

If you have any questions, you may direct them to me at your convenience. Thank you.

Sincerely,

Signature Block

cc DNR Field Representative

THERMAL ATTACHMENT

Sample Location: Effluent temperature shall be measured at the outfall as near as possible to the actual point of discharge into the receiving water body, storm sewer, or other wastewater conveyance.

Multiple Grab Sample Method: Permittees choosing to collect multiple grab effluent temperature samples should record temperature at six (6) evenly spaced intervals during an active discharge in any 24-hour period. Alternative sampling intervals may be approved if the permittee can show that the maximum effluent temperature is captured during the sampling interval.

Continuous Sample Method: Permittees choosing to collect Effluent temperature samples as continuous samples shall do so in accordance with the provisions of s. NR 218.04(13), Wis. Adm. Code. This means that discrete measurements samples shall be recorded at intervals of not more than 15 minutes during an active discharge in any 24-hour period.

Temperature Monitoring Devices: Temperature measurements can be made using a thermometer, temperature probe, or data logger that has been properly calibrated and maintained. The accuracy of the recording device should be tested in a water bath at two temperatures (0°C and 20°C) and recorded in any field notes. A NIST (National Institute of Standards and Technology: www.nist.gov) traceable thermometer accurate to 0.2°C is required to determine accuracy. Calibration information may also be obtained from the manufacturer of the monitoring device.

The department does not endorse any specific manufacturer of temperature recorder although it is fair to say that data loggers are the preferred method for collecting continuous temperature data records. The cost of temperature data loggers continues to decline while their reliability and ease of use continues to improve. There are many manufacturers and models of data loggers from which to choose. A few of the more commonly available recorders are described below:

Commercially Available Submersible Temperature Loggers

Manufacturer	Logger Type	Web Site	Temperature Range	Battery Type (Max. Life)
Onset	Stowaway TidBit v2	www.onsetcomp.com	-4°F – 122°F	Non-Replaceable (Up to 5 years)
Onset	Hobo Water Temp Pro v2	www.onsetcomp.com	-40°F – 158°F	Lithium Replaceable (Up to 6 years)
Veriteq	Spectrum 1000	www.veriteq.com	-40°F – 185°F	Lithium – Internal (Up to 10 years)
Vemco	Minilog-II—T	www.vemco.com	-22°F – 176°F	Unspecified (Up to 10 years)

When selecting a data logger, the following characteristics are recommended:

a. Submersible, waterproof logger
b. Accuracy ±0.2°C
c. Programmable start time/date
d. User-selectable sampling interval

Other issues to consider when selecting a data logger are memory capacity and battery life. Storage capacity needs will depend on sampling interval (i.e. 30 seconds, 15 minutes, 2 hours) and how length of deployment (i.e. 7 days, 6 months, 1 year). For battery life, some loggers have factory replaceable batteries and others have non-replaceable batteries which should last at least 5 years with typical use. Data from these loggers can be transferred in the field to an optical shuttle at the operator's convenience (weekly, monthly, etc.) and brought back to a stationary computer for analysis.

Field Collection: Temperature recorded in the field (i.e., outfall or specified sampling location) should be collected as follows:

a. Place the thermometer, meter probe, or data logger in the water as least 4 inches below the surface or halfway to the bottom if in a shallow stream.
b. If using a thermometer, allow enough time for it to reach a stable temperature (at least 1 minute) before recording the temperature. If using a meter, allow the temperature reading to stabilize at a constant temperature reading before recording temperature.
c. If possible, try to read the temperature with the thermometer bulb beneath the water surface. If it is not possible, quickly remove the thermometer and read the temperature.

Minimum Data Recommendations: Variability in effluent temperature over time is not uncommon and may be influenced by both operational and climatic factors. Permits staff should assess each discharge independently to determine the amount of data needed to characterize the variability of effluent temperature representing "normal operating conditions." In doing so, staff should require sufficient effluent temperature sampling to meet the following:

Continuous Discharge – Limited Daily or Monthly Effluent Temperature Variability: A minimum of one (1) full years of data collection where samples are recorded for at least one (1) operating day per week.

Continuous Discharge – Highly Variable Daily or Monthly Effluent Temperature: A minimum of two (2) full years of data collection where samples are recorded for at least one (1) operating day per week.

Seasonal Discharges or Other Unusual Discharge Conditions: A minimum of two (2) full years of data collection where samples are recorded for at least one (1) operating day per week.

A permittee may choose to collect samples more frequently than weekly but should submit all data consistent with the guidance in #8, below.

SPECIAL NOTE: The minimum data requirements specified in this section <u>are not sufficient</u> to calculate a 99th percentile value for each discrete month of the year. To utilize the P99 approach

described in Chapter 7, pg. 41, of this Guidance, the department strongly recommends the collection of temperature values for no less than three (3) days per week for a minimum of 12 days per month. This collection frequency will ensure an adequate data set to calculate a monthly P99 in lieu of relying on the highest recorded daily or weekly average values authorized in s. NR 106.56(2)(a), Wis. Adm. Code, and s. NR 106.56(3)(a), Wis. Adm. Code, respectively.

Data Reporting: All temperature data collected shall be reported as follows:

Daily maximum values should be reported as the single highest discrete temperature recorded during any active discharge in a 24-hour period.

Weekly average temperature should be reported as the arithmetic mean of all daily maximum effluent temperature values recorded.

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
1	6024	0023141	ABBOTSFORD WASTEWATER TREATMENT FACILITY	WC	25-Feb-08	31-Dec-12	LAL	0.0025	0.32	0.01
2	14562	0049859	ABRAMS SANITARY DISTRICT 1	NE	28-Jun-07	31-Mar-12	WW	0.28	0.12	2.22
3	6025	0023159	ADAMS WASTEWATER TREATMENT FACILITY	WC	12-Mar-09	31-Mar-14	WW	4.75	0.47	10.22
4	7276	0021199	ALBANY WASTEWATER TREATMENT FACILITY	SC	01-Jan-10	31-Dec-14	WW	22.75	0.19	122.31
5	5856	0020745	ALGOMA WASTEWATER TREATMENT FACILITY	NE	28-Mar-08	31-Dec-12	WWGL	0.28	1.55	0.18
6	6214	0028053	ALLENTON SANITARY DISTRICT WWTP	SE	01-Jul-05	30-Jun-10	WW	0.33	0.55	0.60
7	5959	0022101	ALMA WASTEWATER TREATMENT FACILITY	WC	05-Nov-07	30-Sep-12	WW	1525.00	0.19	7998.95
8	5404	0023183	ALMENA VILLAGE OF	NO	17-Dec-08	31-Dec-13	WW	1.75	0.22	7.90
9	7329	0031861	AMANI SANITARY DISTRICT	NO	05-Oct-05	30-Sep-10	LAL	0	0.01	0.00
10	5808	0020125	AMERY CITY OF	NO	23-Dec-09	31-Dec-14	WW	5.75	0.62	9.27
11	6026	0023213	AMHERST WASTEWATER TREATMENT FACILITY	WC	29-Jun-09	30-Jun-14	CW	5.00	0.22	23.04
12	5466	0026808	AMNICON FOUNDATION	NO	22-Jun-06	30-Jun-11	LAL	0	0.00	0.00
13	5963	0022144	ANTIGO CITY OF	NO	17-Dec-08	31-Dec-13	CW	0.63	3.83	0.16
14	6027	0023221	APPLETON WASTEWATER TREATMENT FACILITY	NE	27-Sep-02	30-Sep-07	WWGL	232.50	24.03	9.68
15	6028	0023230	ARCADIA WASTEWATER TREATMENT FACILITY	WC	24-Mar-09	31-Mar-14	WW	31.25	2.19	14.28
16	5967	0022225	ARGYLE WASTEWATER TREATMENT FACILITY	SC	13-Sep-05	30-Sep-10	WW	15.75	0.28	55.53
17	7152	0060232	ARKANSAW WASTEWATER TREATMENT FACILITY	WC	21-Apr-10	31-Mar-15	WW	9.00	0.07	131.96
18	5143	0021512	ARLINGTON WASTEWATER TREATMENT FACILITY	SC	29-Sep-05	30-Sep-10	LAL	0	0.08	0.00
19	6376	0031267	ARPIN WASTEWATER TREATMENT FACILITY	WC	22-Oct-04	30-Sep-09	LAL	0	0.10	0.00
20	6385	0031381	ASHIPPUN SANITARY DISTRICT WWTF	SC	28-Dec-05	31-Dec-10	WW	1.38	0.11	12.54
21	6353	0030767	ASHLAND SEWAGE UTILITY	NO	31-Jan-06	31-Dec-10	CWGL		2.48	0.00
22	5979	0022365	ATHENS WASTEWATER TREATMENT FACILITY	WC	14-Sep-09	30-Sep-14	WW	0.06	0.16	0.38
23	5984	0022411	AUBURNDALE WASTEWATER TREATMENT FACILITY	WC	02-Nov-04	31-Dec-09	LAL	0	0.19	0.00
24	6029	0023272	AUGUSTA WASTEWATER TREATMENT FACILITY	WC	24-Mar-08	31-Mar-13	CW	0.70	0.51	1.37
25	6413	0031852	AURORA SANITARY DISTRICT # 1	NO	24-Mar-08	31-Mar-13	WWGL	197.50	0.05	4247.31
26	7145	0060151	AVOCA WASTEWATER TREATMENT FACILITY	SC	03-Mar-06	31-Mar-11	WW	0.35	0.10	3.53
27	7192	0060771	BAGLEY WASTEWATER TREATMENT FACILITY	SC	29-Jun-05	30-Jun-10	LAL	0	0.07	0.00
28	6524	0035840	BAILEYS HARBOR WASTEWATER TREATMENT FACILITY	NE	13-May-08	31-Mar-13	CWPWS		0.33	10:1 dilution
29	7298	0026891	BALDWIN WASTEWATER TREATMENT FACILITY	WC	25-May-08	31-Mar-13	LFF	0	0.45	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
30	6374	0031224	BANGOR WASTEWATER TREATMENT FACILITY	WC	03-May-05	30-Jun-10	WW	25.00	0.29	84.89
31	5847	0020605	BARABOO WASTEWATER TREATMENT FACILITY	SC	13-Dec-06	31-Dec-11	WW	21.75	3.35	6.50
32	6268	0029131	BARNEVELD WASTEWATER TREATMENT FACILITY	SC	29-Nov-05	31-Dec-10	WW	1.03	0.27	3.80
33	10666	0061255	BAY CITY VILLAGE	WC	30-Apr-10	31-Mar-15	WW	50.00	0.11	441.89
34	6215	0028061	BEAR CREEK WASTEWATER TREATMENT FACILITY	NE	19-Sep-06	30-Sep-11	LFFGL	0.0025	0.16	0.02
35	6030	0023345	BEAVER DAM WASTEWATER TREATMENT FACILITY	SC	29-Jun-06	30-Jun-11	WW	0.24	5.43	0.04
36	7287	0023353	BELGIUM WASTEWATER TREATMENT FACIL	SE	22-Jul-08	31-Dec-12	LALGL	0.0025	0.97	0.00
37	7218	0061336	BELL SANITARY DISTRICT 1	NO	14-Jun-07	30-Jun-12	CWPWS		0.03	10:1 dilution
38	6031	0023361	BELLEVILLE WASTEWATER TREATMENT FACILITY	SC	28-Jun-04	30-Jun-09	WW	8.50	0.54	15.85
39	5833	0020419	BELMONT WASTEWATER TREATMENT FACILITY	SC	30-Jan-09	31-Dec-13	WW	0.20	0.18	1.06
40	6162	0026930	BELOIT TOWN WASTEWATER TREATMENT FACILITY	SC	01-Jan-08	31-Dec-12	WW	54.75	1.55	35.32
41	6032	0023370	BELOIT WASTEWATER TREATMENT FACILITY	SC	15-Dec-09	31-Dec-14	WW	65.00	14.73	4.41
42	5850	0020672	BENTON WASTEWATER TREATMENT FACILITY	SC	03-Mar-06	31-Mar-11	WW	1.43	0.23	6.25
43	5895	0021229	BERLIN WASTEWATER TREATMENT FACILITY	NE	28-Dec-07	30-Jun-12	WW	85.00	2.33	36.56
44	6379	0031313	BETHEL CENTER WWTF	WC	27-Jul-04	30-Jun-09	LAL	0.06	0.03	2.24
45	5145	0022691	BIRNAMWOOD WASTEWATER TREATMENT FACILITY	NE	17-Sep-08	30-Jun-13	LALGL	0	0.22	0.00
46	5883	0021041	BLACK CREEK WASTEWATER TREATMENT FACILITY	NE	18-Sep-08	30-Jun-13	LFFGL	0.01	0.74	0.01
47	7281	0021954	BLACK RIVER FALLS WWTF	WC	13-Jun-06	30-Jun-11	WW	24.00	1.33	18.00
48	5888	0021105	BLANCHARDVILLE WASTEWATER TREATMENT FACILITY	SC	01-Jan-10	31-Dec-14	WW	12.00	0.38	31.99
49	6420	0031950	BLENKER SHERRY SANITARY DISTRICT WWTP	WC	30-Sep-09	30-Sep-14	WW	0.10	0.05	2.15
50	5844	0020575	BLOOMER WASTEWATER TREATMENT FACILITY	WC	18-Dec-08	31-Dec-12	WW	1.75	1.32	1.32
51	7305	0030805	BLOOMFIELD MANOR WASTEWATER TREATMENT FAC	SC	10-Nov-05	31-Dec-10	WWFF	0.07	0.05	1.56
52	6034	0023400	BLOOMINGTON WASTEWATER TREATMENT FACILITY	SC	17-May-05	31-Mar-10	WW	0.40	0.14	2.81
53	6401	0031658	BLUE MOUNDS WASTEWATER TREATMENT FACILITY	SC	21-Jun-04	30-Jun-09	LFF	0	0.12	0.00
54	6035	0023418	BLUE RIVER WASTEWATER TREATMENT FACILITY	SC	22-Mar-07	31-Mar-12	WW	13.00	0.07	199.69
55	6550	0036749	BOAZ WASTEWATER TREATMENT FACILITY	SC	31-Jan-09	31-Dec-13	WW	3.50	0.02	150.54
56	5960	0022110	BOSCOBEL WASTEWATER TREATMENT FACILITY	SC	30-Aug-07	30-Sep-12	WW	670.00	0.73	911.94

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
57	6256	0028908	BOSTWICK VALLEY MHP WWTF	WC	07-Jun-07	30-Jun-12	CW	2.20	0.03	70.97
58	5896	0021237	BOWLER WASTEWATER TREATMENT FACILITY	NE	25-Mar-08	30-Sep-12	CWGL	1.50	0.05	28.46
59	7161	0060330	BOYCEVILLE WASTEWATER TREATMENT FACILITY	WC	06-Nov-08	31-Dec-13	WW	5.00	0.66	7.55
60	7288	0023442	BRANDON WASTEWATER TREATMENT FACILITY	NE	06-Dec-05	31-Dec-10	LFF	0	0.26	0.00
61	5835	0020443	BRILLION WASTEWATER TREATMENT FACILITY	NE	28-Jun-04	30-Jun-09	LALGL	0	1.54	0.00
62	6337	0030481	BRISTOL RAINBOW LAKE, LLC	SE	18-Mar-09	31-Mar-14	LAL	0.0025	0.06	0.04
63	5952	0022021	BRISTOL UTILITY DISTRICT 1	SE	01-Jan-06	31-Dec-10	LAL	0.0025	0.74	0.00
64	5945	0021903	BRODHEAD WASTEWATER TREATMENT FACILITY	SC	24-Mar-06	31-Mar-11	WW	6.25	0.93	6.75
65	5962	0022136	BROKAW WASTEWATER TREATMENT FACILITY	WC	23-Feb-09	31-Mar-14	WW	225.00	0.06	4032.26
66	6037	0023469	BROOKFIELD, CITY OF	SE	23-Oct-07	30-Sep-12	WW	0.55	19.38	0.03
67	6038	0023485	BROOKLYN WASTEWATER TREATMENT FACILITY	SC	03-Mar-06	31-Mar-11	LFF	0.07	0.18	0.38
68	6361	0030911	BROOKVIEW MOBILE HOME COURT, LLC	WC	22-May-07	31-Mar-12	WW	1.60	0.03	51.61
69	5925	0021601	BROWNSVILLE WASTEWATER TREATMENT FACILITY	SC	13-Jun-06	30-Jun-11	LFF	0.01	0.19	0.03
70	6426	0032051	BROWNTOWN WASTEWATER TREATMENT FACILITY	SC	29-Sep-06	30-Sep-11	WW	2.75	0.06	43.27
71	6011	0022926	BURLINGTON WATER POLLUTION CONTROL	SE	23-Jun-09	31-Mar-14	WW	11.00	3.88	2.84
72	6394	0031551	BURNETT SANITARY DISTRICT #1 WWTF	SC	31-Mar-09	31-Mar-14	WWFF	0.27	0.06	4.58
73	6433	0032492	BUTTE DES MORTS CONSOLIDATED SD 1	NE	31-Mar-08	31-Dec-12	WWGL	202.75	0.12	1677.01
74	6039	0023515	CADOTT WASTEWATER TREATMENT FACILITY	WC	21-Sep-06	30-Sep-11	WW	1.30	0.27	4.74
75	6040	0023523	CAMBRIA WASTEWATER TREATMENT FACILITY	SC	24-Mar-06	31-Mar-11	WW	0.05	0.20	0.25
76	5047	0026948	CAMBRIDGE OAKLAND WASTEWATER COMMISSION	SC	31-Dec-09	31-Dec-14	WW	2.30	0.89	2.60
77	5862	0020818	CAMPBELLSPORT WASTEWATER TREATMENT FACILITY	NE	23-Jan-08	30-Jun-12	WWGL	0.03	0.73	0.03
78	6003	0022829	CAROLINE SD 1 WASTEWATER TREATMENT FACILITY	NE	14-Jun-07	31-Mar-12	WW	6.50	0.13	48.20
79	6384	0031372	CASCADE WASTEWATER TREATMENT FACILITY	SE	27-Sep-05	30-Sep-10	WW	0.55	0.26	2.12
80	6041	0023566	CASCO WASTEWATER TREATMENT FACILITY	NE	28-Jun-05	30-Jun-10	CW	0.08	0.11	0.74
81	5871	0020915	CASHTON WASTEWATER TREATMENT FACILITY	WC	26-Dec-06	31-Dec-11	CW	0.70	0.19	3.72
82	5912	0021423	CASSVILLE WASTEWATER TREATMENT FACILITY	SC	11-Dec-06	31-Dec-11	WW	546.00	0.43	1280.94
83	16902	0061701	CATAWBA KENNAN JOINT SEWAGE COMMISSION	NO	20-Mar-07	31-Mar-12	WW	0.14	0.05	2.96
84	7306	0031801	CAZENOVIA WASTEWATER TREATMENT FACILITY	SC	31-Mar-09	31-Mar-14	WW	1.60	0.05	29.49

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
85	5141	0020711	CEDAR GROVE WASTEWATER TRTMNT FACIL	SE	31-Mar-08	31-Mar-13	LALGL	0.01	0.65	0.01
86	5817	0020222	CEDARBURG WASTEWATER TREATMENT FACILITY	SE	01-Jul-08	30-Jun-13	WWGL	1.14	4.26	0.27
87	6104	0025348	CHASEBURG WASTEWATER TREATMENT FAC	WC	12-Mar-09	31-Mar-14	WW	8.50	0.12	68.55
88	5162	0035718	CHELSEA SANITARY DISTRICT	NO	23-Sep-09	30-Sep-14	CW	0.02	0.00	4.84
89	5924	0021598	CHETEK CITY OF	NO	02-Jun-10	30-Jun-15	WW	2.75	0.60	4.61
90	6363	0030961	CHILI WASTEWATER TREATMENT FACILITY	WC	26-Nov-07	30-Sep-12	LAL	0	0.08	0.00
91	7285	0022799	CHILTON WASTEWATER TREATMENT FACILITY	NE	31-Mar-04	31-Mar-09	WWGL	0.06	1.84	0.03
92	6042	0023604	CHIPPEWA FALLS WWTP	WC	31-Mar-09	31-Mar-14	WW	196.50	8.70	22.60
93	6297	0029700	CLARK COUNTY HEALTH CARE CENTER WWTF	WC	17-Nov-08	31-Dec-13	WW	0.02	0.24	0.09
94	6531	0036030	CLARKS MILLS SANITARY DISTRICT	NE	02-May-06	31-Dec-10	WW	0.75	0.03	26.88
95	6548	0036706	CLAYTON VILLAGE OF	NO	25-Sep-06	30-Sep-11	LAL	0.0025	0.06	0.04
96	6043	0023639	CLEAR LAKE VILLAGE OF	NO	19-Jun-09	30-Jun-14	LFF	0	0.39	0.00
97	6357	0030848	CLEVELAND WASTEWATER TREATMENT FACILITY	NE	20-Apr-10	30-Jun-15	CWPWS		0.23	10:1 dilution
98	5953	0022039	CLINTON WASTEWATER TREATMENT FACILITY	SC	21-Sep-06	30-Sep-11	LAL	0.01	0.59	0.02
99	5914	0021466	CLINTONVILLE WASTEWATER TREATMENT FACILITY	NE	30-Nov-04	31-Dec-09	WW	2.10	1.61	1.30
100	6427	0032069	CLOVER SANITARY DISTRICT	NO	20-Nov-07	31-Dec-12	LAL		0.03	10:1 dilution
101	5853	0020702	CLYMAN WASTEWATER TREATMENT FACILITY	SC	17-Dec-01	31-Dec-06	LAL	0	0.08	0.00
102	6044	0023655	COLBY CITY WWTF	WC	01-Oct-07	30-Sep-12	LFF	0.03	0.62	0.04
103	7282	0022080	COLEMAN WASTEWATER TREATMENT FACILITY	NE	22-Dec-09	30-Jun-14	WWGL	0.53	0.43	1.23
104	6045	0023663	COLFAX WASTEWATER TREATMENT FACILITY	WC	29-Dec-08	31-Dec-13	WW	65.00	0.16	419.35
105	5879	0021008	COLUMBUS WASTEWATER TREATMENT FACILITY	SC	30-Sep-09	30-Sep-14	WW	0.63	1.55	0.40
106	6434	0032522	CONRATH VILLAGE OF	NO	16-Mar-10	31-Mar-15	WW	0.28	0.01	19.71
107	5884	0021059	CONSOLIDATED KOSHKONONG SANITARY DIST WWTF	SC	22-Dec-03	31-Dec-08	WW	35.00	0.93	37.63
108	5874	0020958	COON VALLEY WASTEWATER TREATMENT FACILITY	WC	27-Nov-07	30-Sep-12	CW	6.00	0.28	21.51
109	5903	0021300	CORNELL WASTEWATER TREATMENT FACILITY	WC	23-Oct-08	30-Sep-13	WW	100.00	0.61	163.33
110	7163	0060372	CRIVITZ WASTEWATER TREATMENT FACILITY	NE	19-Sep-08	30-Sep-13	WWGL	15.25	0.33	45.76
111	7239	0061263	CROCKETT'S RESORT	WC	05-Nov-09	30-Sep-14	WW	447.50	0.07	6415.77
112	5859	0020788	CROSS PLAINS WASTEWATER TREATMENT FACILITY	SC	17-Sep-04	30-Sep-09	CW	1.15	0.92	1.25

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
113	7254	0035114	CRYSTAL LAKE SANITARY DISTRICT	NO	10-Sep-08	30-Sep-13	LAL	0.10	0.05	1.96
114	5966	0022217	CUBA CITY WASTEWATER TREATMENT FACILITY	SC	08-Sep-06	30-Sep-11	LFF	0.03	0.47	0.06
115	5828	0020354	CUMBERLAND CITY OF	NO	27-Mar-09	31-Mar-14	LFF	0	0.62	0.00
116	6389	0031445	CURTISS WASTEWATER TREATMENT FACILITY	WC	01-Oct-07	30-Sep-12	LAL	0	0.06	0.00
117	6356	0030830	DALE SANITARY DISTRICT NO 1 WWTF	NE	29-Jun-04	30-Jun-09	LALGL	0	0.09	0.00
118	6046	0023698	DALLAS VILLAGE OF	NO	21-Sep-06	30-Sep-11	CW	0.85	0.16	5.48
119	15063	0049816	DANE IOWA WASTEWATER COMMISSION WWTF	SC	31-Mar-05	31-Mar-10	WW	4.25	1.07	3.96
120	5880	0021016	DARLINGTON WASTEWATER TREATMENT FACILITY	SC	11-Dec-06	31-Dec-11	WW	9.25	0.53	17.55
121	6303	0029793	DE SOTO WASTEWATER TREATMENT FACILITY	WC	26-Apr-10	31-Mar-15	WW	1600.00	0.10	16129.03
122	6048	0023744	DEERFIELD WASTEWATER TREATMENT FACILITY	SC	01-Mar-05	31-Mar-10	LAL	0	0.61	0.00
123	6424	0032026	DELAFIELD HARTLAND POLLUTION CONTROL COMM	SE	01-Apr-06	31-Mar-11	WW	0.50	4.82	0.10
124	7345	0021741	DENMARK WASTEWATER TREATMENT FACILITY	NE	31-Jul-06	30-Jun-11	LFF	0.16	0.78	0.21
125	6051	0023817	DICKEYVILLE WASTEWATER TREATMENT FACILITY	SC	27-May-04	31-Mar-09	LAL	0	0.26	0.00
126	7215	0061191	DODGE SANITARY DISTRICT NO 1	WC	19-Dec-07	31-Dec-11	WW	31.00	0.13	243.90
127	6160	0026913	DODGEVILLE WASTEWATER TREATMENT FACILITY	SC	11-Apr-08	31-Mar-13	LFF	0.0025	1.40	0.00
128	5922	0021571	DORCHESTER WASTEWATER TREATMENT FACILITY	WC	20-Apr-10	31-Mar-15	LFF	0	0.20	0.00
129	5907	0021351	DOUSMAN WASTEWATER TREATMENT FACILITY	SE	26-Mar-10	31-Mar-15	WW	0.50	0.54	0.92
130	6402	0031682	DOWNSVILLE SANITARY DISTRICT #1 WWTF	WC	25-Jan-08	31-Dec-12	WW	109.25	0.04	2610.51
131	6399	0031615	DRUMMOND SANITARY DISTRICT 1	NO	11-Dec-07	31-Dec-12	LAL	0	0.06	0.00
132	6360	0030899	DURAND WASTEWATER TREATMENT FACILITY	WC	31-Jul-08	30-Sep-13	WW	530.00	1.33	397.60
133	6393	0031526	EAGLE LAKE SEWER UTILITY	SE	16-Sep-08	30-Sep-13	LAL	0.0025	0.62	0.00
134	5950	0022004	EAGLE RIVER CITY OF	NO	10-Mar-09	31-Mar-14	WW	24.25	0.88	27.45
135	5832	0020397	EAST TROY WASTEWATER TREATMENT FACILITY	SE	01-Jul-08	30-Jun-13	WWFF	0	1.09	0.00
136	5166	0036765	EASTMAN WASTEWATER TREATMENT FACILITY	WC	21-Aug-07	30-Sep-12	CW	0.93	0.08	11.94
137	6052	0023850	EAU CLAIRE WASTEWATER TREATMENT FACILITY	WC	28-Sep-05	30-Sep-10	WW	178.50	17.83	10.01
138	6533	0036102	EAU CLAIRE YMCA	WC	25-Mar-07	31-Mar-11	LAL	0	0.01	0.00
139	6349	0030716	EDEN WASTEWATER TREATMENT FACILITY	NE	24-Mar-04	31-Mar-09	LFFGL	0	0.23	0.00
140	5938	0021784	EDGAR WASTEWATER TREATMENT FACILITY	WC	14-Nov-06	30-Sep-11	LFF	0.02	0.30	0.05
141	5827	0020346	EDGERTON WASTEWATER TREATMENT FACILITY	SC	31-Mar-05	31-Mar-10	WW	35.00	1.09	32.26

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
142	6523	0035661	EGG HARBOR WASTEWATER TREATMENT FACILITY	NE	15-Dec-08	31-Dec-13	CWPWS		0.39	10:1dilution
143	6053	0023892	ELEVA WASTEWATER TREATMENT FACILITY	WC	13-Nov-07	30-Sep-12	N	6.00	0.11	55.30
144	6054	0023914	ELK MOUND WASTEWATER TREATMENT FACILITY	WC	14-Jul-08	30-Jun-13	LFF	0	0.29	0.00
145	5898	0021253	ELLSWORTH WASTEWATER TREATMENT FACILITY	WC	08-Mar-05	31-Mar-10	LAL	0	1.02	0.00
146	6055	0023922	ELMWOOD VILLAGE WWTP	WC	25-Feb-08	30-Sep-10	CW	2.75	0.14	19.71
147	6056	0023931	ELROY WASTEWATER TREATMENT FACILITY	WC	29-May-07	31-Mar-12	WW	2.40	0.52	4.65
148	6057	0023949	EMBARRASS CLOVERLEAF LAKES SD LAGOON SYSTEM	NE	23-Sep-05	30-Sep-10	WW	6.50	0.23	27.96
149	5156	0031488	ENDEAVOR WWTF	NE	10-Dec-04	31-Dec-09	No surface water			
150	7217	0061271	EPHRAIM WASTEWATER TREATMENT FACILITY	NE	17-Mar-09	31-Mar-14	CWPWS		0.48	10:1 dilution
151	5848	0020621	ETTRICK WASTEWATER TREATMENT FACILITY	WC	30-Apr-07	31-Mar-12	CW	2.40	0.10	24.58
152	6536	0036200	FAIRCHILD WASTEWATER TREATMENT FAC	WC	29-Apr-09	31-Mar-14	WW	2.00	0.13	15.93
153	7278	0021440	FAIRWATER WASTEWATER TREATMENT FACILITY	NE	23-Dec-03	31-Dec-08	LALGL	0	0.08	0.00
154	7296	0025976	FALL CREEK WASTEWATER TREATMENT FACILITY	WC	28-Nov-06	30-Sep-11	WW	11.25	0.46	24.23
155	6059	0023973	FALL RIVER WASTEWATER TREATMENT FACILITY	SC	30-Sep-08	30-Sep-13	WW	0.35	2.64	0.13
156	6060	0023981	FENNIMORE WASTEWATER TREATMENT FACILITY	SC	11-Mar-05	31-Mar-10	LFF	0.0025	0.96	0.00
157	6387	0031411	FENWOOD WASTEWATER TREATMENT FACILITY	WC	06-May-08	31-Mar-13	WW	0.02	0.03	0.48
158	5876	0020974	FERRYVILLE WASTEWATER TREATMENT FACILITY	WC	24-Sep-09	30-Sep-14	CW	1.80	0.05	33.18
159	6516	0035203	FISH CREEK SD1 WASTEWATER TREATMENT FACILITY	NE	15-Dec-08	31-Dec-13	CWPWS		0.54	10:1 dilution
160	7290	0023990	FOND DU LAC WATER POLLUTION CONTROL PLANT	NE	17-Sep-04	30-Sep-09	WWPWS		17.21	10:1 dilution
161	6151	0026689	FONKS HOME CENTER INC., HARVEST VIEW ESTATES	SE	01-Jan-06	31-Dec-10	LAL	0	0.16	0.00
162	6347	0030660	FONKS HOME CENTER, INC. - HICKORY HAVEN	SE	26-Dec-06	31-Dec-11	LAL	0.0025	0.03	0.08
163	6530	0036021	FONTANA WALWORTH WATER POLLUTION CONT. COMM	SE	01-Jan-07	31-Dec-09	WW	0.14	2.74	0.05
164	6061	0024023	FOOTVILLE WASTEWATER TREATMENT FACILITY	SC	29-Sep-08	30-Sep-13	WW	0.85	0.13	6.69
165	5159	0032123	FOREST JUNCTION SANITARY DISTRICT	NE	27-Dec-06	31-Dec-11	LALGL	0.01	0.04	0.11
166	6255	0028894	FORESTVILLE WASTEWATER TREATMENT FACILITY	NE	27-Nov-06	31-Dec-11	WWGL	0.28	0.12	2.30

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
167	5990	0022489	FORT ATKINSON WASTEWATER TREATMENT FACILITY	SC	29-Jun-06	30-Jun-11	WW	13.25	4.19	3.17
168	6062	0024040	FOUNTAIN CITY WWTF	WC	21-Aug-07	30-Sep-12	LAL	1580.50	0.33	4742.69
159	6516	0035203	FISH CREEK SD1 WASTEWATER TREATMENT FACILITY	NE	15-Dec-08	31-Dec-13	CWPWS		0.54	10:1 dilution
160	7290	0023990	FOND DU LAC WATER POLLUTION CONTROL PLANT	NE	17-Sep-04	30-Sep-09	WWPWS		17.21	10:1 dilution
161	6151	0026689	FONKS HOME CENTER INC., HARVEST VIEW ESTATES	SE	01-Jan-06	31-Dec-10	LAL	0	0.16	0.00
162	6347	0030660	FONKS HOME CENTER, INC. - HICKORY HAVEN	SE	26-Dec-06	31-Dec-11	LAL	0.0025	0.03	0.08
163	6530	0036021	FONTANA WALWORTH WATER POLLUTION CONT. COMM	SE	01-Jan-07	31-Dec-09	WW	0.14	2.74	0.05
164	6061	0024023	FOOTVILLE WASTEWATER TREATMENT FACILITY	SC	29-Sep-08	30-Sep-13	WW	0.85	0.13	6.69
165	5159	0032123	FOREST JUNCTION SANITARY DISTRICT	NE	27-Dec-06	31-Dec-11	LALGL	0.01	0.04	0.11
166	6255	0028894	FORESTVILLE WASTEWATER TREATMENT FACILITY	NE	27-Nov-06	31-Dec-11	WWGL	0.28	0.12	2.30
167	5990	0022489	FORT ATKINSON WASTEWATER TREATMENT FACILITY	SC	29-Jun-06	30-Jun-11	WW	13.25	4.19	3.17
168	6062	0024040	FOUNTAIN CITY WWTF	WC	21-Aug-07	30-Sep-12	LAL	1580.50	0.33	4742.69
169	5142	0021377	FRANCIS CREEK WASTEWATER TREATMENT FACILITY	NE	31-Mar-05	31-Mar-10	No surface water			
170	6274	0029254	FREDERIC VILLAGE OF	NO	22-Dec-04	31-Dec-09	LFF	0	0.22	0.00
171	5861	0020800	FREDONIA MUNICIPAL SEWER AND WATER UTILITY	SE	23-Dec-09	31-Dec-14	WWGL	6.00	0.93	6.45
172	5864	0020842	FREEDOM SANITARY DISTRICT NO 1	NE	12-Jun-09	30-Sep-13	LFFGL	0	0.62	0.00
173	6126	0026158	FREMONT ORIHULA WOLF RIVER JOINT S C	NE	24-Feb-06	31-Mar-11	WW	117.75	0.16	759.68
174	5158	0031780	FRIESLAND WASTEWATER TREATMENT FACILITY	SC	13-Jun-06	30-Jun-11	LAL	0	0.04	0.00
175	5933	0021725	GALESVILLE WASTEWATER TREATMENT PLANT	WC	15-Aug-08	30-Jun-13	WW	7.50	0.48	15.61
176	5970	0022268	GAYS MILLS WASTEWATER TREATMENT FACILITY	WC	11-Jul-05	30-Jun-10	WW	39.00	0.13	289.21
177	6050	0023787	GBMSD - DE PERE	NE	19-Apr-06	31-Mar-11		165.00	22.01	7.50
178	5886	0021083	GENOA CITY VILLAGE	SE	01-Jul-08	30-Jun-13	WW	0.98	0.90	1.08
179	5972	0022284	GENOA WASTEWATER TREATMENT FACILITY	WC	27-Apr-10	30-Jun-15	WW	1735.00	0.06	27983.87
180	6396	0031577	GIBBSVILLE SANITARY DISTRICT	SE	01-Jan-06	31-Dec-10	WW	1.23	0.09	13.17
181	5956	0022063	GILLETT WASTEWATER TREATMENT FACILITY	NE	24-Jun-09	30-Jun-14	WWGL	46.25	0.52	89.07

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
182	6362	0030937	GILMAN VILLAGE OF	NO	17-Jun-08	30-Jun-13	LAL	0.55	0.19	2.84
183	6307	0029963	GLEN FLORA VILLAGE OF	NO	25-Mar-08	31-Mar-13		0.02	0.02	0.88
184	7164	0060381	GLENWOOD CITY WASTEWATER TREATMENT FACILITY	WC	11-Nov-08	30-Sep-13	LAL	0	0.41	0.00
185	6291	0029599	GLIDDEN SANITARY DISTRICT	NO	06-Dec-06	31-Dec-11	WW	4.75	0.16	30.65
186	6529	0035998	GOETZ COMPANIES INC (PORTAGE PETRO TRAVEL P)	SC	23-Jun-03	30-Jun-08	WWFF	21.75	0.06	342.25
187	5814	0020184	GRAFTON VILLAGE WATER & WASTEWATER UTILITY	SE	17-Dec-08	31-Dec-13	WWGL	6.00	3.33	1.80
188	6080	0024686	GRAND CHUTE MENASHA WEST SEWERAGE COMMISSION	NE	29-Jun-09	30-Jun-14	WWPWS	232.50	8.68	26.79
189	6278	0029327	GRAND GENEVA RESORT & SPA	SE	01-Jul-08	30-Jun-13	WW	0	0.78	0.00
190	7236	0035131	GRAND VIEW SANITARY DISTRICT	NO	31-Mar-10	31-Mar-15	LALGL	0	0.05	0.00
191	5868	0020885	GRANTON WASTEWATER TREATMENT FACILITY	WC	29-May-07	31-Mar-12	WW	0.06	0.09	0.62
192	7166	0060429	GRANTSBURG VILLAGE OF	NO	27-Mar-06	31-Mar-11	WW	6.75	0.19	34.84
193	6063	0024139	GRATIOT WASTEWATER TREATMENT FACILITY	SC	31-Mar-07	31-Mar-12	WW	0.88	0.05	16.13
194	7181	0060607	GREAT LAKES INVESTORS LLC WWTF	SC	08-Sep-06	30-Sep-11	LAL	0	0.05	0.00
195	31515	0063053	GREATER BAYFIELD WWTP COMMISSION	NO	28-Sep-05	30-Sep-10	LAL	0	0.47	10:1 dilution
196	5878	0020991	GREEN BAY METROPOLITAN SEWERAGE DISTRICT	NE	29-Sep-05	30-Sep-10	WW	165.00	81.38	2.03
197	9788	0036846	GREEN LAKE SANITARY DISTRICT	NE	09-Aug-04	30-Sep-09	WWGL	22.50	0.62	36.29
198	5937	0021776	GREEN LAKE WASTEWATER TREATMENT FACILITY	NE	10-Oct-06	30-Sep-11	WW	0.82	0.44	1.86
199	5819	0020249	GREENWOOD WASTEWATER TREATMENT FACILITY	WC	07-Aug-06	30-Jun-11	WW	0.04	0.34	0.12
200	6000	0022781	GRESHAM WASTEWATER TREATMENT FACILITY	NE	07-Jun-05	30-Jun-10	CW	14.00	0.24	59.03
201	5815	0020192	HARTFORD WATER POLLUTION CONTROL FACILITY	SE	26-Sep-06	30-Sep-11	WW	0.13	5.58	0.02
202	6545	0036641	HATFIELD SANITARY DISTRICT	WC	29-Jan-07	31-Dec-11	WW	18.75	0.09	201.61
203	6066	0024201	HAWKINS VILLAGE OF	NO	19-Dec-07	31-Dec-12	LFF	0.03	0.18	0.18
204	7348	0024210	HAZEL GREEN WASTEWATER TREATMENT FACILITY	SC	01-Jul-08	30-Jun-13	WW	3.75	0.26	14.40
205	6375	0031232	HEART OF VALLEY MSD WW TRTMNT FAC	NE	18-Jun-01	30-Jun-06	WWGL		8.53	0.00
206	6377	0031275	HEWITT SANITARY DISTRICT WWTP	WC	16-Feb-10	31-Dec-14	LAL	0	0.08	0.00
207	6552	0036790	HIGHLAND WASTEWATER TREATMENT FACILITY	SC	30-Jun-09	30-Jun-14	LFF	0.0025	0.13	0.02
208	5900	0021270	HILBERT WASTEWATER TREATMENT FACILITY	NE	22-Dec-09	31-Mar-14	LFFGL	0	0.51	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
209	6519	0035483	HILL POINT SANITARY DISTRICT WWTF	SC	01-Apr-08	31-Mar-13	WW	0.40	0.02	23.46
210	5845	0020583	HILLSBORO WASTEWATER TREATMENT FACILITY	WC	17-Nov-09	31-Dec-14	WW	0.85	0.78	1.10
211	6221	0028207	HOLLAND SD 1 WASTEWATER TREATMENT FACILITY	NE	24-Mar-03	31-Mar-08	LALGL	0	0.60	0.00
212	6381	0031330	HOLLANDALE WASTEWATER TREATMENT FACILITY	SC	17-Aug-04	30-Jun-09	WW	3.00	0.05	64.52
213	6068	0024261	HOLMEN WASTEWATER TREATMENT FACILITY	WC	08-May-06	30-Jun-11	WW	0.80	1.26	0.64
214	7302	0028142	HOLY FAMILY CONVENT WASTEWATER TREATMENT FAC	NE	29-Jul-08	30-Jun-13	WW		0.16	10:1 dilution
215	5818	0020231	HORICON WASTEWATER TREATMENT FACILITY	SC	29-Sep-05	30-Sep-10	WW	0.75	0.90	0.83
216	6008	0022896	HORTONVILLE WASTEWATER TREATMENT FACILITY	NE	25-Mar-08	30-Sep-12	WWGL	90.50	0.78	116.77
217	5928	0021679	HOWARDS GROVE WASTEWATER TRTMT FAC	SE	29-Jan-08	31-Dec-12	WWGL	0.01	0.49	0.02
218	11755	0049689	HUB ROCK SANITARY DISTRICT #1 WWTF	SC	30-Sep-09	30-Sep-14	CW	7.25	0.04	179.90
219	26609	0063461	HUBBARD - HUSTISFORD SANITARY DISTRICT 1	SC	29-Sep-06	30-Sep-11	Inactive - no WQBEL			
220	26610	0063479	HUBBARD SANITARY DISTRICT 2	SC	29-Sep-06	30-Sep-11	Inactive - no WQBEL			
221	6069	0024279	HUDSON WASTEWATER TREATMENT FACILITY	WC	23-May-02	31-Mar-07	WW	298.50	3.41	87.54
222	5824	0020303	HUSTISFORD WASTEWATER TREATMENT FACILITY	SC	31-Mar-06	31-Mar-11	WW	37.25	0.23	160.22
223	6429	0032085	HUSTLER WASTEWATER TREATMENT FACILITY	WC	25-Feb-08	31-Mar-13	CW	1.00	0.03	30.72
224	6070	0024287	INDEPENDENCE WASTEWATER TREATMENT PLANT	WC	23-Sep-09	30-Sep-14	CW	21.00	0.26	82.11
225	5932	0021717	IOLA WASTEWATER TREATMENT FACILITY	NE	23-Jun-08	31-Dec-12	WWGL	1.90	0.28	6.85
226	7342	0020486	IRON RIDGE WASTEWATER TREATMENT FACILITY	SC	31-Mar-09	01-Apr-14	LAL	0	0.18	0.00
227	6367	0031038	IXONIA SANITARY DISTRICT #1 WWTF	SC	01-Jul-08	30-Jun-13	LAL	0.01	0.34	0.01
228	5940	0021806	JACKSON (VILLAGE) WASTEWATER TREATMENT PLANT	SE	27-Sep-05	30-Sep-10	WWGL	0.88	2.62	0.33
229	5405	0030627	JAMESTOWN SANITARY DISTRICT NO 2 WWTF	SC	01-Jul-08	30-Jun-13	LAL	0	0.02	0.00
230	6408	0031755	JAMESTOWN SANITARY DISTRICT NO 3 WWTF	SC	01-Mar-05	31-Mar-10	WW	0.05	0.01	3.58
231	6327	0030350	JANESVILLE WASTEWATER UTILITY	SC	01-Apr-05	31-Mar-10	WW	50.25	20.31	2.47
232	6071	0024333	JEFFERSON WASTEWATER TREATMENT FACILITY	SC	28-Dec-02	31-Dec-07	WW	7.75	3.98	1.95
233	5964	0022161	JOHNSON CREEK WASTEWATER TREATMENT FACILITY	SC	01-Jan-10	31-Dec-14	WW	5.00	0.43	11.52
234	6328	0030368	JUDA SANITARY DISTRICT #1 WWTF	SC	21-Dec-06	31-Dec-11	WW	0.11	0.06	1.69

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
235	6216	0028070	JUNCTION CITY WASTEWATER TREATMENT FACILITY	WC	25-Mar-05	31-Mar-10	LAL	0	0.09	0.00
236	5915	0021474	JUNEAU WASTEWATER TREATMENT FACILITY	SC	29-Jun-05	30-Jun-10	LAL	0	0.98	0.00
237	7151	0060224	KELLY LAKE SANITARY DISTRICT NO 1	NE	27-Mar-08	31-Dec-12	No surface water			
238	5840	0020516	KENDALL WASTEWATER TREATMENT FACILITY	WC	30-Jul-08	30-Jun-13	CW	0.45	0.11	4.15
239	6248	0028703	KENOSHA WASTEWATER TREATMENT FACILITY	SE	22-Jan-08	31-Dec-12	WWGL		44.33	0.00
240	5934	0021733	KEWASKUM VILLAGE	SE	23-Dec-04	31-Dec-09	WWGL	0.45	1.16	0.39
241	5813	0020176	KEWAUNEE WASTEWATER TREATMENT FACILITY	NE	16-Jun-08	30-Sep-12	WWPWS	1.93	0.90	2.14
242	5810	0020141	KIEL WASTEWATER TREATMENT FACILITY	NE	31-Mar-09	30-Sep-13	WWGL	0.23	1.34	0.17
243	6276	0029289	KIELER SANITARY DISTRICT NO 1 WWTF	SC	28-May-04	31-Mar-09	LAL	0	0.14	0.00
244	5411	0036421	KINGSTON WASTEWATER TREATMENT FACILITY	NE	14-Jun-05	30-Jun-10	WW	1.00	0.03	30.72
245	7174	0060500	KNAPP WASTEWATER TREATMENT FACILITY	WC	01-Oct-07	30-Sep-12	CW	1.95	0.06	31.45
246	6257	0028941	KNIGHT TOWN OF	NO	30-Mar-09	31-Mar-14	CW	2.26	0.03	66.35
247	6526	0035874	KOSSUTH SANITARY DISTRICT NO. 2 WWTF	NE	29-Sep-04	30-Sep-09	LALGL	0	0.03	0.00
248	6220	0028169	KRAKOW SANITARY DISTRICT WWTF	NE	27-Feb-06	31-Mar-11	WW	0.05	0.13	0.38
249	6290	0029581	LA CROSSE CITY	WC	01-Dec-09	31-Dec-14	WW	1735.00	31.00	55.97
250	6072	0024465	LA FARGE WASTEWATER TREATMENT PLANT	WC	10-Mar-08	31-Mar-13	WW	16.00	0.27	60.02
251	6254	0028878	LA VALLE WASTEWATER TREATMENT FACILITY	SC	19-Sep-07	30-Sep-12	WW	7.25	0.09	82.06
252	5905	0021326	LADYSMITH CITY OF	NO	27-Mar-08	31-Mar-13	WW	103.00	1.00	103.03
253	6372	0031194	LAKE MILLS WASTEWATER TREATMENT FACILITY	SC	31-Mar-10	31-Mar-15	WW	0.35	1.52	0.23
254	7312	0036374	LAKE TOMAHAWK TOWNSHIP SANITARY DISTRICT 1	NO	28-Jul-09	30-Sep-14	WW	31.75	0.08	379.33
255	6279	0029335	LAKELAND COLLEGE	SE	01-Jul-08	30-Jun-13	WWGL	0.70	0.09	7.53
256	6004	0022837	LAKELAND SANITARY DISTRICT	NO	25-Mar-08	31-Mar-13	WWFF	1.63	1.16	1.40
257	5319	0061387	LAKELAND SANITARY DISTRICT # 1	NO	11-Dec-07	31-Dec-12	LFF	0	0.02	0.00
258	7350	0029807	LAKEVIEW NEUROLOGICAL REHAB CENTER-MIDWEST	SE	16-Sep-08	30-Sep-13	LAL	0	0.04	0.00
259	12732	0049841	LAKEWOOD SANITARY DISTRICT NO 1	NE	10-Mar-05	31-Mar-10	CW	2.45	0.08	29.82
260	6073	0024503	LANCASTER WASTEWATER TREATMENT FACILITY	SC	01-Jul-08	30-Jun-13	LFF	0	1.15	0.00
261	6245	0028592	LAONA SANITARY DISTRICT #1	NO	20-Mar-07	31-Mar-12	WW	2.10	0.20	10.42
262	6417	0031925	LARSEN WINCHESTER SD WWTF	NE	23-Dec-03	31-Dec-08	LALGL	0	0.08	0.00
263	6383	0031364	LEBANON SANITARY DISTRICT #1 WWTF	SC	30-Jun-05	30-Jun-10	LAL	0	0.03	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
264	6020	0023051	LEBANON SANITARY DISTRICT #2 WWTF	SC	29-Sep-06	30-Sep-11	LAL	0	0.06	0.00
265	7219	0061361	LENA WASTEWATER TREATMENT FACILITY	NE	25-Sep-07	30-Sep-12		0	0.19	0.00
266	6521	0035548	LEROY KEKOSKEE WWTF COMMISSION	SC	09-Dec-05	31-Dec-10	WW	0.40	0.06	6.79
267	6541	0036447	LIME RIDGE WASTEWATER TREATMENT FACILITY	SC	30-Sep-09	30-Sep-14	WW	0.05	0.02	2.15
268	5923	0021580	LINDEN WASTEWATER TREATMENT FACILITY	SC	06-Sep-05	30-Sep-10	WW	0.08	0.09	0.81
269	7354	0031968	LITTLE SUAMICO SANITARY DISTRICT NO 1	NE	09-Aug-04	30-Sep-09	WW	0.09	0.23	0.36
270	5144	0022187	LIVINGSTON WASTEWATER TREATMENT FACILITY	SC	23-Mar-07	31-Mar-12	LFF	0.01	0.16	0.05
271	6010	0022918	LODI WASTEWATER TREATMENT FACILITY	SC	26-Sep-05	30-Sep-10	CW	3.75	0.50	7.56
272	5331	0029114	LOGANVILLE WASTEWATER TREATMENT FACILITY	SC	13-Dec-04	31-Dec-09	WW	0.65	0.07	9.32
273	5841	0020532	LOMIRA WASTEWATER TREATMENT FACILITY	SC	29-Sep-05	30-Sep-10	LFF	0.06	0.49	0.11
274	6275	0029271	LOWELL WASTEWATER TREATMENT FACILITY	SC	22-Dec-03	31-Dec-06	WW	1.25	0.06	20.16
275	6416	0031917	LUBLIN VILLAGE OF	NO	27-Sep-05	30-Sep-10	LAL	0	0.03	0.00
276	5916	0021482	LUCK VILLAGE OF	NO	30-Jun-09	30-Jun-14	LAL	0	0.56	0.00
277	5946	0021911	LUXEMBURG WASTEWATER PRETREATMENT FACILITY	NE	13-May-05	30-Jun-10			0.62	0.00
278	7172	0060488	LYNDON STATION WASTEWATER TREATMENT FACILITY	WC	02-Jun-10	30-Jun-15	CW	0.23	0.10	2.38
279	6419	0031941	LYONS SANITARY DISTRICT NO 2	SE	01-Oct-05	30-Sep-10	WW	0.98	0.32	3.04
280	6352	0030759	MADELINE SANITARY DISTRICT	NO	04-Sep-08	30-Sep-13	CWGL		0.24	0.00
281	7291	0024597	MADISON METROPOLITAN SEWERAGE DISTRICT WWTF	SC	01-Apr-04	31-Mar-09	WW	0.05	5.58	0.01
282	7291	0024597	MADISON METROPOLITAN SEWERAGE DISTRICT WWTF	SC	01-Apr-04	31-Mar-09	WW	0.00	77.50	0.00
283	6432	0032361	MAIDEN ROCK WASTEWATER TREATMENT FACILITY	WC	01-Aug-08	30-Sep-13	CW	6.25	0.16	40.32
284	5866	0020869	MANAWA WASTEWATER TREATMENT FACILITY	NE	24-Jun-08	31-Mar-13	WWGL	6.50	0.44	14.71
285	6074	0024601	MANITOWOC WASTEWATER TREATMENT FACILITY	NE	29-Jan-07	30-Sep-10	CWPWS	60.00	24.03	10:1 dilution
286	6543	0036552	MAPLE GROVE ESTATES SANITARY DISTRICT	WC	11-Mar-05	31-Mar-10	LFF	0	0.05	0.00
287	6298	0029718	MAPLE LANE HEALTH CARE CENTER	NE	19-Jun-06	30-Jun-11	LAL	0	0.06	0.00
288	6260	0029009	MAPLE SCHOOL DISTRICT	NO	26-Sep-07	30-Sep-12	LAL	0	0.04	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
289	5821	0020273	MARATHON WATER & SEWER DPT WW TREATMNT PLANT	WC	06-Feb-06	31-Mar-11	WW	4.75	0.55	8.71
290	7209	0061051	MARIBEL WASTEWATER TREATMENT FACILITY	NE	04-Dec-08	31-Dec-13	LALGL	0	0.04	0.00
291	6128	0026182	MARINETTE WASTEWATER UTILITY	NE	20-Dec-04	31-Dec-09	WW	310.00	12.09	25.64
292	7343	0020770	MARION WASTEWATER TREATMENT FACILITY	NE	28-Jan-10	30-Jun-14	CWGL	0.45	0.62	0.73
293	6075	0024619	MARKESAN WASTEWATER TREATMENT FACILITY	NE	30-Nov-07	31-Mar-12	WW	0.58	0.60	0.96
294	6076	0024627	MARSHALL WASTEWATER TREATMENT FACILITY	SC	11-Dec-06	31-Dec-11	WW	0.29	0.90	0.32
295	5881	0021024	MARSHFIELD WASTEWATER TREATMENT FACILITY	WC	08-Oct-02	30-Sep-07	LAL	0.02	7.18	0.00
296	6077	0024635	MAUSTON WASTEWATER TREATMENT FACILITY	WC	24-Mar-05	31-Mar-10	WWFFGL	16.00	1.67	9.56
297	6078	0024643	MAYVILLE WASTEWATER TREATMENT FACILITY	SC	01-Jul-08	30-Jun-13	WW	0.33	1.74	0.19
298	6549	0036731	MEDFORD CITY OF	NO	09-Mar-10	31-Mar-15	WW	0.22	2.25	0.10
299	5825	0020311	MELLEN CITY OF	NO	25-Sep-07	30-Sep-12	CW	1.35	0.22	6.22
300	7292	0024678	MELROSE WASTEWATER TREATMENT FACILITY	WC	27-Mar-07	31-Mar-12	WW	1.45	0.08	17.32
301	6081	0024708	MENOMONIE WASTEWATER TREATMENT FACILITY	WC	20-Aug-09	30-Jun-14	WW	109.25	4.46	24.47
302	5811	0020150	MERRILL CITY OF	NO	28-Apr-08	31-Mar-13	WW	211.50	4.74	44.59
303	6082	0024732	MERRILLAN WASTEWATER TREATMENT FACILITY	WC	31-Mar-08	31-Mar-13	WW	2.25	0.12	18.85
304	6300	0029742	MIDDLE RIVER HEALTH & REHABILITATION CENTER	NO	28-Sep-07	30-Sep-12	WW	0.14	0.03	4.84
305	5157	0031500	MILAN S D WASTEWATER TREATMENT FACILITY	WC	17-Nov-05	31-Dec-10	LAL	0	0.09	0.00
306	5981	0022381	MILLADORE WASTEWATER TREATMENT FACILITY	WC	17-Feb-10	31-Dec-14	LAL	0	0.07	0.00
307	7169	0060453	MILTON WASTEWATER TREATMENT FACILITY	SC	29-Jun-05	30-Jun-10	WW	35.00	0.97	36.13
308	6555	0036820	MILWAUKEE METRO SEW DIST COMBINED	SE	26-Mar-03	31-Mar-08	CWGL		190.65	10:1 dilution
309	6555	0036820	MILWAUKEE METRO SEW DIST COMBINED	SE	26-Mar-03	31-Mar-08	CWGL		190.65	4:1 dilution
310	6266	0029106	MINDORO SAN DIST 1 WWTF	WC	16-Jul-07	30-Jun-12	WW	1.08	0.05	22.37
311	6086	0024791	MINERAL POINT WASTEWATER TREATMENT FACILITY	SC	30-Jun-09	30-Jun-14	LAL	0.18	0.78	0.23
312	5846	0020591	MONDOVI WASTEWATER TREATMENT FACILITY	WC	28-May-08	30-Jun-13	WW	11.75	0.59	19.95
313	5829	0020362	MONROE WASTEWATER TREATMENT FACILITY	SC	31-Dec-09	31-Dec-14	WW	0.45	5.74	0.08
314	6087	0024813	MONTELLO WASTEWATER TREATMENT FACILITY	NE	10-Mar-05	31-Mar-10	WW	22.50	0.47	48.39
315	6088	0024821	MONTFORT WASTEWATER TREATMENT FACILITY	SC	22-Jun-05	30-Jun-10	CW	1.00	0.09	10.75
316	6089	0024830	MONTICELLO WASTEWATER TREATMENT FACILITY	SC	21-Sep-06	30-Sep-11	WW	1.65	0.65	2.53

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
317	5974	0022306	MONTREAL CITY OF	NO	26-Dec-06	31-Dec-11	CW	2.50	1.01	2.48
318	6551	0036773	MORRISON SANITARY DISTRICT NO 1	NE	13-May-08	31-Mar-13	LALGL	0	0.08	0.00
319	5982	0022390	MOSINEE WASTEWATER TREATMENT FACILITY	WC	26-Aug-08	30-Jun-13	WW	227.75	1.28	177.93
320	5353	0035963	MT CALVARY WASTEWATER TREATMENT FACILITY	NE	26-Sep-06	30-Sep-11	LFF	0.0025	0.26	0.01
321	5870	0020907	MOUNT HOPE WASTEWATER TREATMENT FACILITY	SC	28-Jul-04	30-Jun-09	LFF	0.0025	0.06	0.04
322	5822	0020281	MOUNT HOREB WASTEWATER TREATMENT FACILITY	SC	29-Oct-02	30-Sep-07	LFF	0.07	0.94	0.07
323	5820	0020265	MUKWONAGO WASTEWATER TREATMENT PLANT	SE	01-Jul-09	30-Jun-14	WW	6.50	2.33	2.80
324	5809	0020133	NECEDAH WASTEWATER TREATMENT FACILITY	WC	20-Apr-04	31-Mar-09	WW	2.18	0.39	5.61
325	6124	0026085	NEENAH MENASHA SEWER COMMISSION WWTF	NE	04-Mar-09	31-Dec-13	WW	116.25	19.84	5.86
326	18555	0063291	NEENAH SEWAGE COLLECTION SYSTEM	NE	01-Mar-06	31-Dec-10	No points			
327	7344	0021202	NEILLSVILLE WASTEWATER TREATMENT FACILITY	WC	19-Jun-07	30-Jun-12	WW	1.98	0.81	2.45
328	7274	0020613	NEKOOSA WASTEWATER TREATMENT FACILITY	WC	15-Apr-09	31-Mar-14	WW	249.75	0.78	322.26
329	6285	0029459	NELSON WASTEWATER TREATMENT FACILITY	WC	07-Sep-06	30-Sep-11		0	0.06	0.00
330	7184	0060666	NESHKORO WASTEWATER TREATMENT FACILITY	NE	24-Aug-05	30-Sep-10	WW	3.00	0.07	43.01
331	5805	0020061	NEW GLARUS WASTEWATER TREATMENT FACILITY	SC	01-Apr-09	31-Dec-14	CW	0.95	0.40	2.40
332	5869	0020893	NEW HOLSTEIN WASTEWATER TREATMENT FACILITY	NE	07-Jun-04	30-Jun-09	LALGL	0	2.06	0.00
333	5852	0020699	NEW LISBON WASTEWATER TREATMENT FACILITY	WC	09-Sep-09	30-Sep-14	WW	14.25	0.31	45.97
334	6091	0024929	NEW LONDON WASTEWATER TREATMENT FACILITY	NE	02-Feb-07	31-Mar-12	WWGL	117.75	3.10	37.98
335	5897	0021245	NEW RICHMOND WASTEWATER TREATMENT FACILITY	WC	09-Sep-08	30-Sep-13	WW	4.25	1.31	3.24
336	6090	0024911	NEWBURG VILLAGE	SE	28-Dec-07	30-Sep-12	WWGL	2.40	0.19	12.90
337	6286	0029467	NIAGARA WASTEWATER TREATMENT FACILITY	NE	27-Mar-08	31-Dec-12	WWGL	197.50	0.60	326.72
338	5839	0020508	NICHOLS WASTEWATER TREATMENT FACILITY	NE	21-Dec-09	31-Dec-14	WWGL	0.02	0.08	0.23
339	6213	0028011	NORTH FREEDOM WASTEWATER TREATMENT FACILITY	SC	22-Jun-05	30-Jun-10	WW	21.00	0.11	193.55
340	6537	0036251	NORTH LAKE POYGAN S D WWTF	NE	30-Mar-09	30-Sep-13	WW		0.08	10:1 dilution
341	6093	0024961	NORWALK WASTEWATER TREATMENT FACILITY	WC	14-Sep-06	30-Sep-11	WW	0.48	0.10	4.64
342	6391	0031470	NORWAY TN SANITARY DISTRICT 1 WWTF	SE	01-Jan-02	31-Dec-06	WW	0.0025	1.16	0.00
343	5412	0036536	O DELL BAY SANITARY DISTRICT 1	WC	18-May-09	31-Mar-14	WW		0.07	10:1 dilution

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
344	5000	0031259	OAKDALE WASTEWATER TREATMENT FACILITY	WC	28-Apr-05	31-Mar-10	LAL	0	0.11	0.00
345	6094	0024988	OAKFIELD WASTEWATER TREATMENT FACILITY	NE	19-Jun-06	30-Jun-11	WW	0.45	0.47	0.95
346	5893	0021181	OCONOMOWOC WASTEWATER TREATMENT PLNT	SE	23-Dec-08	31-Dec-13	WW	0.06	6.20	0.01
347	6007	0022870	OCONTO FALLS WASTEWATER TREATMENT FACILITY	NE	29-Sep-04	30-Sep-09	WWFFGL	46.75	1.05	44.35
348	7286	0022861	OCONTO UTILITY COMMISSION WWTF	NE	25-Sep-07	30-Sep-12	WWGL	50.00	2.81	17.79
349	6238	0028461	OGEMA SANITARY DISTRICT	NO	29-Jun-05	30-Jun-10	LAL	0	0.05	0.00
350	7293	0025011	OMRO WASTEWATER TREATMENT FACILITY	NE	26-Sep-07	31-Mar-12	WWGL	85.00	0.84	101.55
351	6554	0036811	ONION RIVER WASTEWATER COMMISSION	SE	20-May-08	31-Mar-13	WWGL	0.83	0.16	5.27
352	5857	0020753	ONTARIO WASTEWATER TREATMENT FACILITY	WC	07-Jan-08	31-Dec-12	WW	5.25	0.13	39.38
353	5968	0022233	OOSTBURG WASTEWATER TREATMENT PLANT	SE	27-Dec-95	31-Dec-00	LAL	0	0.44	0.00
354	6339	0030503	ORCHARD MANOR WASTEWATER TREATMENT FACILITY	SC	29-Sep-04	30-Sep-09	LAL	0	0.08	0.00
355	5851	0020681	OREGON WASTEWATER TREATMENT FACILITY	SC	29-Sep-05	30-Sep-10	LAL	0.0025	2.79	0.00
356	5931	0021709	ORFORDVILLE WASTEWATER TREATMENT FACILITY	SC	17-Aug-04	30-Jun-09	LAL	0	0.62	0.00
357	6095	0025020	OSCEOLA VILLAGE OF	NO	25-Mar-09	31-Mar-14	WW	275.00	0.94	292.77
358	6096	0025038	OSHKOSH WASTEWATER TREATMENT PLANT	NE	20-Mar-07	31-Dec-11	WW	210.00	31.00	6.77
359	5873	0020940	OWEN WASTEWATER TREATMENT FACILITY	WC	09-Apr-08	31-Mar-13	WW	1.05	1.30	0.81
360	6428	0032077	OXFORD WASTEWATER TREATMENT FACILITY	NE	05-Jun-06	30-Jun-11	CWGL	6.50	0.10	65.52
361	5123	0060933	PACKWAUKEE SANITARY DISTRICT NO 1	NE	30-Sep-03	31-Mar-08	LALGL	0	0.08	0.00
362	6098	0025062	PADDOCK LAKE WASTEWATER TRTMNT FAC	SE	01-Jan-06	31-Dec-10		0	0.75	0.00
363	6366	0031020	PALMYRA WASTEWATER TREATMENT FACILITY	SC	25-Sep-01	30-Sep-06	WW	0.98	0.36	2.73
364	6263	0029033	PARK FALLS CITY OF	NO	30-Mar-10	31-Mar-15	WW	65.00	1.64	39.75
365	5996	0022705	PATCH GROVE WASTEWATER TREATMENT FACILITY	SC	17-May-05	31-Mar-10	LFF	0.0025	0.09	0.03
366	14883	0049794	PELL LAKE SANITARY DISTRICT NO. 1	SE	01-Oct-04	30-Sep-09	WW	0	0.71	0.00
367	6002	0022811	PEPIN WASTEWATER TREATMENT FACILITY	WC	02-Mar-09	31-Mar-14	WW	833.00	0.23	3582.80
368	6346	0030651	PESHTIGO JOINT WASTEWATER TREATMENT FACILITY	NE	02-Aug-04	30-Jun-09	WWGL	37.50	6.51	5.76
369	6264	0029050	PHELPS SANITARY DISTRICT #1	NO	15-Jun-07	30-Jun-12	LAL	0	0.16	0.00
370	5918	0021539	PHILLIPS CITY OF	NO	27-Mar-06	31-Mar-11	WW	5.50	0.58	9.49

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
371	5838	0020494	PITTSVILLE WATER AND SEWER DEPT WWTF	WC	17-Feb-10	31-Dec-14	WW	0.93	0.27	3.43
372	6532	0036048	PLAIN WASTEWATER TREATMENT FACILITY	SC	29-Nov-05	31-Dec-10	LFF	0.08	0.16	0.51
373	7235	0020435	PLATTEVILLE WASTEWATER TREATMENT FACILITY	SC	30-Jan-09	31-Dec-13	WW	0.24	3.18	0.07
374	6351	0030741	PLEASANT PRAIRIE UTILITY DISTRICT 73 1	SE	16-Mar-10	31-Dec-10	LAL	0	0.62	0.00
375	6234	0028380	PLEASANT PRAIRIE UTILITY DISTRICT D WWTF	SE	17-Dec-08	31-Dec-10	LAL	0.0025	0.76	0.00
376	5149	0027995	PLOVER WASTEWATER TREATMENT FACILITY	WC	24-Apr-07	31-Mar-12	WW	290.00	0.85	340.18
377	5913	0021431	PLUM CITY WASTEWATER TREATMENT PLANT	WC	21-Nov-06	31-Dec-11	CW	0.50	0.09	5.38
378	6312	0030031	PLYMOUTH CITY UTIL COMMISSION WWTF	SE	31-Mar-97	31-Mar-02	WW	0.80	2.79	0.29
379	6368	0031054	PLYMOUTH TOWN SANITARY DISTRICT #1 WWTF	SC	24-Mar-04	31-Mar-09	WW	1.65	0.05	35.48
380	12594	0049760	POPLAR VILLAGE OF	NO	09-Sep-08	30-Sep-13	LAL	0	0.06	0.00
381	7273	0020451	PORT EDWARDS WASTEWATER TREATMENT FACILITY	WC	12-Mar-09	31-Mar-14	WW	249.75	0.87	287.73
382	5836	0020460	PORT WASHINGTON WWTP	SE	25-Jun-02	30-Jun-07	CWGL		1.55	10:1 dilution
383	5332	0029670	PORT WING TOWN OF	NO	15-Mar-06	31-Mar-11	WW	0	0.04	0.00
384	5834	0020427	PORTAGE WASTEWATER TREATMENT FACILITY	SC	30-Mar-10	31-Mar-15	WW	447.50	3.10	144.35
385	5919	0021547	POTOSI-TENNYSON SEWAGE COMMISSION WWTF	SC	26-Sep-05	30-Sep-10	LAL	0	0.51	0.00
386	6262	0029025	POTTER WASTEWATER TREATMENT FACILITY	NE	31-Mar-04	31-Mar-09	LALGL	0	0.06	0.00
387	6403	0031691	POY SIPPI SD WASTEWATER TREATMENT FACILITY	NE	21-Sep-04	30-Sep-09	WW	13.00	0.07	174.73
388	6520	0035513	POYGAN POYSIPPI SD 1 WWTF	NE	15-Jun-05	30-Jun-10	WW		0.12	10:1 dilution
389	5887	0021091	POYNETTE WASTEWATER TREATMENT FACILITY	SC	30-Mar-10	31-Mar-15	CW	0.75	0.73	1.03
390	7272	0020257	PRAIRIE DU CHIEN WASTEWATER TREATMENT FAC.	WC	21-Dec-04	31-Dec-09	WW	40.00	3.10	12.90
391	6100	0025178	PRAIRIE FARM VILLAGE OF	NO	27-Jun-06	30-Jun-11	WW	5.00	0.08	64.52
392	5402	0021075	PRENTICE VILLAGE OF	NO	30-Sep-08	30-Sep-13	WW	0.13	0.16	0.84
393	5983	0022403	PRESCOTT WASTEWATER TREATMENT FACILITY	WC	16-Jun-09	30-Jun-14	WW	833.00	0.54	1535.48
394	5955	0022055	PRINCETON WASTEWATER TREATMENT FACILITY	NE	16-Mar-09	30-Sep-13	WWGL	22.50	0.40	55.83
395	6101	0025194	RACINE WASTEWATER UTILITY	SE	18-Jun-08	31-Dec-12	CWGL		46.50	10:1 dilution
396	6370	0031160	RANDOLPH WASTEWATER TREATMENT FACILITY	SC	30-Jun-07	30-Jun-12	LFF	0.01	0.47	0.02
397	5911	0021415	RANDOM LAKE VILLAGE	SE	22-Dec-06	31-Dec-11	WWFFGL	0.03	0.70	0.04
398	7279	0021661	READSTOWN WASTEWATER TREATMENT FACILITY	WC	23-Feb-09	31-Mar-14	WW	21.50	0.15	147.56
399	5854	0020729	REDGRANITE WASTEWATER TREATMENT FACILITY	NE	17-Sep-08	30-Sep-12	CWGL	7.50	0.50	15.03

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
400	5830	0020371	REEDSBURG WASTEWATER TREATMENT FACILITY	SC	28-Jul-04	30-Jun-09	WW	12.50	4.10	3.05
401	5906	0021342	REEDSVILLE WASTEWATER TREATMENT FACILITY	NE	25-Jun-08	30-Jun-13	LALGL	0.01	0.25	0.05
402	6241	0028509	REESEVILLE WASTEWATER TREATMENT FACILITY	SC	30-Sep-09	30-Sep-14	LALGL		0.16	0.00
403	6395	0031569	REWEY WASTEWATER TREATMENT FACILITY	SC	17-Aug-04	30-Jun-09	LAL	0	0.04	0.00
404	5138	0020044	RHINELANDER CITY OF	NO	27-Jun-06	30-Jun-11	WW	76.00	2.95	25.81
405	6261	0029017	RIB LAKE VILLAGE OF	NO	27-Mar-06	31-Mar-11	LAL	0.05	0.31	0.16
406	6522	0035581	RIB MOUNTAIN METRO SEWAGE DISTRICT WWTF	WC	07-Sep-04	30-Sep-09	WW	227.75	6.62	34.41
407	5943	0021865	RICE LAKE UTILITIES CITY OF	NO	30-Jun-09	30-Jun-14	WW	21.00	3.41	6.16
408	5807	0020109	RICHLAND CENTER WASTEWATER TREATMENT FAC	SC	11-Mar-05	31-Mar-10	WW	16.50	2.48	6.65
409	5902	0021296	RIDGELAND WASTEWATER TREATMENT PLANT	WC	29-Jul-08	30-Jun-13	C2	0.33	0.59	0.56
410	6345	0030643	RIDGEWAY COUNTRY CLUB INC WWTF	NE	23-Dec-03	31-Dec-08	LALGL	0	0.01	0.00
411	6382	0031348	RIDGEWAY WASTEWATER TREATMENT FACILITY	SC	13-Dec-07	31-Dec-12	LFF	0	0.12	0.00
412	5139	0020117	RIO WASTEWATER TREATMENT FACILITY	SC	16-Dec-05	31-Dec-10	LAL	0	0.18	0.00
413	5882	0021032	RIPON WASTEWATER TREATMENT FACILITY	NE	29-Jun-04	30-Jun-09	WWGL	0.23	2.79	0.08
414	6282	0029394	RIVER FALLS MUNICIPAL UTILITY WWTF	WC	11-May-10	30-Jun-15	CW	6.50	2.79	2.33
415	6253	0028835	ROBERTS WASTEWATER TREATMENT FACILITY	WC	27-Jun-06	31-Mar-11	LAL	0	0.72	0.00
416	5471	0029041	ROCK SPRINGS WASTEWATER TREATMENT FACILITY	SC	12-Dec-07	31-Dec-12	WW	12.50	0.12	104.73
417	6133	0026352	ROCKDALE WASTEWATER TREATMENT FACILITY	SC	24-Mar-06	31-Mar-11	WW	2.50	0.04	64.52
418	6001	0022802	ROCKLAND SD1 WASTEWATER TREATMENT FACILITY	NE	28-Feb-05	31-Mar-10	LALGL	0.48	0.04	12.26
419	6258	0028967	ROCKLAND WATER SEWER UTILITIES WWTF	WC	16-Jun-09	30-Jun-14	LAL	0	0.06	0.00
420	6235	0028428	ROSENDALE WASTEWATER TREATMENT FACILITY	NE	18-Dec-06	31-Dec-11	LFFGL	0.0025	0.33	0.01
421	5151	0028975	ROXBURY SANITARY DISTRICT #1 WWTF	SC	23-Mar-07	31-Mar-12	LFF	0.01	0.03	0.24
422	6265	0029076	ROZELLVILLE SANITARY DISTRICT NO 1	WC	23-Mar-10	31-Mar-15	LAL	0	0.05	0.00
423	5901	0021288	RUDOLPH WASTEWATER TREATMENT FACILITY	WC	20-Sep-05	30-Jun-10	LAL	0	0.19	0.00
424	6277	0029319	RUSSELL SANITARY DISTRICT #1 TOWN OF	NO	13-Aug-08	30-Sep-13	LAL	0	0.07	0.00
425	7249	0031496	SALEM UTILITY DISTRICT	SE	16-Dec-08	31-Dec-13	WW	15.75	2.43	6.47
426	5406	0030929	SAUK COUNTY HEALTH CARE CENTER WWTF	SC	24-Mar-04	31-Mar-09	LFF	0.15	0.07	2.30
427	5920	0021555	SAUKVILLE VILLAGE SEWER UTILITY	SE	31-Mar-09	31-Mar-14	WWGL	6.00	2.50	2.40
428	5050	0031704	SAXON SANITARY DISTRICT #1	NO	27-Mar-08	31-Mar-13	LFF	0	0.02	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
429	6310	0029998	SCHOOL DISTRICT OF NEW BERLIN	SE	01-Oct-09	30-Jun-12	LAL	0.0025	0.04	0.07
430	6525	0035866	SCHOOL DISTRICT OF SUPERIOR	NO	31-Jul-06	30-Sep-11	CW		0.04	0.00
431	6149	0026654	SEVASTOPOL SD NO 1 WWTF	NE	25-Jun-08	30-Jun-13	LALGL	0	0.12	0.00
432	7136	0060038	SEXTONVILLE SANITARY DISTRICT #1 WWTF	SC	05-May-09	30-Jun-14	WW	7.00	0.10	71.68
433	5936	0021768	SEYMOUR WASTEWATER TREATMENT FACILITY	NE	18-Nov-09	31-Mar-14	LFFGL	0.01	0.90	0.01
434	5991	0022608	SHARON WASTEWATER TREATMENT FACILITY	SE	31-Jul-09	31-Mar-14	LAL	0.0025	0.40	0.01
435	6108	0025411	SHEBOYGAN WASTEWATER TREATMENT PLANT	SE	16-Nov-05	30-Sep-10	CWGL		28.50	10:1 dilution
436	6109	0025453	SHELDON VILLAGE OF	NO	22-Sep-09	30-Sep-14	WW	5.25	0.13	39.38
437	5154	0031127	SHERWOOD WASTEWATER TREATMENT FACILITY	NE	30-Mar-05	31-Mar-10	LAL	0	0.08	0.00
438	6217	0028100	SHIOCTON WASTEWATER TREATMENT FACILITY	NE	17-Nov-08	30-Sep-13	WWGL	90.50	0.23	386.67
439	6229	0028321	SHULLSBURG WASTEWATER TREATMENT FACILITY	SC	22-Jun-05	30-Jun-10	WW	0.02	0.45	0.05
440	5317	0061301	SILVER LAKE SANITARY DISTRICT	NE	06-Dec-05	31-Dec-10	WW	5.75	0.56	10.22
441	5865	0020851	SILVER LAKE VILLAGE	SE	15-Dec-08	31-Dec-13	WW	15.75	0.47	33.87
442	6340	0030520	SINSINAWA DOMINICANS INC WWTF	SC	29-Sep-05	30-Sep-10	LAL	0.0025	0.16	0.02
443	5150	0028924	SIREN VILLAGE OF	NO	26-Jun-08	30-Jun-13	LAL	0	0.30	0.00
444	5957	0022071	SISTER BAY WASTEWATER TREATMENT FACILITY	NE	17-Mar-09	31-Mar-14	CWPWS		1.09	10:1 dilution
445	5823	0020290	SLINGER WASTEWATER TREATMENT FACILITY	SE	16-Sep-08	30-Sep-13	LAL	0.0025	2.33	0.00
446	5969	0022241	SOLDIERS GROVE WASTEWATER TREATMENT FACILITY	WC	24-Sep-09	30-Sep-14	WW	33.75	0.18	191.00
447	6322	0030252	SOMERSET WASTEWATER TREATMENT FACILITY	WC	22-Aug-06	30-Sep-11	WW	19.25	0.23	82.80
448	6251	0028819	SOUTH MILWAUKEE WASTEWATER TREAT FACILITY	SE	29-Dec-05	31-Dec-10	CWGL		9.30	10:1 dilution
449	5973	0022292	SOUTH WAYNE WASTEWATER TREATMENT FACILITY	SC	29-Jun-06	30-Jun-11	WW	18.00	0.11	168.30
450	5855	0020737	SPARTA WASTEWATER TREATMENT FACILITY	WC	30-Jan-06	31-Dec-10	WW	22.00	2.02	10.92
451	5917	0021521	SPENCER WASTEWATER TREATMENT FACILITY	WC	13-Sep-07	30-Jun-12	LAL	0	0.81	0.00
452	6233	0028363	SPRING GREEN GOLF CLUB SANITARY DIST #2 WWTF	SC	30-Sep-09	30-Sep-14	LAL	0	0.14	0.00
453	7195	0060801	SPRING GREEN WASTEWATER TREATMENT FACILITY	SC	31-Mar-09	31-Mar-14	WW	600.00	0.40	1488.83
454	5980	0022373	SPRING VALLEY WASTEWATER TREATMENT FACILITY	WC	31-Jul-08	30-Sep-13	CW	1.60	0.29	5.46
455	6158	0026867	ST CLOUD VILLAGE UTILITY COMMISSION	NE	17-Jun-08	30-Jun-13	WWGL	0.04	0.07	0.51
456	5860	0020796	ST CROIX FALLS CITY OF	NO	21-Dec-07	31-Dec-12	WW	275.00	0.28	985.66

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

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#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
457	6371	0031186	ST JOSEPH SANITARY DISTRICT	WC	20-Nov-07	30-Sep-12	LFF	0	0.08	0.00
458	5965	0022195	ST NAZIANZ WASTEWATER TREATMENT FACILITY	NE	08-Sep-05	30-Sep-10	WW	0.0025	0.20	0.01
459	5942	0021857	STANLEY WASTEWATER TREATMENT FACILITY	WC	27-Sep-07	30-Jun-12	WW	0.01	0.93	0.01
460	5312	0060984	STAR PRAIRIE WASTEWATER TREATMENT FACILITY	WC	08-Jun-06	30-Jun-11	CW	13.25	0.18	73.69
461	6435	0032531	STEPHENSVILLE SANITARY DISTRICT NO 1	NE	29-Jul-08	31-Mar-13	LFFGL	0.06	0.04	1.68
462	7150	0060216	STETSONVILLE, VILLAGE OF	NO	26-Jun-08	30-Jun-13	LAL	0	0.13	0.00
463	6289	0029572	STEVENS POINT WASTEWATER TREATMENT FACILITY	WC	01-Dec-05	31-Dec-10	WW	277.50	6.36	43.67
464	6540	0036285	STITZER SANITARY DISTRICT WWTF	SC	13-Dec-04	31-Dec-09	WW	0.08	0.04	1.94
465	5909	0021393	STOCKBRIDGE WASTEWATER TREATMENT FACILITY	NE	11-Jan-05	31-Dec-09	LAL	0	0.08	0.00
466	6227	0028304	STODDARD WASTEWATER TREATMENT FACILITY	WC	14-Nov-07	30-Sep-12	WW	1580.50	0.17	9104.26
467	5826	0020338	STOUGHTON WASTEWATER TREATMENT FACILITY	SC	27-Dec-02	31-Dec-07	WW	5.25	2.56	2.05
468	7294	0025569	STRATFORD WASTEWATER TREATMENT FACILITY	WC	30-Jun-09	30-Jun-14	LAL	0	0.31	0.00
469	6259	0028991	STRUM WASTEWATER TREATMENT FACILITY	WC	15-May-06	31-Mar-11	WW	5.25	0.16	33.87
470	5889	0021113	STURGEON BAY UTILITIES WWTF	NE	29-Mar-10	31-Mar-15	CWPWS		4.37	10:1 dilution
471	5409	0031844	SULLIVAN TWN SANITARY DISTRICT #1 WWTF	SC	28-Mar-08	31-Mar-13	WW	1.35	0.16	8.71
472	6110	0025585	SULLIVAN WASTEWATER TREATMENT FACILITY	SC	11-Dec-06	31-Dec-11	LAL	0	0.09	0.00
473	5837	0020478	SUN PRAIRIE WASTEWATER TREATMENT FACILITY	SC	11-Dec-06	31-Dec-11	LAL	0.02	4.81	0.00
474	6111	0025593	SUPERIOR SEWAGE DISPOSAL SYSTEM	NO	27-Dec-06	31-Dec-11	WW	8.00	7.75	1.03
475	6334	0030431	SUPERIOR VILLAGE OF	NO	25-Mar-08	31-Mar-13	LFF	0.01	0.13	0.04
476	5867	0020877	SURING WASTEWATER TREATMENT FACILITY	NE	19-Jun-06	30-Jun-11	CW	18.75	0.16	120.97
477	5843	0020559	SUSSEX WASTEWATER TREATMENT FACILITY	SE	22-Dec-08	31-Dec-13	WW	0.04	1.55	0.03
478	7280	0021881	TAYLOR WASTEWATER TREATMENT FACILITY	WC	01-Jan-06	31-Dec-10	CW	6.50	0.09	68.75
479	5976	0022322	THERESA WASTEWATER TREATMENT FACILITY	SC	31-Aug-07	30-Jun-12	WW	0.28	0.56	0.49
480	6112	0025615	THORP WASTEWATER TREATMENT FACILITY	WC	26-Oct-06	30-Sep-11	WW	0.09	0.54	0.16
481	6006	0022853	THREE LAKES SANITARY DISTRICT #1	NO	16-Mar-10	31-Mar-15	LAL	0	0.20	0.00
482	5977	0022349	TIGERTON WASTEWATER TREATMENT FACILITY	NE	27-Mar-08	31-Dec-12	WWGL	3.75	0.17	21.60
483	5904	0021318	TOMAH WASTEWATER TREATMENT FACILITY	WC	15-Jun-06	30-Jun-11	WW	1.28	2.33	0.55
484	5949	0021946	TOMAHAWK CITY OF	NO	21-Dec-07	31-Dec-12	LAL	0	0.08	0.00
485	5046	0026000	TONY VILLAGE OF	NO	25-Sep-07	30-Sep-12	LAL	0	0.04	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
486	5875	0020966	TREMPEALEAU WASTEWATER TREATMENT FACILITY	WC	16-Jun-09	30-Jun-14	WW	1580.50	0.21	7553.17
487	6113	0025631	TURTLE LAKE VILLAGE OF	NO	23-Dec-08	31-Dec-13	LAL	1.75	0.85	2.07
488	5930	0021695	TWIN LAKES WASTEWATER TREATMENT FAC	SE	01-Jul-06	30-Jun-11	WW	0.03	2.02	0.01
489	6146	0026590	TWO RIVERS WASTEWATER TREATMENT FACILITY	NE	15-Jun-05	30-Jun-10	CWPWS		6.82	10:1 dilution
490	7295	0025640	UNION CENTER WASTEWATER TREATMENT FACILITY	WC	29-Jul-05	30-Jun-10	WW	3.75	0.24	15.71
491	6226	0028291	UNION GROVE VILLAGE	SE	29-Dec-04	31-Dec-09	LAL	0.01	3.10	0.00
492	7175	0060526	UNITY WASTEWATER TREATMENT FACILITY	WC	13-Jan-06	31-Dec-10	LAL	0	0.12	0.00
493	5985	0022420	US ARMY HEADQUARTERS, FORT MCCOY WWTP	WC	26-Jun-08	30-Jun-13	CW	8.00	3.88	2.06
494	7352	0030856	V I P SERVICES INC	SE	01-Oct-09	30-Sep-14	LAL	0	0.03	0.00
495	5941	0021831	VALDERS WASTEWATER TREATMENT FACILITY	NE	16-Dec-04	31-Dec-09	LAL	0	0.23	0.00
496	7689	0036854	VALLEY RIDGE CLEAN WATER COMMISSION WWTF	WC	09-Sep-09	30-Sep-14	WW	1830.00	0.10	18163.77
497	7304	0030309	VESPER WASTEWATER TREATMENT FACILITY	WC	20-Mar-07	31-Mar-12	LFF	0.002	0.00	0.00
498	5891	0021148	VIOLA WASTEWATER TREATMENT FACILITY	WC	01-Aug-07	30-Jun-12	WW	16.00	0.16	103.23
499	5947	0021920	VIROQUA WASTEWATER TREATMENT FACILITY	WC	30-Jun-05	30-Jun-10	LAL	0	0.93	0.00
500	5951	0022012	WABENO SANITARY DISTRICT #1	NO	13-Mar-07	31-Mar-12	CWGL	1.13	0.16	7.26
501	5989	0022471	WALDO WASTEWATER UTILITY	SE	26-Feb-07	31-Dec-10	WW	1.05	0.16	6.77
502	7248	0031461	WALWORTH COUNTY METRO	SE	01-Jul-07	30-Jun-10	WW	1.73	10.85	0.16
503	5995	0022675	WASHBURN CITY OF	NO	17-Jun-08	30-Jun-13	CWPWS		0.39	10:1 dilution
504	6359	0030881	WATERLOO WASTEWATER TREATMENT FACILITY	SC	22-Dec-03	31-Dec-08	WW	0.40	0.71	0.56
505	6243	0028541	WATERTOWN WASTEWATER TREATMENT FACILITY	SC	30-Sep-08	30-Sep-13	WW	65.75	8.06	8.16
506	6308	0029971	WAUKESHA CITY	SE	09-May-08	31-Dec-12	WW	2.00	24.80	0.08
507	15138	0061646	WAUMANDEE SANITARY DISTRICT #1	WC	27-Dec-05	31-Dec-10	WW	2.75	0.38	7.21
508	6338	0030490	WAUPACA WASTEWATER TREATMENT FACILITY	NE	27-Feb-06	31-Mar-11	WW	19.25	1.94	9.94
509	5999	0022772	WAUPUN WASTEWATER TREATMENT FACILITY	SC	30-Jun-09	30-Jun-14	WW	0.17	2.79	0.06
510	6114	0025739	WAUSAU WATER WORKS WW TREATMENT FACILITY	WC	28-Jan-05	31-Dec-09	WW	212.50	12.71	16.72
511	7134	0060011	WAUSAUKEE WASTEWATER TREATMENT FACILITY	NE	30-Dec-08	31-Dec-13	WWGL	277.50	0.14	1946.00
512	5971	0022276	WAUZEKA WASTEWATER TREATMENT FACILITY	WC	28-Sep-09	30-Sep-14	WW	47.50	0.12	383.06
513	8719	0036889	WAZEE AREA WASTEWATER COMMISSION	WC	14-Nov-05	30-Sep-10	WW	13.50	0.41	32.87
514	4999	0028843	WEBSTER VILLAGE OF	NO	25-Sep-07	30-Sep-12	WW	0	0.13	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
515	6115	0025763	WEST BEND CITY	SE	27-Sep-05	30-Jun-10	WW	1.40	13.95	0.10
516	5831	0020389	WEST SALEM WASTEWATER TREATMENT FACILITY	WC	18-May-10	30-Jun-15	WW	29.00	0.81	35.98
517	7213	0061107	WESTBORO SANITARY DISTRICT #1	NO	27-Jun-06	30-Jun-11	WW	0.15	0.03	5.20
518	5939	0021792	WESTBY WASTEWATER TREATMENT FACILITY	WC	02-Aug-06	30-Sep-11	LAL	0	0.36	0.00
519	6250	0028754	WESTERN RACINE COUNTY SEWERAGE DISTRICT	SE	28-Mar-05	31-Mar-10	WW	9.75	3.88	2.52
520	7346	0022250	WESTFIELD WASTEWATER TREATMENT FACILITY	NE	29-Mar-05	31-Mar-10	WWGL	5.75	0.70	8.24
521	7275	0020923	WEYAUWEGA WASTEWATER TREATMENT FACILITY	NE	28-Dec-07	30-Jun-12	WWGL	28.75	0.79	36.51
522	5858	0020761	WEYERHAEUSER VILLAGE OF	NO	18-Jun-09	30-Jun-14	LAL	0.03	0.06	0.52
523	6365	0031011	WHEATLAND ESTATES MHP	SE	01-Oct-05	30-Sep-10	WW	15.00	0.06	248.14
524	6407	0031747	WHITECAP MOUNTAINS SANITARY DISTRICT	NO	22-Dec-06	30-Dec-11	CW	2.26	0.08	29.19
525	6129	0026191	WHITEFISH BAY VILLAGE OF	SE	28-Mar-07	31-Mar-12	Inactive - no WQBEL			
526	6364	0030970	WHITEHALL WASTEWATER TREATMENT FACILITY	WC	12-Apr-07	31-Mar-12	WW	16.50	1.86	8.87
527	5954	0022047	WHITELAW WASTEWATER TREATMENT FACILITY	NE	31-Oct-06	31-Dec-11	LAL	0	0.16	0.00
528	5803	0020001	WHITEWATER WASTEWATER TREATMENT FACIL	SE	16-Dec-08	31-Dec-13	WW	2.88	5.66	0.51
529	5926	0021636	WHITING WASTEWATER TREATMENT FACILITY	WC	15-Feb-07	31-Dec-11	WW	277.50	0.48	577.52
530	6293	0029611	WI ACADEMY WASTEWATER TREATMENT FACILITY	SC	30-Sep-03	30-Sep-08	WW	0.35	0.05	6.64
531	10065	0023078	WI AIR NATIONAL GUARD	WC	26-May-10	31-Mar-15	WW	11.00	0.31	35.48
532	7353	0031402	WI DELLS LK DELTON SEWERAGE COMMISSION WWTF	SC	28-Jan-04	31-Dec-08	WW	447.50	4.23	105.75
533	6335	0030449	WI DNR COPPER FALLS STATE PARK	NO	04-Sep-08	30-Sep-13	CWGL	1.35	0.03	45.84
534	6280	0029343	WI DNR PENINSULA STATE PARK WWTF	NE	10-Jun-08	31-Dec-12	LALGL	0	0.00	0.00
535	5051	0031887	WI DNR RICHARD BONG RECREATION AREA	SE	01-Apr-09	31-Mar-14	LAL	0	0.02	0.00
536	6414	0031879	WI DNR YELLOWSTONE LAKE STATE PARK WWTF	SC	29-Jun-05	30-Jun-10	LAL	0	0.00	0.00
537	6315	0030066	WI DOC FLAMBEAU CORRECTIONAL CENTER	NO	12-Jun-07	30-Jun-12	LAL	0.01	0.02	0.81
538	7349	0026701	WI DOC LINCOLN HILLS SCHOOL	NO	23-Jun-06	30-Jun-11	LAL	0	0.12	0.00
539	7139	0060071	WILD ROSE WASTEWATER TREATMENT FACILITY	NE	10-Mar-05	31-Mar-10	WW	1.40	0.18	7.72
540	5410	0032140	WILSON WASTEWATER TREATMENT FACILITY	WC	19-May-10	30-Jun-15	LAL	0	0.04	0.00

Appendix A1. – Qs:Qe Ratios for Municipal POTWs with Surface Water Discharge (as of 7/22/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	FIN	Permit No.	Facility Name	DNR REG	Issued	Expires	Rec. Water Class	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
541	5988	0022462	WILTON WASTEWATER TREATMENT FACILITY	WC	28-Jan-10	31-Dec-14	WW	1.23	0.14	8.78
542	5948	0021938	WINNECONNE WASTEWATER TREATMENT FACILITY	NE	30-Sep-04	30-Sep-09	WW	190.00	0.77	247.64
543	6116	0025844	WISCONSIN RAPIDS WWTF	WC	29-Apr-09	31-Mar-14	WW	249.75	8.00	31.23
544	6236	0028444	WITTENBERG WASTEWATER TREATMENT FACILITY	NE	06-Sep-06	30-Sep-11	CWGL	1.58	0.39	4.06
545	6237	0028452	WOLF TREATMENT PLANT	NE	30-Nov-04	31-Dec-09	WW	77.50	4.65	16.67
546	6296	0029688	WONEWOC WASTEWATER TREATMENT FACILITY	WC	25-Jun-07	30-Jun-12	WW	5.25	0.02	241.94
547	5986	0022438	WRIGHTSTOWN SANITARY DISTRICT 1	NE	26-Sep-05	30-Sep-10	LAL	0	0.06	0.00
548	5978	0022357	WRIGHTSTOWN SANITARY DISTRICT 2	NE	30-Jun-03	30-Jun-08	LALGL	0	0.07	0.00
549	7347	0022497	WRIGHTSTOWN SEWER & WATER UTILITY	NE	28-Mar-05	31-Mar-10	WWFFGL	197.50	0.66	301.23
550	7368	0029831	YORKVILLE SEWER UTILITY DISTRICT NO 1	SE	29-Dec-04	31-Dec-09	LAL	0	0.23	0.00

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
1	0039781	AFP advanced food products llc	NO	30-Sep-11	LAL	001	0.00	0.09	10:1 dilution
2	0039781	AFP advanced food products llc	NO	30-Sep-11	LAL	002	0.00	0.50	10:1 dilution
3	0050237	AGROPUR INC LUXEMBURG	NE	30-Jun-05	LALGL	003	0.00	0.30	0
4	0050237	AGROPUR INC LUXEMBURG	NE	30-Jun-05	LALGL	008	0.00	0.02	0
5	0001449	AGROPUR INC WEYAUWEGA PLANT	NE	31-Mar-10	WW	001	28.75	0.00	18548.39
6	0002666	ALLENS INC FAIRWATER PLANT	NE	30-Jun-13	WW	010	0.09	0.06	1.49
7	0045080	ALLENS INC PULASKI PLANT	NE	30-Jun-03	LALGL	001	0.00	0.04	0
8	0003760	AMPI BLAIR CHEESE PLANT	WC	31-Dec-14	WW	004	8.75	0.03	282.26
9	0003476	AMPI JIM FALLS DIVISION	WC	30-Jun-10	WW	001	60.00	0.34	174.37
10	0003476	AMPI JIM FALLS DIVISION	WC	30-Jun-10	WW	002	60.00	7.13	8.42
11	0000990	APPLETON PAPERS LLC, COMBINED LOCKS MILL	NE	31-Mar-10	WW	007	0	8.18	0
12	0000990	APPLETON PAPERS LLC, COMBINED LOCKS MILL	NE	31-Mar-10	WW	009	0	8.18	0
13	0000990	APPLETON PAPERS LLC, COMBINED LOCKS MILL	NE	31-Mar-10	WW	010	232.50	8.18	28.41
14	0000990	APPLETON PAPERS LLC, COMBINED LOCKS MILL	NE	31-Mar-10	WW	011	232.50	8.18	28.41
15	0000990	APPLETON PAPERS LLC, COMBINED LOCKS MILL	NE	31-Mar-10	WW	012	232.50	8.18	28.41
16	0000990	APPLETON PAPERS LLC, COMBINED LOCKS MILL	NE	31-Mar-10	WW	014	0	8.18	0
17	0057592	ARCHER DANIELS MIDLAND COMPANY	WC	30-Jun-10	WW	002	0.01	0.00	4.74
18	0027197	ARLA FOODS PRODUCTION LLC	NE	30-Sep-06	LALGL	001	0	0.21	0
19	0043974	BADGER ARMY AMMUNITION PLANT	SC	30-Jun-12	WW	004	0	3.18	0
20	0043974	BADGER ARMY AMMUNITION PLANT	SC	30-Jun-12	WW	004	0	3.18	0
21	0033529	BADGER METER INC	SE	31-Mar-11	WW	001	0.01	0.49	0.01
22	0033529	BADGER METER INC	SE	31-Mar-11	WW	002	0.00		
23	0062103	BADGER STATE ETHANOL LLC	SC	31-Jul-07	WWFF	001	0.45	0.16	2.85
24	0037702	BAY VALLEY FOODS LLC GREEN BAY PLANT	NE	31-Mar-14	WWGL	001	165.00	0.20	844.85
25	0051128	BELGIOIOSO CHEESE INC DENMARK	NE	31-Dec-06	WW	002	UK	0.10	
26	0027201	BELGIOIOSO CHEESE INC SHERWOOD	NE	31-Dec-10	LAL	001	0	0.08	0
27	0027456	BEMIS MANUFACTURING COMPANY PLANT D	SE	31-Mar-12	WW	001	1.25	0.82	1.52
28	0042528	BIRCHWOOD MANUFACTURING CO	NO	30-Jun-12	WW	001	21.00	0.85	24.63

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
29	0070726	BNSF RAILWAY COMPANY	NO	31-Mar-13	LAL	001	0	0.23	0
30	0026514	BRIGGS STRATTON CORP WAUWATOSA	SE	31-Mar-10	WWGL	002	0.58	0.08	7.42
31	0026514	BRIGGS STRATTON CORP WAUWATOSA	SE	31-Mar-10	WWGL	003	0.58	0.02	37.10
32	0000761	BRILLION IRON WORKS	NE	30-Sep-10	LFF	001	0.00		
33	0000761	BRILLION IRON WORKS	NE	30-Sep-10	LFF	002	0.00	0.24	0.01
34	0000761	BRILLION IRON WORKS	NE	30-Sep-10	LFF	004	0.00	0.37	0.01
35	0000761	BRILLION IRON WORKS	NE	30-Sep-10	LFF	005	0.00		
36	0000761	BRILLION IRON WORKS	NE	30-Sep-10	LFF	006	0.00		
37	0003191	BROOKSIDE DAIRY	WC	30-Sep-10	CW	001	0.25	0.04	6.45
38	0047180	BULLFROG FISH FARM	WC	30-Sep-14	LAL	001	0	0.84	0
39	0039039	BURNETT DAIRY COOPERATIVE	NO	30-Sep-12	WW	001	3.50	0.30	11.76
40	0039039	BURNETT DAIRY COOPERATIVE	NO	30-Sep-12	WW	006	3.50	0.30	11.76
41	0003557	BUSH BROTHERS AND COMPANY INC	WC	31-Dec-11	WW	001	0	0.51	0
42	0063258	C & D TECHNOLOGIES	SE	31-Mar-12	WWGL	006	6.50	0.26	25.42
43	0064351	CANADIAN PACIFIC RAILWAY	SE	31-Dec-14	WW	001	1.70	0.00	1096.77
44	0033286	CAPITOL SAND & GRAVEL CO INC STAGECOACH RD	SC	30-Jun-10	CW	001	0.08	6.70	0.01
45	0003077	CASCADES TISSUE GROUP WISCONSIN INC	WC	30-Sep-14	WW	001	178.50	4.98	35.88
46	0050245	CEDAR GROVE CHEESE FACTORY	SC	31-Dec-08	WWFF	002	0.45	0.02	24.19
47	0003204	CELLU TISSUE - CITYFOREST LLC	NO	30-Jun-10	WW	001	103.00	2.17	47.47
48	0000680	CELLU TISSUE NEENAH	NE	31-Mar-09	WWPWSGL	001	116.25	3.12	37.31
49	0000680	CELLU TISSUE NEENAH	NE	31-Mar-09	WWPWSGL	008	0	4.65	0
50	0003735	COLUMBIA FOREST PRODUCTS	NO	30-Sep-11	CW	001	1.35	0.41	3.32
51	0052159	CONN-SELMER, HOLTON DIV	SE	30-Jun-13	LAL	001	6.25	0.01	504.03
52	0027731	COOK COMPOSITES AND POLYMERS CO	SE	30-Jun-12	WWGL	001	6.00	1.05	5.72
53	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	001	1525.00	2.79	546.59
54	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	002	1525.00	2.79	546.59

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
55	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	003	1525.00	2.79	546.59
56	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	004	1525.00	2.79	546.59
57	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	005	1525.00	2.79	546.59
58	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	006	1525.00	2.79	546.59
59	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	007	1525.00	2.79	546.59
60	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	011	1525.00	2.79	546.59
61	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	012	1525.00	2.79	546.59
62	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	013	1525.00	2.79	546.59
63	0040223	DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	WC	31-Dec-10	WW	014	1525.00	2.79	546.59
64	0003239	DAIRYLAND POWER COOP GENOA	WC	30-Jun-13	WW	001	867.50	4.34	199.88
65	0003239	DAIRYLAND POWER COOP GENOA	WC	30-Jun-13	WW	002	867.50	4.34	199.88
66	0003239	DAIRYLAND POWER COOP GENOA	WC	30-Jun-13	WW	004	867.50	4.34	199.88
67	0003239	DAIRYLAND POWER COOP GENOA	WC	30-Jun-13	WW	007	867.50	4.34	199.88
68	0003239	DAIRYLAND POWER COOP GENOA	WC	30-Jun-13	WW	008	867.50	4.34	199.88
69	0003239	DAIRYLAND POWER COOP GENOA	WC	30-Jun-13	WW	010	867.50	4.34	199.88
70	0048747	DANE COUNTY REGIONAL AIRPORT	SC	31-Dec-12	WW	001	1.78	0.78	2.29
71	0048747	DANE COUNTY REGIONAL AIRPORT	SC	31-Dec-12	WW	002	1.78	2.48	0.72
72	0048747	DANE COUNTY REGIONAL AIRPORT	SC	31-Dec-12	WW	003	1.78	880.40	0
73	0048747	DANE COUNTY REGIONAL AIRPORT	SC	31-Dec-12	WW	032	1.78		

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
74	0038083	DARLING NATIONAL LLC	NE	31-Dec-10	WW	001	0	0.02	0
75	0027448	DEL MONTE CORPORATION MARKESAN PLANT #116	NE	31-Dec-10	WW	001	0.58	2.17	0.26
76	0026620	DEL MONTE FOODS CAMBRIA PLANT #108	SC	31-Dec-09	WW	002	0.01	0.36	0.01
77	0026620	DEL MONTE FOODS CAMBRIA PLANT #108	SC	31-Dec-09	WW	008	0.00		
78	0001571	DOMINION ENERGY KEWAUNEE, INC.	NE	30-Jun-10	CWPWS	001	0	765.70	0
79	0001571	DOMINION ENERGY KEWAUNEE, INC.	NE	30-Jun-10	CWPWS	002	0.00		
80	0001571	DOMINION ENERGY KEWAUNEE, INC.	NE	30-Jun-10	CWPWS	003	0	0.25	0
81	0003620	DOMTAR	WC	31-Jan-07	WW	001	0	54.25	0
82	0003620	DOMTAR	WC	31-Jan-07	WW	002	249.75	47.28	5.28
83	0003620	DOMTAR	WC	31-Jan-07	WW	003	0	54.25	0
84	0003620	DOMTAR	WC	31-Jan-07	WW	006	0	54.25	0
85	0003620	DOMTAR	WC	31-Jan-07	WW	007	0	54.25	0
86	0003620	DOMTAR	WC	31-Jan-07	WW	008	0	54.25	0
87	0003620	DOMTAR	WC	31-Jan-07	WW	009	0	54.25	0
88	0003620	DOMTAR	WC	31-Jan-07	WW	011	0	54.25	0
89	0003620	DOMTAR	WC	31-Jan-07	WW	013	0	54.25	0
90	0026042	DOMTAR PAPER CO LLC	WC	31-Mar-14	WW	010	227.75	9.94	22.92
91	0026042	DOMTAR PAPER CO LLC	WC	31-Mar-14	WW	011	227.75	9.94	22.92
92	0026042	DOMTAR PAPER CO LLC	WC	31-Mar-14	WW	012	227.75	9.94	22.92
93	0026042	DOMTAR PAPER CO LLC	WC	31-Mar-14	WW	013	227.75	9.94	22.92
94	0026042	DOMTAR PAPER CO LLC	WC	31-Mar-14	WW	014	227.75	9.94	22.92
95	0026042	DOMTAR PAPER CO LLC	WC	31-Mar-14	WW	015	227.75	4.12	55.24
96	0062723	DRS POWER & CONTROL TECHNOLOGIES, INC.	SE	31-Mar-14	LALGL	001	0.21	0.21	1.02
97	0062723	DRS POWER & CONTROL TECHNOLOGIES, INC.	SE	31-Mar-14	LALGL	002	0.21	0.05	4.23
98	0062723	DRS POWER & CONTROL TECHNOLOGIES, INC.	SE	31-Mar-14	LALGL	003	0.21	0.16	1.35
99	0062723	DRS POWER & CONTROL TECHNOLOGIES, INC.	SE	31-Mar-14	LALGL	009	0.21	0.07	2.82
100	0002020	DTE STONEMAN LLC	SC	31-Mar-12	WW	001	2600.00	36.27	71.68
101	0002020	DTE STONEMAN LLC	SC	31-Mar-12	WW	002	2600.00	0.47	5591.40

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

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#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
102	0002020	DTE STONEMAN LLC	SC	31-Mar-12	WW	003	2600.00	0.01	279569.89
103	0044831	DULUTH WINNIPEG PACIFIC RWY POKEGAMA YARD	NO	30-Sep-14	LFF	003	0	0.02	0
104	0022942	ELLSWORTH COOP CREAMERY	WC	31-Mar-10	LAL	001	0.00		
105	0022942	ELLSWORTH COOP CREAMERY	WC	31-Mar-10	LAL	002	0	0.31	0
106	0003565	ERCO WORLDWIDE (USA) INC - PORT EDWARDS	WC	30-Sep-09	WW	001	249.75	8.49	29.40
107	0002089	FAIRBANKS MORSE ENGINE	SC	30-Sep-12	WW	002	62.50	0.59	106.11
108	0002089	FAIRBANKS MORSE ENGINE	SC	30-Sep-12	WW	004	62.50	0.59	106.11
109	0002089	FAIRBANKS MORSE ENGINE	SC	30-Sep-12	WW	005	62.50	0.59	106.11
110	0002089	FAIRBANKS MORSE ENGINE	SC	30-Sep-12	WW	008	62.50	0.59	106.11
111	0002089	FAIRBANKS MORSE ENGINE	SC	30-Sep-12	WW	009	62.50	0.59	106.11
112	0049964	FISH, CRYSTAL AND MUD LAKE REHABILITATION DI	SC	30-Jun-14	WW	001	550.00	0.94	585.54
113	0003212	FLAMBEAU RIVER PAPERS LLC	NO	30-Sep-14	WW	001	65.00	10.21	6.36
114	0003212	FLAMBEAU RIVER PAPERS LLC	NO	30-Sep-14	WW	005	0	7.91	0
115	0003212	FLAMBEAU RIVER PAPERS LLC	NO	30-Sep-14	WW	006	0	7.91	0
116	0003212	FLAMBEAU RIVER PAPERS LLC	NO	30-Sep-14	WW	009	0	7.91	0
117	0039993	FOREMOST FARMS USA APPLETON SPENCER ST	NE	31-Mar-11	WW	001	232.50	0.35	669.64
118	0039993	FOREMOST FARMS USA APPLETON SPENCER ST	NE	31-Mar-11	WW	011	232.50	0.15	1546.39
119	0003018	FOREMOST FARMS USA CLAYTON	NO	31-Dec-13	WW	003	0	0.27	0
120	0004413	FOREMOST FARMS USA - RICHLAND CENTER	SC	30-Sep-12	WW	008	16.50	0.78	21.12
121	0037982	FOREMOST FARMS USA COOP - MARSHFIELD	WC	30-Jun-15	LAL	001	0	0.02	0
122	0051250	FOREMOST FARMS USA COOP ALMA CENTER	WC	30-Sep-10	LAL	002	0	0.41	0
123	0027618	FOREMOST FARMS USA COOP CHILTON	NE	30-Jun-12	LAL	001	0	0.09	0
124	0062308	FOREMOST FARMS USA COOP LANCASTER	SC	30-Sep-14	LFF	001	0	0.66	0
125	0003859	FOREMOST FARMS USA COOP PLOVER	WC	31-Mar-11	WW	001	0	0.51	0
126	0003859	FOREMOST FARMS USA COOP PLOVER	WC	31-Mar-11	WW	002	72.50	1.14	63.47
127	0003859	FOREMOST FARMS USA COOP PLOVER	WC	31-Mar-11	WW	005	290.00	0.78	374.19
128	0003875	FOREMOST FARMS USA COOP ROTHSCHILD	WC	31-Mar-09	WW	001	227.75	0.73	309.99
129	0047546	FOREMOST FARMS USA COOP SPARTA	WC	31-Dec-10	WW	001	22.00	0.16	136.48

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
130	0026026	FOREMOST FARMS USA COOP WAUMANDEE	WC	31-Mar-15	WW	001	0.00		
131	0026026	FOREMOST FARMS USA COOP WAUMANDEE	WC	31-Mar-15	WW	002	1.95	0.33	5.82
132	0003662	FOREMOST FARMS USA COOP WILSON	WC	31-Mar-10	LAL	001	0	0.24	0
133	0003662	FOREMOST FARMS USA COOP WILSON	WC	31-Mar-10	LAL	002	0	0.01	0
134	0003662	FOREMOST FARMS USA COOP WILSON	WC	31-Mar-10	LAL	005	0	0.01	0
135	0000035	FOREMOST FARMS USA REEDSBURG	SC	30-Jun-12	WW	001	12.50	0.47	26.88
136	0061891	FOX ENERGY CO LLC - FOX ENERGY CENTER	NE	31-Dec-07	WWGL	001	185.00	0.60	306.04
137	0027553	GALLOWAY COMPANY	NE	31-Dec-14	WWGL	001	0	0.38	0
138	0046477	GENERAL MITCHELL INTERNATIONAL AIRPORT	SE	30-Jun-11	WWGL	001	0	0.05	0
139	0046477	GENERAL MITCHELL INTERNATIONAL AIRPORT	SE	30-Jun-11	WW	003	0	1.80	0
140	0046477	GENERAL MITCHELL INTERNATIONAL AIRPORT	SE	30-Jun-11	WWGL	007	0	2.39	0
141	0001848	GEORGIA PACIFIC CONSUMER PRODUCTS LP	NE	30-Sep-10	WWGL	001	165.00	21.37	7.72
142	0001848	GEORGIA PACIFIC CONSUMER PRODUCTS LP	NE	30-Sep-10	WWGL	002	165.00	101.39	1.63
143	0001261	GEORGIA-PACIFIC CONSUMER PRODUCTS LP	NE	31-Mar-10	WWGL	001	165.00	12.15	13.58
144	0001261	GEORGIA-PACIFIC CONSUMER PRODUCTS LP	NE	31-Mar-10	WWGL	002	165.00		
145	0001261	GEORGIA-PACIFIC CONSUMER PRODUCTS LP	NE	31-Mar-10	WWGL	003	165.00		
146	0001261	GEORGIA-PACIFIC CONSUMER PRODUCTS LP	NE	31-Mar-10	WWGL	006	165.00		
147	0001261	GEORGIA-PACIFIC CONSUMER PRODUCTS LP	NE	31-Mar-10	WWGL	007	165.00		
148	0001261	GEORGIA-PACIFIC CONSUMER PRODUCTS LP	NE	31-Mar-10	WWGL	008	165.00		
149	0001732	GRAF CREAMERY INC	NE	30-Sep-10	WWFFGL	001	0.01	0.02	0.32
150	0050016	GRANDE CHEESE CO BROWNSVILLE	SC	30-Jun-11	LFF	003	0.01	0.57	0.01
152	0050547	GRANDE CHEESE COMPANY FOOD INGREDIENT DIV	WC	31-Dec-12	WW	003	4.75	0.06	76.61
153	0051764	GRANDE CHEESE CORP WYOCENA	SC	31-Jan-09	WW	002	3.00	0.21	14.44
154	0002984	GRASSLAND DAIRY PRODUCTS, INC.	WC	30-Jun-11	WW	002	1.73	0.06	27.82
155	0050407	GREAT LAKES KRAUT COMPANY-BEAR CREEK	NE	30-Sep-08	LAL	002	0	0.23	0
156	0045942	GREAT LAKES WATER INSTITUTE	SE	31-Dec-13	WWGL	001	1.40	0.40	3.47
157	0045942	GREAT LAKES WATER INSTITUTE	SE	31-Dec-13	WWGL	002	1.40	0.40	3.47
158	0000973	GREEN BAY PACKAGING, INC. - MILL DIVISION	NE	31-Dec-13	WWGL	001	165.00	2.00	82.65

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

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#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
159	0000973	GREEN BAY PACKAGING, INC. - MILL DIVISION	NE	31-Dec-13	WWGL	088	0	3.10	0
160	0025941	HORMEL FOODS CORPORATION	SC	30-Sep-13	WW	001	0.02	0.06	0.42
161	0025941	HORMEL FOODS CORPORATION	SC	30-Sep-13	WW	002	0.02	0.45	0.05
162	0044334	IRON RIVER NATIONAL FISH HATCHERY	NO	31-Mar-13	CW	001	2.21	8.22	0.27
163	0004316	JACOB LEINENKUGEL BREWING FACILITY, LLC MILL	WC	30-Sep-14	WW	001	6.00	0.18	32.80
164	0070408	JENNIE O TURKEY STORE INC BARRON PLANT	NO	31-Mar-10	FAL	001	9.50	1.40	6.77
165	0070408	JENNIE O TURKEY STORE INC BARRON PLANT	NO	31-Mar-10	WW	007	9.50	1.12	8.49
166	0000108	JOHNSON CONTROLS INC	SE	31-Mar-11	WW	001	0.21	0.00	135.48
167	0001759	JOHNSONVILLE SAUSAGE LLC	SE	31-Mar-10		002	0.83	0.01	118.28
168	0001759	JOHNSONVILLE SAUSAGE LLC	SE	31-Mar-10		003	0.00		
169	0055808	K & K CHEESE LLC	WC	31-Dec-12	WW	002	0	0.04	0
170	0050784	KENOSHA BEEF INTERNATIONAL	SE	31-Dec-10	LAL	002	0	0.03	0
171	0000540	KIMBERLY CLARK CORPORATION MARINETTE	NE	31-Dec-08	WWFFGL	001	0.00		
172	0000540	KIMBERLY CLARK CORPORATION MARINETTE	NE	31-Dec-08	WWFFGL	002	0.00		
173	0000540	KIMBERLY CLARK CORPORATION MARINETTE	NE	31-Dec-08	WWFFGL	003	0.00		
174	0000540	KIMBERLY CLARK CORPORATION MARINETTE	NE	31-Dec-08	WWFFGL	004	310.00	3.20	96.95
175	0000540	KIMBERLY CLARK CORPORATION MARINETTE	NE	31-Dec-08	WWFFGL	005	0.00		
176	0054241	KLONDIKE CHEESE CORP	SC	31-Dec-09	WW	002	0.04	0.01	2.51
177	0001309	KOHLER COMPANY	SE	30-Jun-11	WWPWS	001	4.25	2.64	1.61
178	0000795	KOHLER COMPANY GENERATOR	SE	31-Dec-13	WWGL	001	0	0.13	0
179	0049204	KRIER FOODS INC RANDOM LAKE	SE	30-Sep-11	LFFGL	001	0.03	0.16	0.16
180	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	002	0	0.28	0
181	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	003	0	0.09	0
182	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	004	0	0.05	0
183	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	009	0	0.01	0
184	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	011	0	0.09	0
185	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	013	0	0.07	0
186	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	014	0	0.01	0

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#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
187	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	015	0	0.38	0
188	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	017	0	0.01	0
189	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	020	0	0.02	0
190	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	021	0	0.05	0
191	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	032	0	0.09	0
192	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	033	0	0.07	0
193	0000728	LADISH FORGING, LLC	SE	30-Sep-14	WW	040	0.00		
194	0054364	LAGRANDERS HILLSIDE DAIRY INC	WC	31-Dec-14	WW	001	0	0.01	0
195	0054364	LAGRANDERS HILLSIDE DAIRY INC	WC	31-Dec-14	WW	006	0	0.03	0
196	0049352	LAKE ALTOONA PROTECTION & REHAB DISTRICT	WC	30-Jun-11	WW	001	15.00	8.93	1.68
197	0000485	LAKESIDE FOODS INC EDEN	NE	31-Dec-08	LFFGL	002	0	0.20	0
198	0041475	LAKESIDE FOODS INC MANITOWOC PLANT	NE	30-Sep-12	WW	003	2.75	0.12	23.66
199	0027634	LAKESIDE FOODS INC SEYMOUR PLANT	NE	31-Dec-13	LFF	001	0	0.04	0
200	0057738	LAKESIDE FOODS INC. - REEDSBURG	SC	30-Sep-08	WW	001	12.50	0.37	34.17
201	0057738	LAKESIDE FOODS INC. - REEDSBURG	SC	30-Sep-08	WW	002	12.50	0.48	26.18
202	0057738	LAKESIDE FOODS INC. - REEDSBURG	SC	30-Sep-08	WW	003	12.50	0.37	34.17
203	0057738	LAKESIDE FOODS INC. - REEDSBURG	SC	30-Sep-08	WW	006	12.50	1.02	12.22
204	0052060	LAKESIDE FOODS, INC - MONDOVI	WC	30-Jun-13	WW	002	11.75	0.22	54.15
205	0000817	LAKESIDE FOODS, INC. - BELGIUM PLANT	SE	30-Jun-09	WW	002	0	0.78	0
206	0000817	LAKESIDE FOODS, INC. - BELGIUM PLANT	SE	30-Jun-09	WW	004	0	0.78	0
207	0002836	LAKESIDE FOODS, INC. NEW RICHMOND	WC	30-Sep-10	WW	001	4.25	0.62	6.85
208	0049379	LANDMARK SERVICES COOPERATIVE	SC	30-Sep-12	WW	001	0.00		
209	0052809	LEACH FARMS INC	NE	31-Dec-13		005	7.50	0.11	69.12
210	0049573	LEMBERGER LANDFILL SUPERFUND SITE	NE	31-Dec-10		001	1.00	0.47	2.15
211	0003450	LIGNOTECH USA INC	WC	31-Mar-07	WW	001	227.75	0.69	328.71
212	0003450	LIGNOTECH USA INC	WC	31-Mar-07	WW	002	0	1.16	0
213	0003450	LIGNOTECH USA INC	WC	31-Mar-07	WW	003	0	1.16	0
214	0001341	LITTLE RAPIDS CORP SHAWANO SPECIALTY PAPERS	NE	30-Jun-14	WW	001	77.50	2.86	27.07

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#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
215	0001341	LITTLE RAPIDS CORP SHAWANO SPECIALTY PAPERS	NE	30-Jun-14	WW	002	77.50	2.86	27.07
216	0002658	LODI CANNING CO	SC	31-Dec-13	CW	001	3.75	0.62	6.05
217	0051152	LYNN DAIRY/LYNN PROTEIN, INC.	WC	31-Mar-14	WW	001	0.04	0.48	0.08
219	0001961	MADISON GAS & ELECTRIC BLOUNT STATION	SC	31-Mar-11	WW	001	0	0.36	0
220	0001961	MADISON GAS & ELECTRIC BLOUNT STATION	SC	31-Mar-11	WW	002	0	51.77	0
221	0001961	MADISON GAS & ELECTRIC BLOUNT STATION	SC	31-Mar-11	WW	003	0	78.90	0
222	0001961	MADISON GAS & ELECTRIC BLOUNT STATION	SC	31-Mar-11	WW	008	0	0.13	0
223	0001961	MADISON GAS & ELECTRIC BLOUNT STATION	SC	31-Mar-11	WW	009	0.00		
224	0027189	MANITOWOC PUBLIC UTILITIES	NE	31-Aug-07	CWPWS	004	0	1.31	0
225	0027189	MANITOWOC PUBLIC UTILITIES	NE	31-Aug-07	CWPWS	009	0	110.05	0
226	0027189	MANITOWOC PUBLIC UTILITIES	NE	31-Aug-07	CWPWS	010	0.00		
227	0003883	MAPLE ISLAND INC	NO	30-Sep-13	WW	001	3.00	0.93	3.23
228	0062260	MAYFAIR MALL	SE	31-Mar-08	WWGL	001	0.00	0.03	0.08
229	0000272	MAYNARD STEEL CASTING CO	SE	30-Jun-13	LALGL	002	0.38	0.00	120.97
230	0054518	MCCAIN FOODS USA, INC., PLOVER	WC	30-Sep-13	WW	003	290.00	2.67	108.78
231	0027707	MENASHA ELECTRIC AND WATER UTILITY	NE	30-Sep-14	WW	001	116.25	17.05	6.82
232	0027707	MENASHA ELECTRIC AND WATER UTILITY	NE	30-Sep-14	WW	002	116.25	20.00	5.81
233	0027707	MENASHA ELECTRIC AND WATER UTILITY	NE	30-Sep-14	WW	003	116.25	0.31	375.00
234	0027707	MENASHA ELECTRIC AND WATER UTILITY	NE	30-Sep-14	WW	004	116.25	0.60	192.31
235	0000493	METAL TECHNOLOGIES INC. W ALLIS DUCTILE IRON	SE	30-Jun-07	LAL	001	0	1.61	0
236	0000493	METAL TECHNOLOGIES INC. W ALLIS DUCTILE IRON	SE	30-Jun-07	LAL	003	0	1.61	0
237	0000493	METAL TECHNOLOGIES INC. W ALLIS DUCTILE IRON	SE	30-Jun-07	LAL	005	0	1.61	0
238	0000493	METAL TECHNOLOGIES INC. W ALLIS DUCTILE IRON	SE	30-Jun-07	LAL	006	0	1.61	0
239	0000493	METAL TECHNOLOGIES INC. W ALLIS DUCTILE IRON	SE	30-Jun-07	LAL	008	0	1.61	0
240	0054500	METALLICS INC	WC	30-Sep-13	WW	003	0.80	0.03	25.81
241	0058564	MICHELS MATERIALS FL&B SHEPPARD QUARRY	NE	30-Sep-11		001	0.00		
242	0058564	MICHELS MATERIALS FL&B SHEPPARD QUARRY	NE	30-Sep-11		003	0.00		
243	0058564	MICHELS MATERIALS FL&B SHEPPARD QUARRY	NE	30-Sep-11		004	0	1.12	0

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
244	0049956	MIDDLETON CITY TIEDEMAN POND	SC	30-Jun-07	WW	001	0.00		
245	0038946	MIDWEST ENERGY RESOURCES COMPANY	NO	31-Dec-14	CW	001	0	0.93	0
246	0038946	MIDWEST ENERGY RESOURCES COMPANY	NO	31-Dec-14	CW	002	0.00		
247	0001236	MILK SPECIALTIES CO INC - ADELL FACILITY	SE	30-Sep-11	WWFFGL	001	0.0025	1.55	0
248	0003107	MILK SPECIALTIES CO, INC	SC	31-Mar-13	WW	001	1.35	0.54	2.49
249	0000744	MILLERCOORS LLC	SE	31-Mar-12	WWGL	001	1.48	0.03	48.06
250	0000744	MILLERCOORS LLC	SE	31-Mar-12	WWGL	004	1.48	0.50	2.97
251	0003034	MULE HIDE MFG. COMPANY	WC	31-Dec-08	WW	001	100.00	0.10	1008.06
252	0003034	MULE HIDE MFG. COMPANY	WC	31-Dec-08	WW	002	0.00		
253	0054127	MULLINS CHEESE INC	WC	30-Jun-14	WW	004	227.75	0.02	12244.62
254	0003085	MURPHY OIL USA INC SUPERIOR REFINERY	NO	31-Dec-09	LFFGL	001	0	0.76	0
255	0003085	MURPHY OIL USA INC SUPERIOR REFINERY	NO	31-Dec-09	LFFGL	002	0	0.76	0
256	0003085	MURPHY OIL USA INC SUPERIOR REFINERY	NO	31-Dec-09	LFFGL	003	0	0.76	0
257	0003085	MURPHY OIL USA INC SUPERIOR REFINERY	NO	31-Dec-09	LFFGL	004	0	0.76	0
258	0003085	MURPHY OIL USA INC SUPERIOR REFINERY	NO	31-Dec-09	LFFGL	011	0	0.76	0
259	0003085	MURPHY OIL USA INC SUPERIOR REFINERY	NO	31-Dec-09	LFFGL	021	0	0.76	0
260	0058220	NASCO DIVISION OF ARISTOTLE	SC	31-Mar-14	WW	001	13.25	0.10	131.51
261	0001996	NATIONAL RIVET AND MANUFACTURING COMPANY	SC	31-Mar-12	WW	001	0.02	0.17	0.10
262	0037842	NEENAH PAPER INC NEENAH MILL	NE	31-Dec-08	WWPWSGL	001	116.25	3.83	30.34
263	0037842	NEENAH PAPER INC NEENAH MILL	NE	31-Dec-08	WWPWSGL	005	0	5.05	0
264	0003611	NEENAH PAPER INC WHITING MILL	WC	30-Jun-10	WW	004	277.50	3.10	89.52
265	0002518	NESTLE PURINA PETCARE CO	SC	31-Dec-10	WW	001	7.75	1.35	5.75
266	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	001	0	4.65	0
267	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	002	0	4.65	0
268	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	003	217.50	10.02	21.70
269	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	005	217.50	2.50	87.16
270	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	007	0	4.65	0
271	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	008	0	4.65	0

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
272	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	009	0	4.65	0
273	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	010	0	4.65	0
274	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	011	0	4.65	0
275	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	012	0.00		
276	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	021	0	4.65	0
277	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	022	0.00		
278	0003468	NEW PAGE WISCONSIN	WC	31-Dec-09	WW	023	0.00		
279	0000698	NEWPAGE CORPORATION - KIMBERLY MILL	NE	31-Dec-07	WWGL	001	197.50	15.47	12.77
280	0000698	NEWPAGE CORPORATION - KIMBERLY MILL	NE	31-Dec-07	WWGL	002	0.00		
281	0000698	NEWPAGE CORPORATION - KIMBERLY MILL	NE	31-Dec-07	WWGL	005	0.00		
282	0000698	NEWPAGE CORPORATION - KIMBERLY MILL	NE	31-Dec-07	WWGL	019	0.00		
283	0000698	NEWPAGE CORPORATION - KIMBERLY MILL	NE	31-Dec-07	WWGL	022	0.00		
284	0000698	NEWPAGE CORPORATION - KIMBERLY MILL	NE	31-Dec-07	WWGL	088	0.00		
285	0000698	NEWPAGE CORPORATION - KIMBERLY MILL	NE	31-Dec-07	WWGL	099	0.00		
286	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	001	0	11.16	0
287	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	005	0.00		
289	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	006	0	11.16	0
290	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	008	0	11.16	0
291	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	009	0	11.16	0
292	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	011	0.00		
293	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	012	0.00		
294	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	013	0.00		
295	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	015	0.00		
296	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	017	197.50	9.41	20.99
297	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	018	0	11.16	0
298	0000752	NEWPAGE CORPORATION NIAGARA MILL	NE	30-Jun-09	WWGL	019	0	11.16	0
299	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	001	249.75	40.64	6.15
300	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	003	0.00		

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
301	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	005	0.00		
302	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	006	0.00		
303	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	007	0.00		
304	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	010	0	33.39	0
305	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	011	249.75	75.28	3.32
306	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	012	0	33.39	0
307	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	013	0	33.39	0
308	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	014	0	33.39	0
309	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	015	249.75	3.89	64.19
310	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	016	0	33.39	0
312	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	019	249.75	9.97	25.06
313	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	020	0.00		
314	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	021	0	33.39	0
315	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	022	0	33.39	0
316	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	023	0	33.39	0
317	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	025	0.00		
318	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	026	0.00		
319	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	027	0.00		
320	0037991	NEWPAGE CORPORATION- WATER QUALITY CENTER	WC	30-Jun-06	WW	028	0.00		
321	0042650	NEWTON MEATS AND SAUSAGE	NE	31-Mar-10	LALGL	001	0	0.00	0
322	0000957	NEXTERA ENERGY POINT BEACH LLC	NE	30-Jun-09	CWGL	001	0	566.99	0
323	0000957	NEXTERA ENERGY POINT BEACH LLC	NE	30-Jun-09	CWGL	002	0	580.32	0
324	0000957	NEXTERA ENERGY POINT BEACH LLC	NE	30-Jun-09	CWGL	004	0	0.31	0
325	0047147	NICOLET FOREST BOTTLING CO INC	NE	30-Sep-10	CW	001	0.93	0.01	119.35
326	0039144	NORTHERN WISCONSIN CENTER FOR DEV DISABLED	WC	30-Sep-10	WW	001	0	0.04	0
327	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	001	0	25.73	0
328	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	002	0	18.55	0
329	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	003	0	0.45	0

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
330	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	004	0.00		
331	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	007	0.00		
332	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	009	0.00		
333	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	013	0.00		
334	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	015	0.00		
335	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	016	0.00		
336	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	017	0.00		
337	0002887	NSPW BAY FRONT PLANT	NO	31-Dec-07	CWGL	018	0.00		
338	0070785	NSPW FRENCH ISLAND GENERATING STATION	WC	30-Sep-06	WW	001	0	32.24	0
339	0070785	NSPW FRENCH ISLAND GENERATING STATION	WC	30-Sep-06	WW	002	0	32.55	0
340	0070785	NSPW FRENCH ISLAND GENERATING STATION	WC	30-Sep-06	WW	003	0	0.05	0
341	0070785	NSPW FRENCH ISLAND GENERATING STATION	WC	30-Sep-06	WW	004	0	0.02	0
342	0070785	NSPW FRENCH ISLAND GENERATING STATION	WC	30-Sep-06	WW	005	0	0.02	0
343	0062561	OCEAN SPRAY CRANBERRIES INC KENOSHA	SE	31-Dec-13	CWGL	002	0	0.07	0
344	0038580	ORCHID INTERNATIONAL	SC	31-Mar-09	WW	001	0.45	0.29	1.54
345	0025321	P & H MINING EQUIPMENT	SE	31-Dec-08	WWGL	001	1.70	0.44	3.85
346	0025321	P & H MINING EQUIPMENT	SE	31-Dec-08	WWGL	002	1.70	0.01	219.35
347	0002810	PACKAGING CORPORATION OF AMERICA - TOMAHAWK	NO	31-Mar-15	WW	002	0	10.85	0
348	0002810	PACKAGING CORPORATION OF AMERICA - TOMAHAWK	NO	31-Mar-15	WW	003	96.50	9.15	10.54
349	0002810	PACKAGING CORPORATION OF AMERICA - TOMAHAWK	NO	31-Mar-15	WW	004	0	10.85	0
350	0070581	PACKERLAND WHEY PRODUCTS INC	NE	30-Sep-09	LFF	003	0	0.00	0
351	0070581	PACKERLAND WHEY PRODUCTS INC	NE	30-Sep-09	LFF	004	0	0.19	0
352	0026999	PECHINEY PLASTIC PACKAGING - MENASHA PLANT	NE	30-Sep-13	WWGL	001	116.25	0.57	203.25
353	0026999	PECHINEY PLASTIC PACKAGING - MENASHA PLANT	NE	30-Sep-13	WWGL	003	116.25	0.57	203.25
354	0026999	PECHINEY PLASTIC PACKAGING - MENASHA PLANT	NE	30-Sep-13	WWGL	004	116.25	0.57	203.25

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

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#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
355	0026999	PECHINEY PLASTIC PACKAGING - MENASHA PLANT	NE	30-Sep-13	WWGL	005	116.25	0.57	203.25
356	0026999	PECHINEY PLASTIC PACKAGING - MENASHA PLANT	NE	30-Sep-13	WWGL	008	0	0.57	0
357	0001635	PENTAIR - PLYMOUTH PRODUCTS INC	SE	31-Mar-13	WWGL	001	4.25	0.77	5.49
358	0041351	PENTAIR RESIDENTIAL FILTRATION, LLC	SE	31-Dec-11	WW	002	6.50	0.02	279.57
359	0055816	PENTAIR WATER INC	SE	30-Jun-11	WW	001	0	0.72	0
360	0046957	PGP INTERNATIONAL INC	SC	30-Jun-11	WW	001	0.06	0.39	0.14
361	0041149	PHILLIPS PLATING CORPORATION	NO	31-Mar-11	WW	001	0	0.29	0
362	0041149	PHILLIPS PLATING CORPORATION	NO	31-Mar-11	WW	101	0	0.06	0
363	0038938	PLYMOUTH TUBE - EAST TROY & TRENT PLANTS	SE	31-Mar-09	WW	001	1.23	0.32	3.87
364	0069965	POWER PACKAGING INC	NE	30-Sep-10	WW	001	0.00	0.14	0.02
365	0029149	PPG INDUSTRIES INC	SE	30-Sep-14	WW	001	0	0.06	0
366	0029149	PPG INDUSTRIES INC	SE	30-Sep-14	WW	002	0.00		
367	0029149	PPG INDUSTRIES INC	SE	30-Sep-14	WW	003	0.00		
368	0044628	PROVIMI FOODS INC	NE	31-Dec-11	LAL	001	0	0.10	0
369	0061921	RIVERSIDE ENERGY CENTER LLC	SC	30-Sep-07	WW	001	54.75	0.40	135.86
370	0002488	RUSHING WATERS FISHERIES, INC	SC	31-Dec-10	WW	001	0.0085	3.16	0
371	0027596	SAPUTO CHEESE USA INC BLACK CREEK	NE	30-Sep-13	LFF	001	0.01		
372	0027596	SAPUTO CHEESE USA INC BLACK CREEK	NE	30-Sep-13	LFF	003	0.01	0.04	0.17
373	0059404	SAPUTO CHEESE USA INC REEDSBURG	SC	31-Dec-13	WW	001	32.50	0.19	174.73
374	0052086	SAPUTO CHEESE USA INC WALDO	SE	31-Dec-11		004	1.05	0.14	7.53
375	0027308	SAPUTO CHEESE USA LENA	NE	31-Dec-11	LAL	001	0	0.20	0
376	0027308	SAPUTO CHEESE USA LENA	NE	31-Dec-11	LAL	006	0	0.20	0
377	0027308	SAPUTO CHEESE USA LENA	NE	31-Dec-11	LAL	007	0	0.20	0
378	0027308	SAPUTO CHEESE USA LENA	NE	31-Dec-11	LAL	012	0.00		
379	0027308	SAPUTO CHEESE USA LENA	NE	31-Dec-11	LAL	015	0	0.20	0
380	0027308	SAPUTO CHEESE USA LENA	NE	31-Dec-11	LAL	016	0	0.20	0
381	0027308	SAPUTO CHEESE USA LENA	NE	31-Dec-11	LAL	018	0.00		
382	0000159	SAPUTO CHEESE USA NEW LONDON	NE	30-Jun-11	WW	001	117.50	0.00	75806.45

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
383	0056120	SAPUTO CHEESE USA, FOND DU LAC (SCOTT ST)	NE	31-Dec-11		001	0.10	0.06	1.65
384	0000132	SAPUTO CHEESE USA, FOND DU LAC (TOMKINS ST)	NE	30-Sep-12	WW	001	0	0.01	0
385	0002003	SAPUTO CHEESE WAUPUN FACILITY	NE	30-Jun-09	WW	001	0	0.37	0
386	0002003	SAPUTO CHEESE WAUPUN FACILITY	NE	30-Jun-09	WW	002	0	0.37	0
387	0023094	SARA LEE FOODS - NEW LONDON	NE	31-Dec-10	LAL	001	0	1.38	0
388	0032794	SARTORI FOOD CORPORATION	NO	31-Dec-14	WW	003	0.63	0.16	4.03
389	0041904	SARTORI FOOD CORPORATION-WEST MAIN BUILDING	SE	31-Mar-11	WW	001	0.80	0.31	2.57
390	0037389	SCA TISSUE NORTH AMERICA LLC	NE	31-Dec-08	WW	001	232.50	6.05	38.46
391	0037389	SCA TISSUE NORTH AMERICA LLC	NE	31-Dec-08	WW	002	232.50	6.05	38.46
392	0037389	SCA TISSUE NORTH AMERICA LLC	NE	31-Dec-08	WW	003	0	6.05	0
393	0037389	SCA TISSUE NORTH AMERICA LLC	NE	31-Dec-08	WW	007	0	6.05	0
394	0026751	SCHREIBER FOODS INC - WEST BEND	SE	31-Mar-14	WWGL	001	0.88	0.74	1.19
395	0026751	SCHREIBER FOODS INC - WEST BEND	SE	31-Mar-14	WWGL	004	0.00		
396	0026751	SCHREIBER FOODS INC - WEST BEND	SE	31-Mar-14	WWGL	005	0.00		
397	0004499	SCHREIBER FOODS INC MERLIN G BUSH PLANT	NE	31-Mar-10	WW	002	0.06	0.04	1.27
398	0004499	SCHREIBER FOODS INC MERLIN G BUSH PLANT	NE	31-Mar-10	WW	004	0.06		
399	0046248	SCHROEDERS GREENHOUSE	NE	31-Dec-10	WW	001	188.64	0.00	121703.23
400	0002160	SENECA FOODS CORPORATION - CLYMAN	SC	30-Jun-01		001	0.0025	0.62	0
401	0003891	SENECA FOODS CORPORATION CAMBRIA	SC	30-Jun-11	WW	001	0	0.25	0
402	0052701	SENECA FOODS CORPORATION CUMBERLAND	NO	31-Dec-10	LFF	003	0	1.12	0
403	0000345	SENECA FOODS CORPORATION GILLETT	NE	30-Jun-14	WW	001	0.04	0.23	0.18
404	0002267	SENECA FOODS CORPORATION OAKFIELD	NE	31-Dec-09	WWFF	001	0	0.28	0
405	0002267	SENECA FOODS CORPORATION OAKFIELD	NE	31-Dec-09	WWFF	008	0.00		
406	0001163	SENECA FOODS CORPORATION RIPON	NE	31-Mar-12	WW	001	0	1.09	0
407	0002534	SENSIENT FLAVORS INC	SC	31-Dec-14	LAL	001	0	0.29	0
408	0002534	SENSIENT FLAVORS INC	SC	31-Dec-14	LAL	002	0.00		
409	0062146	SPF North America, Inc.	WC	30-Jun-12	WW	001	11.75	0.07	168.46

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
410	0053015	SPRINGSIDE CHEESE CORPORATION	NE	31-Mar-13		002	UK	0.01	
411	0000531	ST PAPER LLC	NE	30-Jun-09	WWGL	001	46.75	3.10	15.08
412	0000531	ST PAPER LLC	NE	30-Jun-09	WWGL	007	46.75	1.39	33.66
413	0000531	ST PAPER LLC	NE	30-Jun-09	WWGL	008	46.75	1.39	33.66
414	0056880	STELLA JONES CORPORATION - BANGOR	WC	31-Mar-15	LAL	001	0	0.00	0
415	0056880	STELLA JONES CORPORATION - BANGOR	WC	31-Mar-15	LAL	002	0.00		
416	0063231	Sysco Food Service of Eastern Wisconsin	SE	31-Dec-10	WWGL	001	0.25	0.00	53.23
417	0001031	THE PROCTER & GAMBLE PAPER PRODUCTS CO	NE	31-Mar-08	WWGL	001	165.00	7.99	20.66
418	0001031	THE PROCTER & GAMBLE PAPER PRODUCTS CO	NE	31-Mar-08	WWGL	009	0	6.67	0
419	0001031	THE PROCTER & GAMBLE PAPER PRODUCTS CO	NE	31-Mar-08	WWGL	010	0	6.67	0
420	0001031	THE PROCTER & GAMBLE PAPER PRODUCTS CO	NE	31-Mar-08	WWGL	088	0	6.67	0
421	0001031	THE PROCTER & GAMBLE PAPER PRODUCTS CO	NE	31-Mar-08	WWGL	099	0	6.67	0
422	0001473	THILMANY LLC - DE PERE FACILITY	NE	30-Jun-09	WW	003	165.00	3.80	43.45
423	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	001	197.50	30.85	6.40
424	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	002	0	26.74	0
425	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	003	0	26.74	0
426	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	005	0	26.74	0
427	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	007	0	26.74	0
428	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	009	0	26.74	0
429	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	010	0	26.74	0
430	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	011	0	26.74	0
431	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	012	0	26.74	0
432	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	013	0	26.74	0
433	0000825	THILMANY, LLC	NE	30-Sep-08	WWGL	014	0	26.74	0
434	0043699	THYSSENKRUPP WAUPACA INC MARINETTE	NE	31-Mar-12	WW	001	310.00	2.18	141.91
435	0043699	THYSSENKRUPP WAUPACA INC MARINETTE	NE	31-Mar-12	WW	004	310.00		
436	0026379	THYSSENKRUPP WAUPACA INC PLANT NO 1	NE	30-Jun-12	WW	001	19.25	0.62	31.05
437	0026379	THYSSENKRUPP WAUPACA INC PLANT NO 1	NE	30-Jun-12	WW	002	0.00		

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
438	0001040	TYCO FIRE SUPPRESSION & BP - ANSUL LLC	NE	30-Jun-08	WWFFGL	001	310.00	1.32	235.29
439	0001040	TYCO FIRE SUPPRESSION & BP - ANSUL LLC	NE	30-Jun-08	WWFFGL	003	0	0.31	0
440	0046574	TYSON FOODS INC	SC	31-Dec-09	WW	002	7.75		
441	0045756	UNITED STATES DEPARTMENT OF INTERIOR USGS	WC	31-Dec-10	WW	001	0	1.43	0
442	0045756	UNITED STATES DEPARTMENT OF INTERIOR USGS	WC	31-Dec-10	WW	002	0.00		
443	0062502	UNITED WISCONSIN GRAIN PRODUCERS LLC	SC	30-Sep-08	WW	001	0	0.16	0
444	0063649	UTICA ENERGY LLC	NE	30-Jun-13	WWGL	001	0	0.26	0
445	0038296	UW MADISON CHARTER STREET HEATING PLANT	SC	30-Apr-13	WW	001	0	0.43	0
446	0038296	UW MADISON CHARTER STREET HEATING PLANT	SC	30-Apr-13	WW	003	0.00		
447	0038296	UW MADISON CHARTER STREET HEATING PLANT	SC	30-Apr-13	WW	004	0.00		
448	0002038	VALERO RENEWABLE FUELS COMPANY, LLC	SC	30-Sep-13	WW	001	5.00	0.88	5.66
449	0052931	VPP GROUP, LLC	WC	30-Sep-11	WW	002	0.48	0.01	43.78
450	0049514	WASTE MANAGEMENT OMEGA HILLS LANDFILL	SE	30-Jun-08	WWFF	001	0	0.12	0
451	0003671	WAUSAU PAPER MILLS, LLC	WC	30-Sep-10	WW	001	9.00	13.49	0.67
452	0003671	WAUSAU PAPER MILLS, LLC	WC	30-Sep-10	WW	003	9.00	3.57	2.52
453	0003671	WAUSAU PAPER MILLS, LLC	WC	30-Sep-10	WW	004	9.00	15.04	0.60
454	0003671	WAUSAU PAPER MILLS, LLC	WC	30-Sep-10	WW	007	9.00		
455	0003671	WAUSAU PAPER MILLS, LLC	WC	30-Sep-10	WW	008	9.00		
456	0003379	WAUSAU PAPER MILLS, LLC	WC	30-Jun-07	WW	004	225.00	10.85	20.74
457	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	004	76.00	10.43	7.29
458	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	010	76.00	13.02	5.84
459	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	011	76.00	10.43	7.29
460	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	012	76.00	13.02	5.84
461	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	016	76.00	13.02	5.84
462	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	018	76.00	13.02	5.84
463	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	019	76.00	13.02	5.84
464	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	021	0.00		
465	0003026	WAUSAU PAPER MILLS, LLC	NO	31-Dec-08	WW	022	0.00		

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
466	0043583	WE - PLEASANT PRAIRIE POWER PLANT	SE	30-Jun-09	CWPWSGL	001	0	12.40	0
467	0043583	WE - PLEASANT PRAIRIE POWER PLANT	SE	30-Jun-09	CWPWSGL	002	0	12.40	0
468	0043583	WE - PLEASANT PRAIRIE POWER PLANT	SE	30-Jun-09	CWPWSGL	003	0	12.40	0
469	0000922	WE - PORT WASHINGTON GENERATING STATION	SE	31-Dec-12	CWPWSGL	001	0	0.54	0
470	0000922	WE - PORT WASHINGTON GENERATING STATION	SE	31-Dec-12	CWPWSGL	002	0	0.54	0
471	0000931	WE - VALLEY POWER PLANT	SE	31-Dec-91	WW	001	0	110.90	0
472	0000931	WE - VALLEY POWER PLANT	SE	31-Dec-91	WW	002	0	110.90	0
473	0000931	WE - VALLEY POWER PLANT	SE	31-Dec-91	WW	101	0	110.90	0
474	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	001	0	9.46	0
475	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	003	0	9.46	0
476	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	004	0	9.46	0
477	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	005	0	9.46	0
478	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	006	0	9.46	0
479	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	007	0	9.46	0
480	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	012	0	9.46	0
481	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	013	0.00		
482	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	014	0.00		
483	0000914	WE ENERGIES OAK CREEK POWER PLANT	SE	29-Mar-10	CWGL	015	0.00		
484	0070645	WESTBY COOP CREAMERY	WC	30-Sep-11	LAL	002	0	0.02	0
485	0039527	WEYAUWEGA STAR DAIRY	NE	31-Mar-12	WW	001	0.00		
486	0049069	WHITEWATER COGENERATION FACILITY	SC	31-Dec-08	WW	001	2.88	0.34	8.43
487	0049069	WHITEWATER COGENERATION FACILITY	SC	31-Dec-08	WW	102	2.88	0.12	23.19
488	0058271	WI DNR ART OEHMCKE STATE FISH HATCHERY	NO	30-Jun-11	WW	001	0.17	4.46	0.04
489	0058271	WI DNR ART OEHMCKE STATE FISH HATCHERY	NO	30-Jun-11	WW	002	0.17	4.46	0.04
490	0058271	WI DNR ART OEHMCKE STATE FISH HATCHERY	NO	30-Jun-11	WW	003	0.17	4.46	0.04
491	0058271	WI DNR ART OEHMCKE STATE FISH HATCHERY	NO	30-Jun-11	WW	005	0.17	4.46	0.04
492	0004171	WI DNR BRULE RIVER STATE FISH HATCHERY	NO	31-Mar-12	WWGL	001	0.63	3.77	0.17
493	0004171	WI DNR BRULE RIVER STATE FISH HATCHERY	NO	31-Mar-12	WWGL	002	0.63	0.01	100.81

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
494	0060241	WI DNR DEVILS LAKE STATE PARK	SC	31-Oct-12	LAL	004	0	4.01	0
495	0049191	WI DNR GOV TOMMY THOMPSON FISH HATCHERY	NO	30-Sep-11	WW	001	6.75	2.39	2.83
496	0049191	WI DNR GOV TOMMY THOMPSON FISH HATCHERY	NO	30-Sep-11	WW	002	0.00		
497	0049191	WI DNR GOV TOMMY THOMPSON FISH HATCHERY	NO	30-Sep-11	WW	003	0.00		
498	0049191	WI DNR GOV TOMMY THOMPSON FISH HATCHERY	NO	30-Sep-11	WW	004	0.00		
499	0026255	WI DNR KETTLE MORAINE SPRINGS FISH HATCHERY	SE	30-Jun-10	CWGL	001	0.55	2.17	0.25
500	0022721	WI DNR LAKEWOOD REARING STATION	NE	31-Dec-09	LAL	002	0	2.20	0
501	0004162	WI DNR LES VOIGT STATE FISH HATCHERY	NO	31-Mar-12	CWGL	001	1.55	3.57	0.43
502	0002585	WI DNR NEVIN FISH HATCHERY	SC	31-Dec-11	WW	001	0.15	3.26	0.05
503	0004197	WI DNR OSCEOLA FISH HATCHERY	NO	31-Dec-11	WW	001	0.22	2.95	0.08
504	0004201	WI DNR ST CROIX FALLS HATCHERY	NO	31-Mar-12	WW	001	275.00	0.53	515.75
505	0004201	WI DNR ST CROIX FALLS HATCHERY	NO	31-Mar-12	WW	002	275.00	1.64	168.01
506	0004201	WI DNR ST CROIX FALLS HATCHERY	NO	31-Mar-12	WW	003	275.00	1.93	142.51
507	0004201	WI DNR ST CROIX FALLS HATCHERY	NO	31-Mar-12	WW	004	275.00	0.29	953.87
508	0022713	WI DNR THUNDER RIVER REARING STATION	NE	31-Dec-14	CW	001	1.45	4.52	0.32
509	0022713	WI DNR THUNDER RIVER REARING STATION	NE	31-Dec-14	CW	002	1.45	5.35	0.27
510	0022713	WI DNR THUNDER RIVER REARING STATION	NE	31-Dec-14	CW	003	1.45	0.47	3.10
511	0022713	WI DNR THUNDER RIVER REARING STATION	NE	31-Dec-14	CW	005	1.45		
512	0022713	WI DNR THUNDER RIVER REARING STATION	NE	31-Dec-14	CW	007	0.00		
513	0022756	WI DNR WILD ROSE FISH HATCHERY	NE	30-Jun-13	CW	001	1.40	0.05	30.11
514	0022756	WI DNR WILD ROSE FISH HATCHERY	NE	30-Jun-13	CW	019	1.40		
515	0061441	WI ELECTRIC POWER CO CONCORD STATION	SC	31-Dec-06	WW	001	1.25	0.05	26.88
516	0061441	WI ELECTRIC POWER CO CONCORD STATION	SC	31-Dec-06	WW	002	1.25	0.19	6.72
517	0061441	WI ELECTRIC POWER CO CONCORD STATION	SC	31-Dec-06	WW	003	1.25	0.19	6.72
518	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		001	0	1.26	0
519	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		002	0	1.26	0
520	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		003	97.50	1.26	77.66
521	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		004	0	1.26	0

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
522	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		005	0	1.26	0
523	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		101	0	1.26	0
524	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		102	0	1.26	0
525	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		201	0	1.26	0
526	0002402	WI POWER AND LIGHT ROCK RIVER PLANT	SC	30-Jun-91		202	0	1.26	0
527	0001589	WIS. POWER AND LIGHT EDGEWATER GEN. STATION	SE	30-Sep-08	CWPWSGL	002	0	8.96	0
528	0001589	WIS. POWER AND LIGHT EDGEWATER GEN. STATION	SE	30-Sep-08	CWPWSGL	004	0	8.96	0
529	0001589	WIS. POWER AND LIGHT EDGEWATER GEN. STATION	SE	30-Sep-08	CWPWSGL	006	0	8.96	0
530	0001589	WIS. POWER AND LIGHT EDGEWATER GEN. STATION	SE	30-Sep-08	CWPWSGL	009	0	8.96	0
531	0001589	WIS. POWER AND LIGHT EDGEWATER GEN. STATION	SE	30-Sep-08	CWPWSGL	010	0	8.96	0
532	0001589	WIS. POWER AND LIGHT EDGEWATER GEN. STATION	SE	30-Sep-08	CWPWSGL	012	0	8.96	0
533	0001589	WIS. POWER AND LIGHT EDGEWATER GEN. STATION	SE	30-Sep-08	CWPWSGL	014	0.00		
534	0055751	WISCONSIN DAIRY STATE CHEESE, INC.	WC	31-Dec-10	LAL	001	0	0.05	0
535	0002780	WISCONSIN POWER AND LIGHT CO - COLUMBIA	SC	30-Sep-11	WW	001	0	3.70	0
536	0002780	WISCONSIN POWER AND LIGHT CO - COLUMBIA	SC	30-Sep-11	WW	002	0	3.70	0
537	0000965	WISCONSIN PUBLIC SERVICE CORP PULLIAM	NE	30-Jun-11	WW	001	0	364.56	0
538	0000965	WISCONSIN PUBLIC SERVICE CORP PULLIAM	NE	30-Jun-11	WW	002	0	364.56	0
539	0000965	WISCONSIN PUBLIC SERVICE CORP PULLIAM	NE	30-Jun-11	WW	003	0	364.56	0
540	0003131	WISCONSIN PUBLIC SERVICE CORP WESTON 1 & 2	WC	31-Dec-11	WW	001	227.75	150.20	1.52
541	0003131	WISCONSIN PUBLIC SERVICE CORP WESTON 1 & 2	WC	31-Dec-11	WW	002	227.75	0.17	1335.78
542	0003131	WISCONSIN PUBLIC SERVICE CORP WESTON 1 & 2	WC	31-Dec-11	WW	004	227.75	36.89	6.17
543	0042765	WISCONSIN PUBLIC SERVICE CORP WESTON 3 & 4	WC	31-Mar-15	WW	002	227.75	1.16	195.91
544	0042765	WISCONSIN PUBLIC SERVICE CORP WESTON 3 & 4	WC	31-Mar-15	WW	003	227.75	1.16	195.91
545	0042765	WISCONSIN PUBLIC SERVICE CORP WESTON 3 & 4	WC	31-Mar-15	WW	004	227.75	1.16	195.91
546	0042765	WISCONSIN PUBLIC SERVICE CORP WESTON 3 & 4	WC	31-Mar-15	WW	005	227.75	1.16	195.91
547	0042218	WISCONSIN THERMOSET MOLDING INC	SE	31-Dec-12	WWGL	005	6.00	0.00	19354.84
548	0040282	WISCONSIN UNIVERSITY MILWAUKEE POWER PLANT	SE	30-Sep-10	CWPWSGL	001	0	22.01	0
549	0047929	WISCONSIN VENEER AND PLYWOOD INC	NE	31-Dec-11	CW	001	1.30	1.16	1.12

Appendix A2. – Qs:Qe Ratios for Industrial WPDES Permittees with Surface Water Discharge (as of 7/8/2010)

Note: This Appendix is for informational purposes only. Updated Qs:Qe values will be calculated upon permit reissuance.

#	Permit No.	Facility Name	DNR REG	Expires	Rec. Water Class	Outfall Number	Qs (in cfs)	Qe (in cfs)	Qs:Qe Ratio (in cfs)
550	0002381	WPL NELSON DEWEY GENERATING STATION	SC	31-Mar-06	WW	001	2600.00	218.55	11.90
551	0002381	WPL NELSON DEWEY GENERATING STATION	SC	31-Mar-06	WW	002	2600.00	3.53	735.71
552	0002381	WPL NELSON DEWEY GENERATING STATION	SC	31-Mar-06	WW	003	2600.00	15.50	167.74
553	0002381	WPL NELSON DEWEY GENERATING STATION	SC	31-Mar-06	WW	004	2600.00	1.86	1397.85
554	0049131	Wis Electric Power Company-Tn of Paris	SE	31-Dec-11	WW	001	0.00		
555	0049131	Wis Electric Power Company-Tn of Paris	SE	31-Dec-11	WW	101	0	1.58	0
556	0049131	Wis Electric Power Company-Tn of Paris	SE	31-Dec-11	WW	102	0.00		
557	0049131	Wis Electric Power Company-Tn of Paris	SE	31-Dec-11	WW	103	0.00		
558	0042757	Wisconsin Electric Power Company GERMANTOWN	SE	31-Dec-10	WW	001	0	0.33	0
559	0042757	Wisconsin Electric Power Company GERMANTOWN	SE	31-Dec-10	WW	002	0.00		
560	0042757	Wisconsin Electric Power Company GERMANTOWN	SE	31-Dec-10	WW	003	0.00		

Appendix B. Limit Calculation Spreadsheet Instructions

The goal of the thermal limits spreadsheet is to provide a user-friendly tool to determine case-specific WQBELs for temperature and to determine the reasonable potential for those limitations to be exceeded. The spreadsheet was constructed to reflect the provisions of Chapters NR 102 and NR 106 (Wis. Adm. Code) and is to be used in conjunction with Chapters NR 102 – Subchapter II and NR 106 – Subchapters V & VI.

Do I need to use the spreadsheet?

To save a little time calculating specific limits which aren't applicable, consider the following before jumping into either of the spreadsheets:

Stream Classification -

- Wastewater effluent channels as defined in s. NR 104.02(1)(d), Wis. Adm. Code: 120 °F
- Wetlands shall not exceed standards in ch. NR 103, Wis. Adm. Code
- Limited Aquatic Life Communities: 86 °F
- Qs:Qe ratio for unidirectional waters – s. NR 106.55(6)(a), Wis. Adm. Code

The spreadsheets to calculate WQBELs consistent with the thermal standards can be accessed on the Thermal Standards Webs Page using the following link: http://dnr.wi.gov/topic/surfacewater/thermal.html

Two versions of this spreadsheet are available. If any of the following statements are applicable, then the full spreadsheet should be used:

- Effluent flows through a storm sewer before reaching the surface water and after the point of temperature monitoring.
  - It is important to know where monitoring takes place. If the facility monitors before discharge into the sewer then this calculation can be used. If the facility monitors after flow through a sewer, before discharge to the surface water then the calculation of heat loss from the sewer is not applicable.
- Site specific ambient temperature data are available.

In other cases, the simplified spreadsheet may be used to determine limits and reasonable potential.

Simplified Spreadsheet Directions

There are two versions of the simplified spreadsheet; one for discharges to receiving waters with unidirectional flow and another for discharges to lakes. The results will be the same regardless of which spreadsheet is used however the simplified version currently can only be used with the default ambient temperature. It uses the

worksheets identified with italics above simplified into three worksheets (worksheet names listed in bold indicates where data is to be entered by the user):

- **Raw Data** - This worksheet allows the user to copy effluent flow and temperature data from SWAMP, and to automatically obtain the monthly values needed for WQBEL calculations. Only the first 2000 rows are used in the calculation. Note: If the time appears after the date (e.g. 00:00:00), the data may not be recognized in the datasheet. If this occurs use the Find and Replace tool to delete the time.
- **Pivot table** – Data are not entered in this worksheet however other steps are necessary.
    1. After entering the flow and temperature daily values in the "raw data" worksheet, the table must be updated: Right-click on the table and select "Refresh Data". This has to be done each time a change is brought to the "Raw Data" worksheet;
    2. Verify whether or not there are any unusual monthly flow (Qe) conditions (last column) before doing the flow ratio screening.
    3. An additional feature allows results for a specific year to be shown by using the filter "year".
- **Calculations** – Combines Uni Flow Flow Ratios, Uni Flow WQBEL Default Ta and Uni Flow Sum Tab Default Ta in the StreamThermal.xls spreadsheet and Lakes WQBEL Default Ta and Lakes Sum Tab Default Ta in the LakesThermal.xls spreadsheet.

Basic Procedure

As a summary, the basic procedure for calculating thermal water quality based effluent limits (WQBELs) using the spreadsheet is:

1. Copy the effluent flow and temperature in the raw data worksheet.

2. Identify the category of receiving waters to which the effluent is discharged:
    - Waters with unidirectional flow (non-specific and specific large rivers)
    - Inland lakes, impoundments and Great Lakes waters
    - Storm sewer or storm water conveyance channel
    - Limited aquatic life (default limit = 86 degrees F)
    - Wastewater effluent channel (default limit = 120 degrees F)
    - Wetlands (see s. NR 106.55(4), Wis. Adm. Code, for calculation method on a case-by-case basis)

3. Determine the Qs:Qe ratio and proceed to effluent limit (WQBEL) calculations when required. The Qs:Qe ratio screening aims to determine whether or not calculation of effluent limits will be required for a facility discharging to non-limited aquatic life waters with unidirectional flow (s. NR 105.55(6)(a), Wis. Adm. Code).

Flow Ratio Categories		
Warm Water and LFF	Cold Water	Effluent Temperature
Qs:Qe $\geq$ 20:1	Qs:Qe . 30:1	120°F
20:1 > Qs:Qe > 2:1	30:1 > Qs:Qe > 2.5:1	120°F or sub-lethal WQBEL
Qs:Qe $\leq$ 2:1	Qs:Qe $\leq$ 2.5:1	Sub-lethal and acute WQBELs

For a municipal discharge (subject to ch. NR 210, Wis. Adm. Code), the effluent flow used to calculate the flow ratio is the annual design flow, or the flow anticipated to occur for 12 continuous months during the design life of the treatment facility, pursuant to s. NR 106.53(2)(a)1, Wis. Adm. Code. For discharges not subject to ch. NR 210, Wis. Adm. Code, the actual maximum annual flow is used to calculate flow ratios, pursuant to s. NR 106.53(2)(a)2, Wis. Adm. Code. Additional information on the Qs:Qe ratio is provided in Chapter 3 (pg. 22) of the Guidance.

The WQBEL default worksheet assists in the calculation of the acute and sub-lethal effluent limits for each month of the year. The following variables must be supplied:

- Receiving water flow rate (Qs) (25% of 7Q10 or 25% of 4-day, 3-year biologically based stream flow, if available). Monthly Qs values should be used when available and are discussed in Chapter 9 (pg. 53).
- Fraction of effluent flow that is withdrawn from the receiving water, f (unit less value between 0 and 1)
- Effluent flow rate (Qe). This is calculated from the effluent flow data in SWAMP. The spreadsheet manipulates the effluent data to provide the effluent flow rates consistent with the methods specified in ss. NR 106.53(2)(b) and (c) , Wis. Adm. Codes. NOTE: The effluent flows used to calculate acute and sub-lethal limits are not the same flows used to calculate flow ratios.

4. Review the summary table to determine if there is a reasonable potential that effluent temperatures will exceed the calculated WQBELs and limits should be included. Limits should be included for each individual month that reasonable potential is exceeded. The representative highest daily maximum and weekly average effluent temperature for each month of the year must be supplied to make this determination. Without actual effluent data reasonable potential cannot be determined and limits subject to drop as described in Chapter 17 (pg. 114) should be included in the permit unless an exemption as described in Chapter 8 (pg. 50) applies.

5. Verify and include the summary table in the WQBEL recommendation memo.

Full Spreadsheet Directions- Available Upon Request

As a MS-Excel Spreadsheet, the master document is a *workbook* of several *worksheets.* The dynamic design of this spreadsheet will automatically link the user to the proper worksheet as they progress through the opening screens. However, for any user who wishes to evaluate the content of any particular worksheet, they can be accessed by clicking on the tabs at the bottom of the page. Comments were included to display further explanations (see cells with red triangle indicators). The unique worksheets in this file are presented in the following order and include (worksheet names listed in bold indicate where data is to be entered by the user):

- **TOC** – Table of Contents
- **Procedure** – Describes the steps in the process:
    1. Identify the receiving waters to which the effluent is discharged
    2. Proceed to WQBEL calculations
    3. Perform a reasonable potential analysis to determine if the limitation is required in permits
    4. Verify and print the summary table and graph for records.
- **Raw Data** - This worksheet allows the user to copy effluent flow and temperature data from SWAMP, and to automatically obtain the monthly values needed for WQBEL calculations. The name of the facility, period of data collected, user name and current date are also entered on this worksheet and automatically copied over to others. Note: If the time appears after the date (e.g. 00:00:00), the data may not be recognizable in the datasheet. Use the Find and Replace tool to delete the time.
- **Datasheet** – The raw data is automatically moved to this worksheet where average flow and temperatures are calculated.
- **Monthly Qe & T** – Data are not entered in this worksheet however other steps are necessary.
    1. After entering the flow and temperature daily values in the "raw data" worksheet, the table must be updated: Right-click on the table and select "Refresh Data". This has to be done each time a change is brought to the "Raw Data" worksheet;
    2. Verify whether or not there are any unusual monthly flow (Qe) conditions (last column) before doing the flow ratio screening.
    3. An additional feature allows results for a specific year to be shown by using the filter "year".
- **Storm Sewers** – For discharges to storm sewers and storm water conveyance channels only. The calculated temperature limit, heat loss value and length of the storm sewer are entered to adjust limits for heat loss. An assumed heat loss value is specified in s. NR 106.55(5), Wis. Adm. Code.
- The following worksheets are used for discharges to receiving waters with unidirectional flow only:
    1. ***Uni Flow Flow Ratios –*** Qs:Qe screening. Annual average flow and receiving water low flow are entered to determine if limit calculation is needed.
    2. ***Uni Flow WQBEL Default Ta*** – Used with default ambient temperature data. This is expected to be the most common situation. Receiving water type and flow rates are entered here.
    3. ***Uni Flow Sum Tab Default Ta*** – Summary table includes representative highest monthly effluent temperatures from the data entered into the raw data worksheet and the calculated water quality based effluent limit. The effluent data is compared to the calculated limits to determine reasonable potential.

4. ***Uni Flow WQBEL SS Ta*** – Used only in the cases where site-specific ambient temperature has been provided. The site-specific data are entered into the worksheet.
5. ***Uni Flow Sum Tab SS Ta*** – Summary table for reasonable potential when site specific ambient temperatures are used.

- The remaining worksheets are to be used for lake discharges only:
    1. ***Lakes WQBEL Default Ta*** - Used with default ambient temperature data. This is expected to be the most common situation. Receiving water type and discharge category are entered here.
    2. ***Lakes Sum Tab Default Ta*** - Summary table includes representative highest monthly temperatures from the data entered into the raw data worksheet and the calculated water quality based effluent limit. The effluent data are compared to the calculated limits to determine reasonable potential.
    3. ***Lakes WQBEL SS Ta***- Used only in the cases where site-specific ambient temperature has been provided. The site-specific data are entered into the worksheet.
    4. ***Lakes Sum Tab SS Ta*** - Summary table for reasonable potential when site-specific ambient temperatures are used.

The procedure for calculation of site-specific acute and sub-lethal criteria is not included in this spreadsheet. It is provided in s. NR 102.27, Wis. Adm. Code, and must be performed on a case-by-case basis.

Categories for Uni-directional waters:

Non-Specific Waters (s. NR 102.25(2), Wis. Adm. Code):

- Cold = waters with a fish and other aquatic life use designation of "cold water community"
- Warm –Large = waters with a fish and other aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows > 200 cfs (129 mgd)
- Warm – Small = waters with a fish and other aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows < 200 cfs (129 mgd)
- LFF = waters with a designation of "limited forage fish community"

Specific Large Rivers (s. NR 102.25(3), Wis. Adm. Code):

- Mississippi River = applies to any portion of Wisconsin's Mississippi River reach
- Rock River = applies to waters downstream of Lake Koshkonong
- Upper Wisconsin River = applies to waters upstream of Petenwell Dam
- Lower Wisconsin River = applies to waters downstream of Petenwell Dam to the confluence with the Mississippi River
- Lower Fox River = applies to waters downstream of the Lake Winnebago outlet

Lake Categories:

Inland Lakes and Impoundments (s. NR 102.25(4), Wis. Adm. Code):

- Northern Inland Lakes = applicable for those lakes and impoundments north of State Highway 10
- Southern Inland Lakes = applicable for those lakes and impoundments south of State Highway 10

Great Lakes Waters of Wisconsin (s. NR 102.25(5), Wis. Adm. Code):

- Green Bay waters south = south of the Brown County line to the Fox River mouth
- Green Bay waters north = north of the Brown County line to the northernmost point on Washington Island
- Lake Michigan waters south = south of the Milwaukee River mouth (downtown Milwaukee)
- Lake Michigan waters north = north of the Milwaukee River mouth (downtown Milwaukee)
- Lake Superior = waters in Lake Superior except those in Chequamegon Bay
- Chequamegon Bay = waters within the region enclosed by Chequamegon Point and a straight line west to the mainland

Discharge Type (s. NR 106.55(7)(b), Wis. Adm. Code):

- Inland lake or impoundment off shore discharge
- Inland lake or impoundment shore discharge
- Great Lakes harbor discharge
- Great Lakes off shore discharge
- Great Lakes off shore discharge
- Maximum area allowed for mixing zone. A department approved site specific mixing zone based on a mixing zone study may be substituted.

Appendix C. Notice of Application for an Alternative Effluent Limitation (AEL) for Temperature

<table>
<tr><td>WPDES Permit No:</td><td>Facility Name:</td><td colspan="2">Facility Address:</td></tr>
<tr><td colspan="4">Contact Information:</td></tr>
<tr><td>Name: & Title:</td><td>Phone:</td><td colspan="2">E-mail:</td></tr>
<tr><td colspan="4">Discharge Information:</td></tr>
<tr><td>Outfall Number:</td><td colspan="3">Outfall GPS Coordinates

(Latitude/Longitude):</td></tr>
<tr><td colspan="4">Type of AEL Requested:</td></tr>
<tr><td>___ New Discharge

___ Existing Discharge</td><td>___ "Prior Appreciable Harm" (Type 1)

___ "Protection of RIS" (Type 2)

___ "Combination of 1 and 2" (Type 3)</td><td colspan="2">___ Acute Limitation

___ Sub-Lethal Limitation

___ Both</td></tr>
<tr><td colspan="4">Duration of AEL Requested:</td></tr>
<tr><td>___ Annual Limitation

___ Monthly Limitation</td><td colspan="3">If applying for monthly limitation, check all that apply:

___ Jan ___ Jul

___ Feb ___ Aug

___ Mar ___ Sep

___ Apr ___ Oct

___ May ___ Nov

___ Jun ___ Dec</td></tr>
</table>