BUREAU OF WATER QUALITY
PROGRAM GUIDANCE
WASTEWATER POLICY MANAGEMENT TEAM

Guidance for Evaluating Intake Structures Using Best Professional Judgment (BPJ)

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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.

APPROVED:

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Introduction

Section 316(b) of the Clean Water Act requires and Wis. Stat. § 283.31(6) allows the Department to require that the location, design, construction, and capacity of intake structures reflect the best technology available (BTA) for minimizing adverse environmental impact. The Department's authority to regulate intake structures is tied to the issuance of Wisconsin Pollutant Discharge Elimination System (WPDES) permits and is found in Wis. Stat. § 283.31(6):

> *Any permit issued by the department under this chapter which by its terms limits the discharge of one or more pollutants into the waters of the state may require that the location, design, construction and capacity of water intake structures reflect the best technology available for minimizing adverse environmental impact.*

Federal regulations establish requirements under section 316(b) for all existing facilities that withdraw > 2 MGD design intake flow from waters of the U.S. and that use $\geq$ 25% of their intake water for cooling. For existing facilities that fall below either of these thresholds, BTA determinations must be made using best professional judgment, according to 40 CFR 125.90(b):

> *Cooling water intake structures not subject to requirements under §§ 125.94 through 125.99 or subparts I or N of this part must meet requirements under section 316(b) of the CWA established by the Director on a case-by-case, best professional judgment (BPJ) basis.*

Other facilities may also need an interim BTA determination to be made using best professional judgment, while they are collecting the information necessary to comply with application requirements in federal regulations. Wis. Stat. § 283.31(6) gives the Department authority to regulate any intake structure used by a WPDES permit holder, whether cooling water is present or not.

What is Best Professional Judgment?

According to the USEPA NPDES Permit Writers' Manual (EPA-833-K-10-001 09/10), BPJ-based limits are technology-based limits derived on a case-by-case basis for non-municipal (industrial) facilities. BPJ limits are established whenever effluent limit guidelines are not available for the pollutant in question. BPJ is defined in s. 5.2.3 of the Manual as "the highest quality technical opinion developed by a regulator after consideration of all reasonably available and pertinent information". The authority for BPJ is contained in Section 402(a)(1) of the Clean Water Act (CWA), which authorizes the regulator to issue a permit containing "such conditions as the Administrator determines are necessary to carry out the provisions of this Act."

Regulations at s. 40 CFR 125.3(c)(2) state that permits developed on a case-by case basis under s. 402(a)(1) of the CWA must consider (i) The appropriate technology for the category of point sources of which the applicant is a member, based upon available information; and (ii) Any unique factors relating to the applicant. 40 CFR § 125.3(d) and the USEPA NPDES Permit Writers' Manual provides factors that must be considered when developing BPJ conditions, including: 1) the total cost of application of technology in relation to effluent reduction benefits, 2) the age of equipment and facilities, 3) the process employed, 4) engineering aspects of the application of various types of control techniques, 5) process changes, and 6) non-water quality environmental impacts. Staff should consider each of these factors when establishing BPJ-based conditions in permits.

Because it is broad in scope, BPJ allows considerable flexibility in establishing permit conditions. However, lack of specificity also places a burden on staff to show that their BPJ decision is the highest quality technical opinion and based on a thorough review of reasonably available information. Therefore, it is important to provide thorough documentation of the basis for the BPJ decision. Staff should include a detailed description of the intake and the cooling water system (where applicable) in the fact sheet to document the current situation. Also, the permit should include language which

specifies (at a minimum) that the permittee will continue to operate the intake and notify the Department prior to making any changes.

In addition to technology-based BPJ evaluations applicable to permittees based on their industrial category, it is also important that Department staff evaluate whether site-specific water quality impacts are occurring because of the location, design, or operation of the intake. These evaluations are important, as they could determine whether a more detailed BPJ review is necessary and/or the need for new or improved technologies. Regional staff, knowledgeable about local aquatic life and water quality conditions, should evaluate the receiving water in the area under the influence of the intake structure to determine whether impacts are occurring prior to permit reissuance.

A detailed evaluation of intake fish rejection technologies should be done when a new intake is installed to make sure that the best and newest technologies are implemented. Department staff should perform a detailed and thorough evaluation of all proposed new intakes. For existing intakes, Department staff will need to determine when the intake was installed, whether the intake technologies chosen were appropriate at the time of construction, and whether those technologies continue to minimize adverse environmental impact (impingement/entrainment) at the current location.

Making Best Professional Judgement Decisions of BTA

In order for staff to make a determination of BTA, they will need to evaluate site-specific information for the given facility. In some cases, the decision may be more clear-cut (for example, a small intake on a large river has less potential for adverse impact); in others, it may be more complex. Due to variability in factors such as size, location, and operations of individual intakes, different factors may be of greater importance than others in deciding whether each intake meets BTA requirements.

It is likely there could be other scenarios in which it will be possible to make a clear determination that the existing or proposed intake is BTA. However, there may also be situations which are not easily decided, and in these cases staff will have to do the best they can with the information available. If more information is needed to make a final BTA decision, permits should require that data be collected during the permit term. Schedules which allow for the collection of additional information should be as short as reasonably possible.

Staff generally will need to make one of the following determinations:

1. Available information adequately characterizes the intake for purposes of making a BTA determination and the intake is in compliance; or

2. The intake appears to be in compliance with BTA, but data is limited and more detailed information will be collected during the permit term; or

3. The intake is not in compliance with BTA. The reissued permit will require a compliance schedule to collect more detailed information and/or to install technology to attain compliance.

There are two ways that BPJ could be evaluated. BPJ could be determined sequentially and separately for impingement mortality and for entrainment mortality based, to the extent appropriate, on the federal rules of 40 CFR 125.94. Or as shown in the following example, BPJ could be determined as a combined BTA for both impingement and entrainment.

The federal rule provides several options for compliance with impingement mortality requirements and allows for a site specific BTA determination for entrainment: these federal provisions of BTA can be used for interim BTA or BPJ under 40 CFR 125.90(b). Pursuant to this guidance, a permit drafter may consider each intake structure and any controls or system of controls that a facility may have to reduce impingement morality or entrainment (i.e., passive or traveling

water screens, the location of the intake structure, variable speed pumps, etc.) in addition to the flow rate at the intake structure.

BTA for impingement mortality may be satisfied if a closed cycle recirculating system, offshore velocity cap, modified traveling screen, barrier nets, or other technologies approved by staff based on demonstrated IM reductions or other information are in use and adequately reducing impingement. See 40 CFR § 125.94(c). BTA for entrainment mortality may also be achieved through the use of these technologies, when used in addition to location, flow reductions, or other means to reduce the amount of organisms entrained.

The following provides some general guidelines that staff may use when making a BTA determination using their BPJ, on a case-by-case basis. As an example, staff should be able to determine, in most cases, that BTA is present at an existing facility if it meets the following criteria (note that in this example, the criteria support a determination of BTA for both impingement mortality and entrainment).

1. The facility-wide design intake flow (DIF) for all water intake structures is $\leq$ 2 MGD (all intake water, cooling and non-cooling, is included in the determination of whether this DIF threshold is met) [1] OR < 25% of the total water withdrawn is used exclusively for cooling purposes (water from a public water system, treated effluents, process water, gray water, wastewater, reclaimed water, or water used in a manufacturing process before or after it is used for cooling is not considered cooling water for the purposes of this determination) [1];
2. ONE OR MORE OF THE FOLLOWING (See 40 CFR § 125.94(c) and (d)):
    a. Each water intake structure has a maximum design intake velocity of 0.5 feet per second (fps) [1] OR a maximum actual intake velocity of 0.5 fps, demonstrated via measured or calculated values which show the maximum intake velocity as water passes through the intake system, measured perpendicular to the opening, does not exceed 0.5 fps at any point up until the first screen of mesh size 3/8" (or equivalent) or less.[2]
    b. The facility operates a closed-cycle recirculating system that only requires make-up water with $\geq$ 3 cycles of concentration on at least a daily basis. Cycles of concentration can be measured as the ratio of chloride levels in the recirculated water or blowdown relative to the chloride levels in the source water, or makeup water; or the make-up water volume divided by the blowdown volume (provided there aren't other water losses); or the blowdown water conductivity divided by the make-up water conductivity.
    c. The facility operates an intake structure that minimizes impingement rates by nature of its location (e.g. offshore velocity cap).
    d. The facility employs a system of technologies (e.g. wedge-wire screens, barrier nets; acoustic, light, or pH deterrent systems; variable speed pumps, etc.) that minimize impingement mortality rates.
    e. The facility operates a modified traveling screen in an optimal manner that does not promote re-impingement or predation of returned organisms.
    f. The facility's intake withdraws water at > 0.25 fps less than or equal to 16% of the time.
    g. There is data indicating that the impingement mortality rate has been/will be reduced 80-95% compared to a once-through cooling system with 3/8" traveling screens;
    h. There is biological data that affirmatively demonstrates that: 1) the source water body does not include threatened or endangered species in the vicinity of the intake, and 2) there are no aquatic life and water quality problems partly or solely due to the presence or operation of the intake structure.

3. **AND** ONE OR MORE OF THE FOLLOWING:
    a. The total water withdrawn (actual intake flow) is $\leq$ 5% of the mean annual flow of the river on which the intake is located (if on a river or stream) OR the total quantity of the water withdrawn is restricted to a level necessary to maintain the natural thermal stratification or turnover patterns (where present) except in cases where the disruption is beneficial (if on a lake or reservoir) [2, 3, 4]
    b. The facility operates at < 8% capacity utilization rate (with pumps turned off or, if variable frequency drives exist, down substantially during periods of non-operation) or at full capacity only for portions of days during a few months or less on an annual basis.[2] If located in a spawning area, the period of water

intake operation should not correspond with times when spawning, peak egg/larval abundance, or larval recruitment is occurring (depending on species present, usually between April – October).

c. The facility operates a closed-cycle recirculating system that only requires make-up water with $\geq$ 3 cycles of concentration on at least a daily basis. Cycles of concentration can be measured as the ratio of chloride levels in the recirculated water or blowdown relative to the chloride levels in the source water, or makeup water; or the make-up water volume divided by the blowdown volume (provided there aren't other water loses); or the blowdown water conductivity divided by the make-up water conductivity.
d. The facility utilizes other means such as variable speed pumps, unit retirements, etc. to decrease entrainment rates by greater than or equal to 60% compared to a once-through cooling system with 3/8" traveling screens. Flow rate may be used as a surrogate for entrainment rates when determining percent reduction;
e. There is biological data that affirmatively demonstrates that: 1) the source water body does not include threatened or endangered species in the vicinity of the intake, 2) there are no aquatic life and water quality problems partly or solely due to the presence or operation of the intake structure, and 3) the department biologist concurs that operation of the intake during periods of spawning, peak egg/larval abundance, and larval recruitment will not substantially impact populations or prey bases for the fishery.

[1] Design intake flow < 2 MGD, < 25% used for cooling, and design intake velocity would need to be demonstrated based on existing data at the time of application. No additional monitoring or demonstration of flow rates, percent used for cooling, or intake velocity would be necessary during the permit term, as long as no significant changes were made that would change these values.
[2] Actual intake velocity, intake volume (for determining % mean annual flow of the river), days of intake use, and cycles of concentration would need to be demonstrated based on existing data at the time of application, but should also be verified (through calculation estimates or monitoring) during the permit term.
[3] Special attention should be paid to situations where there is the potential for cumulative impacts due to multiple intakes in the same area.
[4] EPA has indicated that 30% of facilities on freshwater streams or rivers have actual intake flows greater than 5% the mean annual flow of their source waters (79 FR 48402).

The Department believes that existing facilities which fit into the criteria above generally pose low to no risk for causing an adverse environmental impact and therefore, in the absence of other site-specific factors which cause concern, a determination can be made that BTA is present at these locations. There may be other scenarios (technologies, operations, locations) that meet the BTA standard in some cases; staff should use their judgment to determine when these circumstances exist.

Existing facilities with intake volumes < 2 MGD or < 25% used exclusively for cooling should submit the following information with their permit application (or request for coverage, if a general permit) to aid the permit drafter in making a BTA determination:

- Engineering drawings showing the physical configuration, dimensions, and location of the intake structure(s) and mean and 7Q10 water elevations.
- A narrative description of the intake structure and operation of each of the intake structures, including
    - Description of any existing impingement mortality and entrainment reduction technologies in place
    - Design intake flows,
    - Daily hours of operation,
    - Number of days of the year in operation and seasonal changes, if applicable, and
    - Latitude and longitude in degrees, minutes, and seconds for each of your cooling water intake structures;

- A flow diagram that includes all sources of water to the facility, recirculating flows, and discharges, including average flow rates (using the last 5 years of data) that can be used to verify the percent of flow used exclusively for cooling purposes
- Any existing, available biological data or studies related to:
    - Abundance or types of all life stages of fish and shellfish in the vicinity of the intake structure (including identification of threatened, endangered, and protected species) and their importance to commercial and recreational fisheries and susceptibility to entrainment and impingement mortality
    - Impingement and/or entrainment rates
    - Identification of the primary period of reproduction, larval recruitment, and period of peak abundance for taxa present.
- A summary of the operational status of the facility, including capacity utilization rate (or, for manufacturing facilities, days of operation) for the most recent two years and any plans for changes in operational status in the next five years.

Permit language should be included which reflects the BTA determination that has been made. Permit language should also be included that requires the permittee to report actual intake flow velocity, intake volume, days of intake use, cycles of concentration, or other applicable criteria that should be verified on a regular basis.

Staff should include a detailed description of existing intakes and cooling water systems in individual permit fact sheets to document the current situation. The fact sheet should contain discussion of the BTA determination, specifically why the intake and installed technologies represent BTA. Also, individual permits should include language which specifies (at a minimum) that the permittee will continue to operate the intake as approved and notify the Department prior to making any changes. General permits should contain language which allows coverage only for those facilities that can demonstrate that BTA is present (as defined using the criteria listed above or in the permit) or will be achieved during the term of the permit. If staff decide that the existing intake does not represent BTA, they will need to include a reasonable compliance schedule to allow time for making the necessary changes to meet BTA.

A detailed evaluation of proposed technologies should be done before a new intake is installed to make sure that the best available technologies are implemented. Department staff should perform a thorough evaluation of all proposed new intakes.

Because smaller facilities (< 2 MGD) are believed to have less potential to cause adverse environmental impact, these BTA determinations can typically proceed without review by DNR fisheries, USFWS, and USEPA. If permit staff have questions or concerns in specific situations, fisheries biologists and/or water quality biologists may be consulted to confirm that problems are not present. An NHI Portal check should be completed to confirm whether or not T&E species are present.

No Formal Plan Approval Needed for Intake Structures

The plan approval process laid out in Chapter NR 108, Wis. Adm. Code, does not apply to intake structures. However, Department staff will need to review proposals for new or modified intakes and determine whether the changes will meet BTA requirements. New structures that extend below the ordinary high-water mark of a waterway will also require a state permit according to chapter 30, Wis. Stats. BTA determinations in these situations should be coordinated with Department waterway permitting staff. The Department's formal BTA determination should be made at the time of permit reissuance whenever possible and any compliance schedules needed for construction included in the permit.

Evaluation of Best Technology Available at the Next Reissuance

Each time a permit is reissued, all available information should be used to re-evaluate the facility's intake structure to determine if it continues to meet BTA. If no changes have been made to the intake structure since the last reissuance

and no known adverse environmental impacts are occurring, no additional analysis will be needed in most cases. Staff should state in the fact sheet whether the intake continues to meet BTA, referencing previous evaluations where necessary. If changes have occurred since the last reissuance, staff should re-evaluate the intake using the guidance found in this document. Referring to fact sheets and permits issued by others which have incorporated a BTA determination may also be helpful.