

## **NONCONTACT COOLING WATER OR CONDENSATE AND BOILER WATER FACT SHEET**

WPDES Permit No. WI-0044938-5  
April 2001

### GENERAL PERMIT COVERAGE

General Permits (GP) are designed to cover discharges from a class of facilities or industries that are similar in nature. When a GP is issued, all facilities meeting its requirements are covered by the GP. GP's currently exist for groundwater remediations, nonmetallic mining operations, swimming pools and numerous other types of facilities. For facilities that are eligible for coverage under a GP, the Department sends a cover letter and a copy of the permit to the facility. The cover letter includes the Department's determination that a facility's discharge is covered under the GP and may specify alternate requirements outlined in the permit such as modified sampling frequencies for certain parameters or the inclusion of monitoring for parameters in addition to those requiring regular monitoring.

### MORE THAN ONE GP CAN APPLY

A facility may need to be covered under more than one GP, depending on the different types of wastestreams that a facility discharges. A facility that manufactures concrete block could also mine gravel on site. The wastewater from the concrete block operation could be discharged in compliance with one GP and the wastewater from the gravel mining operation could be discharged in compliance with a different GP. However, a facility that requires an individual permit for any part of its discharge may have all of its discharges covered under an individual permit. An obvious exception would be for a facility that commences a discharge that is eligible for a GP, after an individual permit has already been issued or reissued for the facility. For example, a facility that currently has an individual permit may begin a process that results in the discharge of noncontact cooling water. The noncontact cooling water discharge can be covered under a GP, as long as it meets the requirements of the GP, until the individual permit can be reissued or modified to include the noncontact cooling water discharge.

### GENERAL DESCRIPTION OF OPERATIONS COVERED UNDER THIS GP

This permit is applicable to discharges of non-contact cooling water and condensates or boiler water (blowdown and bleed-off).

#### A. Noncontact Cooling Water (NCCW)

NCCW includes once through cooling water for processes such as air compressors, welders, etc. Discharge of cooling tower blowdown without biocides may be covered under this permit. However, all cooling towers need to control biological growth during the summer. Any facility not using biocides will have to mechanically clean the system

or use biocides in the near future. Covering cooling tower blowdown under this permit when biocides are not being proposed can be done with the realization that this is a short term situation. These facilities require constant vigil to prevent the unauthorized discharge of biocides. It is recommended that the facility dose the system appropriately (to control biological growth and legionellae bacteria) and discharge the wastewater to the sanitary sewer. Facilities need to obtain authorization from the servicing publicly owned treatment works prior to discharging new wastewater sources to the sanitary sewer.

Sometimes once through NCCW will contain scale or corrosion control additives. Most of the time these additives are non-toxic. However, every additive needs to be reviewed on a case-by-case basis.

B. Boiler Blowdown (BBD) and Bleed-off

Discharges from boilers removes dissolved and suspended solids from the system. Discharges from boilers can be both intermittent and continuous. All boilers have discharge connections at low points for short duration intermittent removal of settled sludge (blowdown). Frequent blowdown may be necessary to meet the total suspended solids limit included in this permit. Many boilers also have discharge connections located just below the water level in the steam release area for continuous removal of dissolved solids (bleed-off). Continuous blowdown and/or bleed-off of a small amount of boiler water provides for better operation by providing more consistent control of boiler water chemistry and chemical additives. Chemicals are added to boiler water to control scale and corrosion and provide a good quality steam. Most boiler water additives are non-toxic. However, every additive needs to be reviewed on a case-by-case basis.

C. Condensates

Discharges of condensates includes air conditioner condensate and may also include uncontaminated steam tunnel condensate. Steam condensate may contain amines or other additives. All additives need to be reviewed prior to determining if a discharge is covered by this permit. Air compressor condensate may also be discharged under this permit as long as it is not contaminated with oil and grease.

RATIONALE FOR PERMIT REQUIREMENTS

A. APPLICABILITY CRITERIA

(1) Facilities covered

This permit is applicable to NCCW, noncontact condensates, and boiler blowdown and bleed-off that are discharged directly to surface waters or indirectly to groundwaters via seepage. Discharges of water that contain non-

toxic additives are likely candidates for coverage by this permit. The permit contains very general applicability criteria to allow coverage of innocuous discharges.

(2) Facilities Not Covered

Process Wastewater

Discharges of process wastewater from operations occurring at a facility cannot be regulated by this permit. Process wastewaters are those wastewaters that come in contact with or are the result of production operations at a facility (for example, wastewater that directly contacts molded plastic for cooling purposes or wastewater generated as a byproduct of processing whey).

Boiler Cleaning Operations

Wastewater resulting from boiler cleaning operations contain additives and contaminants that are not appropriately regulated by this permit.

Condensate Contaminated With Oil And Grease

Condensate contaminated with oil and grease is not considered a noncontact discharge that is appropriately regulated by this permit.

Biocides

Biocides are toxic and typically require regulation by an individual permit. Facilities discharging wastewater treated with biocides will be in violation of the permit. However, certain compounds that are considered biocides, such as chlorine, are also used in drinking water supplies to provide safe drinking water. The addition and discharge of these compounds in NCCW is allowed under this permit at levels necessary to provide a safe drinking water supply.

Great Lakes

Discharges greater than 13.2 million gallons per day (MGD) are not covered under this permit. This cut-off was calculated using a maximum discharge temperature of 120°F and a cooling pond analysis that takes into account heat loss to the atmosphere through the water's surface. The equation is similar to that outlined in the permit for inland lakes; however, the mixing zone for Great Lakes discharges extends from the shoreline in the shape of a rectangle with the dimensions of 2500 feet x 1250 feet. At a discharge temperature of 120°F and a discharge volume of 13.2 MDG, the discharge meets the requirement of not raising the receiving water's

background temperature by 3°F at the edge of the mixing zone during the winter months.

#### Wetlands

Discharges covered under this permit shall meet the wetland protection requirements of ch. NR 103, Wis. Adm. Code, and shall not significantly adversely impact wetlands. For discharges that impact wetlands, a facility will need to submit information that allows the Department to determine if a discharge meets code requirements.

#### Outstanding And Exceptional Resource Waters

Discharges to outstanding and exceptional resource waters are not authorized by this permit. Regulation of discharges to outstanding and exceptional resource waters requires an individual permit which provides the oversight and discharge limitations necessary to protect these types of receiving waters.

#### Surface Water and Groundwater Standards

The discharges from facilities eligible for this permit are not expected to exceed any surface water or groundwater standards. Facilities with discharges that may violate surface water quality standards or groundwater quality standards require the oversight available under an individual permit.

#### Bioaccumulating Toxic Substances

The discharges from facilities eligible for this permit are not expected to contain any of the 21 bioaccumulating toxic substances. This permit categorically does not authorize discharge of any of the 21 bioaccumulating toxic substances. Regulation of these compounds requires an individual permit.

### **B. REQUIREMENTS FOR ALL COVERED FACILITIES**

The following requirements apply to all facilities covered by this permit. Facilities discharging to either groundwaters or surface waters are required to meet the following requirements.

#### Water Treatment Additives

Water treatment additives vary from innocuous to highly toxic. This permit allows the use of non-biocide compounds which are innocuous for the most part. Non-biocide water treatment additives are defined, for the purposes of this permit,

as those additives which are used primarily to control corrosion or prevent deposition of scale forming materials and which do not exhibit any residual toxic effects on receiving waters.

### Approval

Only additives that have been reviewed and approved in writing by the Department may be discharged under this permit. Facilities are required to submit information regarding the toxicity of the additive and the proposed treatment regimen so that the Department can determine if it is allowable and won't negatively impact aquatic life or groundwater. For surface water discharges, the toxicological information needed is at least one 48-hour LC<sub>50</sub> or EC<sub>50</sub> value for daphnia magna or ceriodaphnia dubia, and at least one 96-hour LC<sub>50</sub> or EC<sub>50</sub> value for either fathead minnow, rainbow trout, or bluegill. In many cases, this information is provided in the Material Data Safety Sheet (MSDS) which the chemical manufacturer provides to its customers. Some chemical manufacturers provide LC<sub>50</sub> and EC<sub>50</sub> values only for the active ingredient or a component of the product. It is not possible for the Department to ascertain the toxicity of the whole product on the basis of LC<sub>50</sub> and EC<sub>50</sub> values for product constituents. This is because of the potential for synergistic effects of the other constituents of the product to affect the whole product toxicity. If the facility is unable to provide the whole product toxicity, and if the Department's additive database does not have the toxicity information, the facility will not be eligible for coverage under this general permit.

Changing the types or quantity of additives discharged must also be approved by the Department in writing. Changes in additive use will change the wastewater discharge characteristics and could impact aquatic life or groundwater.

### NCCW and Biocides

As stated previously, the use of biocides typically requires regulation by an individual permit unless the addition and discharge of this type of additive in NCCW is at levels necessary to provide a safe drinking water supply. If a facility wants approval to use a biocide, it shall provide the Department with information that shows that the additive is used in drinking water supplies and that the proposed usage is at a level necessary to provide a safe drinking water supply.

### Additive Monitoring and Reporting

Facilities are required to maintain records of additive use for Department inspection. Recording additive use will provide a check for the facility and the Department to verify that the wastewater is being treated and disposed of in accordance with the permit requirements.

**C. ADDITIONAL REQUIREMENTS FOR GROUNDWATER DISCHARGES**

A discharge to groundwaters in Wisconsin includes wastewater infiltration from irrigation, drain fields, ditches, and ponds that may impact water beneath the ground surface.

Discharges to groundwater shall meet the requirements outlined in this section, including the monitoring requirements specified in Table 1. Samples taken in compliance with the monitoring requirements specified in Table 1 shall be taken at each outfall following treatment (if applicable) and prior to discharge to groundwaters. The samples taken shall be representative of the discharge.

Table 1

Monitoring Requirements for Groundwater Discharges		
Parameter	Sample Frequency	Sample <sup>(a,b)</sup> Type
Flow (Gallons Per Day)	Annually	Estimate
Oil and Grease (mg/l) (c)	Annually	Grab
Ammonia Nitrogen (mg/l) (c)	Annually	Grab
Water Treatment Additives	Monthly	Record Usage
<p>(a) Estimate means a reasonable approximation of the average daily flow based on a water balance, an uncalibrated weir, calculations from the velocity and cross section of the discharge, intake water meter readings, discharge water meter readings, or any other method approved by the Department.</p> <p>(b) A grab sample means a single sample taken at one moment of time or a combination of several smaller samples of equal volume taken in less than a two minute period.</p> <p>(c) After reviewing the results of two years of discharge monitoring, the Department may waive, by letter, monitoring for any of the following: oil and grease and ammonia nitrogen; and may extend this waiver into subsequent permit terms.</p>		

The following abbreviations are typically used when referring to the concentration of a substance in a discharge:

mg/l = milligrams per liter  $\approx$  parts per million

$\mu$ g/l = micrograms per liter  $\approx$  parts per billion

### **Flow**

An estimate of the average daily flow performed annually will be sufficient to assure that the facility is aware of the loading to the seepage area. An estimate means a reasonable approximation of flow based on any of the following: (a) water balance, (b) an uncalibrated weir, (c) calculations from the velocity and cross section of the discharge, (d) intake water meter readings where the intake, or a specific portion of it, is discharged, (e) discharge water meter readings, and (f) any of the more complex methods listed in section NR 218.05(1), Wis. Adm. Code. The Department may approve additional methods for estimating flow.

### **Oil and Grease, and Ammonia**

Annual monitoring for these parameters will provide the facility and the Department an indication of possible cross contamination with process wastewaters. Monitoring for these parameters is required for all facilities on an annual basis using a grab sample.

### **Water Treatment Additives**

The facility shall keep a monthly record of the daily maximum and monthly average quantity of each additive used. This will provide the necessary information to the facility and the Department to determine if additive usage is remaining within Department approved levels.

### **Reduced Monitoring**

Annual monitoring for oil and grease, and ammonia nitrogen may be removed after two years of monitoring. Depending on the results of the monitoring, further monitoring for either or both of these parameters may no longer be warranted.

## **D. ADDITIONAL REQUIREMENTS FOR SURFACE WATER DISCHARGES**

Surface water discharges include ditches, storm sewers and pipes that convey wastewater to creeks, streams, rivers and lakes in Wisconsin.

Discharges to surface waters shall meet the requirements outlined in this section, including the effluent limitations and monitoring requirements specified in Table 2. Samples taken in compliance with the monitoring requirements specified in Table 2 shall be taken at each outfall following treatment (if applicable) and prior to discharge to surface waters. The samples taken shall be representative of the discharge.

Table 2

Limitations for Surface Water Discharges				Monitoring Requirements	
Parameter	Daily Minimum	Daily Maximum	Temperature Eligibility Value (TEV)	Sample <sup>(a)</sup> Frequency	Sample <sup>(b,c)</sup> Type
Flow (Gallons Per Day)	-	-	-	Quarterly	Estimate
Temperature (°F)	-	-	<b>(d)</b>	Quarterly	Grab
Total Suspended Solids <sup>(e)</sup>	-	40 mg/l	-	Quarterly	Grab
pH <sup>(e)</sup>	6.0 s.u.	9.0 s.u.	-	Annually	Grab
Oil and Grease (mg/l) <sup>(f)</sup>	-	-	-	Annually	Grab
BOD <sub>5</sub> (mg/l) <sup>(f)</sup>	-	-	-	Annually	Grab
Total Phosphorus (mg/l)	-	-	-	Annually	Grab
Ammonia Nitrogen (mg/l) <sup>(f)</sup>	-	-	-	Annually	Grab
Water Treatment Additives	-	-	-	Monthly	Record Usage

(a) Quarterly sample frequency means performing the associated monitoring four times per year; once anytime during each of the four annual quarters (Jan.-Feb.-March, April-May-June, July-Aug.-Sept., Oct.-Nov.-Dec.). If there is no discharge during a quarter, the permittee shall state this on the discharge monitoring report form.

(b) Estimate means a reasonable approximation of the average daily flow based on a water balance, an uncalibrated weir, calculations from the velocity and cross section of the discharge, intake water meter readings, discharge water meter readings, or any other method approved by the Department.

(c) A grab sample means a single sample taken at one moment of time or a combination of several smaller samples of equal volume taken in less than a two minute period.

(d) The TEV is applied as a daily maximum level. The Department shall specify the TEV in the cover letter accompanying this permit.

(e) pH and total suspended solids monitoring applies only to discharges of boiler blowdown or boiler bleed-off.

(f) After reviewing the results of two years of discharge monitoring, the Department may waive, by letter, monitoring for any of the following: oil and grease, BOD<sub>5</sub>, and ammonia nitrogen; and may extend this waiver into subsequent permit terms.

(1) Floating Solids and Foam

There shall be no discharge of floating solids or visible foam in other than trace amounts.

(2) Temperature Eligibility Values (TEV) for Surface Water Discharge

The Department shall calculate a TEV, based on the equation below, for spring (April and May), summer (June through September), fall (October and November), and winter (December through March). The permittee shall meet the TEV specified for the respective time period. The TEV shall be calculated as follows:

- (a) For facilities with multiple outfalls to receiving waters, the total discharge flow rate shall be used to determine the TEV.
- (b) No TEV's are given below 60 °F.
- (c) Streams

For discharges to flowing streams classified for fish and aquatic life protection, except when the conditions of 2. below are met, the following equation shall be used;

$$TEV = 5 \left( \frac{Q_s + Q_e(1 - f)}{Q_e} \right) + T_s$$

Where: TEV = Temperature Eligibility Value, in °F.

$Q_e$  = Effluent Flow, in gpd.

$Q_s$  = Stream Flow = 1/4 of the  $Q_{7,10}$ , in gpd (the  $Q_{7,10}$  is the estimated average 7-day low flow which occurs once in 10 years. Convert cfs to gpd by multiplying cfs by 646,272 gpd/cfs).

$T_s$  = Ambient Stream Temperature in °F ( $T_s$  = 50 °F for spring, 80 °F for summer, 60 °F for fall, and 40 °F for winter months).

$f$  = water withdrawal factor (fraction of the effluent flow that is withdrawn from the receiving water between 0 and 1).

1. The effluent flow ( $Q_e$ ) shall be adjusted for heat loss in the ditch or storm sewer. The loss of heat from the discharge point to the receiving water is calculated as follows.
  - a. For distances <1000 feet, the equation above shall not be modified.
  - b. For distances of 1000 to 5000 feet, the  $Q_e$  shall be divided by 2 to reflect the loss of 1/2 the BTUs of the effluent.

c. For distances >5000 feet, the  $Q_e$  shall be divided by 3 to reflect the loss of 2/3 the BTUs of the effluent.

2. If the amount of water withdrawn from the receiving water that makes up the discharge is greater than 1/4 of the  $Q_{7,10}$  [ $Q_e \times f > 1/4 Q_{7,10} (Q_s)$ ], then the TEV is equal to 60 °F for spring, 85 °F for summer, 65 °F for fall, and 60 °F for winter months.

(d) Great Lakes

For discharges to the Great Lakes (Lake Michigan and Lake Superior) allowed under this permit, the TEV shall be 120°F.

(e) Other Receiving Waters

For discharges to surface waters not classified as full fish and aquatic life, the TEV shall be 120°F.

(f) Inland Lakes

For discharges to inland lakes, the following equation shall be used;

$$TEV = T_s + \frac{3}{e^{-\alpha}}$$

Where: TEV = Temperature Eligibility Value, in °F .

$T_s$  = Ambient Lake Temperature ( $T_s$  = 50 °F for spring, 80 °F for summer, 60 °F for fall, and 40 °F for winter months), in °F.

$e^{-\alpha}$  = An empirical factor.

The quantity  $\alpha$  is calculated by the following equation:

$$\alpha = \frac{KA}{PC_p Q_e}$$

Where:  $K$  = Energy exchange coefficient  
(BTU/ft<sup>2</sup>-day-°F)  
 $= 15.7 + (0.26 + B)(bW)$   
 $B$  = a coefficient which depends on the ambient lake temperature  
 $= 0.990$  for  $E$  between 80°F and 90°F.  
 $= 0.555$  for  $E$  between 60°F and 70°F.  
 $= 0.405$  for  $E$  between 50°F and 60°F.  
 $b$  = experimental evaporation coefficient = 15  
 $W$  = Wind speed = 10 mph.  
 $A$  = Area in square feet.  
 $P$  = Density of water (62.4 lbs/ft<sup>3</sup>).  
 $C_p$  = 1 BTU/lb-°F.  
 $Q_e$  = Discharge volume in ft<sup>3</sup> per day.  
 $1 \text{ ft}^3/\text{day} = 7.48 \times 10^{-6}$  MGD (million gallons per day)

The area ( $A$ ) of the mixing zone from a shoreline outfall is a 100 foot radius semi-circle (15,708 square feet).

The effluent flow ( $Q_e$ ) shall be adjusted for heat loss in the ditch or storm sewer. The loss of heat from the discharge point to the receiving water is calculated as follows.

1. For distances <1000 feet, the equation above shall not be modified.
2. For distances of 1000 to 5000 feet, the  $Q_e$  shall be divided by 2 to reflect the loss of 1/2 the BTUs of the effluent.
3. For distances >5000 feet, the  $Q_e$  shall be divided by 3 to reflect the loss of 2/3 the BTUs of the effluent.

### Temperature

A Temperature Eligibility Value (TEV) shall be calculated using the formula specified in the permit for a facility. TEV's are assigned for spring (April and May), summer (June through September), fall (October and November), and winter (December through March). Background temperatures used in the equations in the permit are 50 °F for spring, 80 °F for summer, 60 °F for fall, and 40 °F for winter months. TEV's are not given below 60°F, the typical residential storm sewer temperature during the winter.

Since the TEV varies depending on receiving water flow, discharge flow, and other factors, the TEV shall be specified in the cover letter accompanying this permit. Temperature monitoring is required for all facilities on a quarterly basis using a grab sample. The use of mercury thermometers for monitoring is probably a common practice. It is very important that mercury not be released to the environment due to

monitoring (even if the mercury is in the elemental form). A metal case is a minimal requirement. It is recommended that mercury thermometers not be used.

### Streams

For discharges to streams, the TEV is determined from a standard dilution equation. Discharges are allowed the dilution of up to 1/4 of the receiving water's  $Q_{7,10}$  (the estimated average 7-day low flow which occurs once in 10 years) and the flow of a facility's discharge. This dilution is decreased depending on the amount of water in a facility's discharge that is made up of water withdrawn from the receiving water. The TEV is based on allowing the discharge to raise the receiving water's background temperature by 5°F at the edge of the mixing zone. For discharges that enter long storm sewers or ditches prior to reaching the receiving water, the heat loss over distance is taken into account.

If the amount of water withdrawn from the receiving stream that makes up part or all of a facility's discharge is greater than 1/4 of the receiving stream's  $Q_{7,10}$ , it is assumed that there is no mixing zone for the discharge. Therefore, the end-of-pipe discharge must be within 5°F of background temperature (TEV=background + 5°F). Since background temperatures during the winter and spring are more than 5°F less than the 60°F minimum TEV, the TEV for spring and winter is 60°F.

### Great Lakes

For discharges to the Great Lakes, the TEV is 120°F. This level is for human protection in cases of incidental contact.

### Other Receiving Waters

For discharges to wetlands, intermediate and marginal receiving waters, the TEV is 120°F. This level is for human protection in cases of incidental contact.

### Inland Lakes

For discharges to inland lakes, the TEV is determined using a cooling pond analysis that takes into account heat loss to the atmosphere through the water's surface. The equation provides for a mixing zone that extends from the shoreline in the shape of a semicircle with a radius of 100 feet. The TEV is based on allowing the discharge to raise the receiving water's background temperature by 3°F at the edge of the mixing zone. For discharges that enter long storm sewers or ditches prior to reaching the receiving water, the heat loss over distance is taken into account.

### **Flow**

The same discussion of flow in section C applies here.

### **Total Suspended Solids (TSS)**

The TSS daily maximum effluent limit is 40 mg/l (milligrams per liter). The TSS limit is based on the ability of simple settling equipment to easily remove suspended solids from the discharge to concentrations below 40 mg/l. Water is basically clear at 40 mg/l of TSS. TSS monitoring is only required for boiler water discharges since noncontact cooling water and condensates should not contain significant levels of suspended solids. TSS monitoring is required on a quarterly basis for boiler water discharges using a grab sample.

### **pH**

The pH is limited to the range of 6.0 to 9.0 standard units. This is consistent with the water quality based pH range for waters classified for fish and aquatic life. pH monitoring is only required for discharges of boiler water since the pH of the water in the boiler is maintained above 9.0 s.u. No pH monitoring is required for NCCW and condensate since these discharges are typically in the range of 6.0 to 9.0 s.u. pH monitoring of boiler water is required on an annual basis using a grab sample.

### **Oil and Grease, BOD<sub>5</sub> (Biochemical Oxygen Demand), Phosphorus, and Ammonia**

Annual monitoring for these parameters will provide the facility and the Department an indication of possible cross contamination with process wastewaters. Phosphorus monitoring is also designed to provide information on usage levels of phosphorus containing water treatment additives. Monitoring for these parameters is required for all facilities on an annual basis using a grab sample.

### **Water Treatment Additives**

The discussion in section C is also applicable here.

### **Reduced Monitoring**

Annual monitoring for oil and grease, BOD<sub>5</sub>, and ammonia nitrogen may be removed after two years of monitoring. Depending on the results of the monitoring, further monitoring for either or both of these parameters may no longer be warranted.

### **Floating Solids and Foam**

The prohibition on floating solids and foam is a Best Professional Judgment (BPJ) condition, in accordance with ch. NR 220, Wis. Adm. Code, dating back to the Refuse Act Permit Program and the Corps of Engineer's River and Harbor Act of 1899. This condition is achievable by application of best practicable control technology.

Respectfully submitted,

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Bureau of Watershed Management

cc: U.S. EPA, Region V, Permits Branch  
Northeast Region  
Southeast Region

South Central Region  
Northern Region  
West Central Region