# Kerry Ingredients @ Owen Public Noticed Permit Fact Sheet

## General Information

| | |
|---|---|
| Permit Number: | WI-0000027-12-0 |
| Permittee & Discharge Location: | Kerry Ingredients, 324 N. Harding Street, P O Box 339, Owen WI 54460 |
| Receiving Water: | Brick Creek Pond and the Groundwaters of the Popple River Watershed of the Black River Basin located in Clark County |
| StreamFlow ($Q_{7,10}$): | 0.34 cfs |
| Stream Classification: | Warm Water Sport Fish (WWSF) community, non-public water supply |
| Discharge Type: | Existing, continuous |

## Facility Description

Kerry Ingredients is a food ingredient processing facility that generates 52,000 gallons per day (gpd) of process wastewater. During a previous permit term Kerry Ingredients constructed a wastewater treatment facility that allowed them to discharge treated effluent to Brick Creek Pond (Outfall 006). The treatment facility consists of a nanofiltration system, an effluent reaeration tank and a sludge thickener. Addition of ferric chloride is used for phosphorus removal. Although the permittee had the option in their permit to discharge the treated process wastewater (which includes wash water, boiler blowdown and seal water) to Brick Creek Pond (Outfall 006), and land apply the washwater on approved sites (Outfall 002), they did not use these options but instead discharged these wastestreams to the City of Owen municipal wastewater treatment facility (WWTF). In this permit term Kerry stated they plan to discontinue sending all wastewater to Owen WWTF., but instead will resume discharging treated effluent to Brick Creek Pond and land applying wash water. The sludge generated from the treatment of wastewater has been and will continue to be land applied on Department approved sites (Outfall 003). Sanitary wastewater is sent to the Owen WWTF. Outfall 004 for discharge of noncontact cooling water (NCCW) has been removed from the permit. This outfall has not been used for multiple permit terms and the facility stated the NCCW outfall does not have infrastructure to operate this outfall.

Significant effluent monitoring and/or limitation changes at Outfall 006 for this permit term are as follows: 1) the addition of quarterly effluent monitoring for total nitrogen, nitrite + nitrate nitrogen and total Kjeldahl nitrogen per he Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, 2) addition of chronic WET testing three times during the permit term, 3) reduction in the chloride weekly average mass limit from 560 lbs/day to 372 lbs/day based on the concentration limit and the maximum annual average flow, 4) monitoring for PFOS and PFOA every other month has been added in accordance with s. NR 106.98(2)(d), Wis. Adm. Code, and 5) the monitoring frequency has been increased for BOD, TSS, phosphorus, DO, pH, chloride and temperature. To quantitate the risk, PFAS sludge sampling has been included in the permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code. A schedule is included in the permit that requires the permittee submit updated land application management plan. Also, because the permittee is switching their discharge to surface water a compliance schedule has been included that requires the permittee have a certified operator in charge.

## Substantial Compliance Determination

**Enforcement During Last Permit:** The facility received a notice of noncompliance (NON) on April 6, 2023 for failure to submit a complete land application management plan. The facility did not have site maps and department approvals for any of their sites. As a follow up to this the facility was required to begin submitting land application sites for approval to our land application specialist. They are currently still in the process of getting approvals for all fields they would like to use. This is being completed on a schedule in waves prior to applying on fields. As part of the new permit they will be

required to submit an updated land application management plan with all site maps and approvals they have completed since this enforcement.

After a desk top review of all Discharge monitoring reports, Land application reports, and compliance schedule items, and an inspection on 07/11/2023, Kerry Ingredients has been found to be in substantial compliance with their current permit.

Compliance determination made by Jenna Monahan on 08/24/2023.

| Sample Point Designation | | |
|---|---|---|
| **Sample Point Number** | **Discharge Flow, Units, and Averaging Period** | **Sample Point Location, Waste Type/Sample Contents and Treatment Description (as applicable)** |
| 006 | Wastewater was not discharged to SW the last three permit terms, but instead sent to the Owen WWTF. The maximum annual average flow is 0.060 MGD. | Representative effluent samples shall be collected from the final effluent composite sampler located in the wastewater treatment building prior to discharge to Brick Creek Pond. Discharge is limited to process wastewater, which includes wash water, boiler blowdown and seal water. |
| 002 | Wash water was not landspread during the last three permit terms, but instead was sent to the Owen WWTF, therefore past flow volume reporting was not required. | Representative samples shall be collected from a truckload of liquid waste prior to pretreatment and the initiation of landspreading activities. Discharge is limited to wash water waste. |
| 003 | 1.46 million gallons land applied in previous five years | Representative samples shall be collected from the truckload of waste at the time of loading. Discharge from outfall #003 shall be limited to sludge generated from the treatment of wastewater at the treatment facility. Land application shall occur on Department approved sites. |

# 1 Surface Water - Monitoring and Limitations

## Sample Point Number: 006- EFFLUENT to BRICK CREEK POND

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Flow Rate | | MGD | Daily | Continuous | |
| BOD5, Total | Daily Max | 10 mg/L | 3/Week | 24-Hr Flow Prop Comp | |
| BOD5, Total | Monthly Avg | 5.0 mg/L | 3/Week | 24-Hr Flow Prop Comp | |
| Suspended Solids, Total | Daily Max | 13 mg/L | 3/Week | 24-Hr Flow Prop Comp | |
| Suspended Solids, Total | Monthly Avg | 6.0 mg/L | 3/Week | 24-Hr Flow Prop Comp | |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Dissolved Oxygen | Daily Min | 6.0 mg/L | Daily | Grab | Limit applies May - Oct |
| Dissolved Oxygen | Daily Min | 7.0 mg/L | Daily | Grab | Limit applies Nov - April |
| pH Field | Daily Min | 6.0 su | Daily | Grab | |
| pH Field | Daily Max | 9.0 su | Daily | Grab | |
| Nitrogen, Ammonia (NH3-N) Total | | mg/L | Quarterly | 24-Hr Flow Prop Comp | |
| Chloride | Daily Max | 1,200 mg/L | 4/Month | 24-Hr Flow Prop Comp | Chloride samples shall be collected 4/month on consecutive days. Monitor concurrently with WET test. Sample shall be collected at the same time as a scheduled WET test. |
| Chloride | Weekly Avg | 743 mg/L | 4/Month | 24-Hr Flow Prop Comp | |
| Chloride | Monthly Avg | 743 mg/L | 4/Month | 24-Hr Flow Prop Comp | |
| Chloride | Weekly Avg | 372 lbs/day | 4/Month | Calculated | |
| PFOS | | ng/L | 1/ 2 Months | Grab | Monitoring only. See PFOS/PFOA sections in permit & the associated schedule. |
| PFOA | | ng/L | 1/ 2 Months | Grab | |
| Nitrogen, Total Kjeldahl | | mg/L | Quarterly | 24-Hr Flow Prop Comp | Total Nitrogen shall be calculated as the sum of reported values for Total Kjeldahl Nitrogen and Total Nitrite + Nitrate Nitrogen. See Nitrogen Series Monitoring section below. |
| Nitrogen, Nitrite + Nitrate Total | | mg/L | Quarterly | 24-Hr Flow Prop Comp | |
| Nitrogen, Total | | mg/L | Quarterly | Calculated | |
| Temperature Maximum | Daily Max | deg F | Daily | Continuous | See section below on daily maximum & weekly average temperature limits that vary monthly. |
| Temperature Maximum | Weekly Avg | deg F | Daily | Continuous | |
| Phosphorus, Total | Monthly Avg | 0.225 mg/L | 3/Week | 24-Hr Flow Prop Comp | |
| Phosphorus, Total | 6-Month Avg | 0.075 mg/L | 3/Week | 24-Hr Flow Prop Comp | See Section 4.3.2 of permit for formula on calculating 6-month avg. |
| Phosphorus, Total | 6-Month Avg | 0.038 lbs/day | 3/Week | Calculated | |
| Acute WET | | TUa | See Listed | 24-Hr Flow | |

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| | | | Qtr(s) | Prop Comp | See WET testing section below. Samples for WET tests & chloride shall be collected at the same time. |
| Chronic WET | | TUc | See Listed Qtr(s) | 24-Hr Flow Prop Comp | |

## Changes from Previous Permit

The effluent monitoring frequency for all parameters with limits were considered. Monitoring frequencies are based on the size and type of the facility and are established to best characterize effluent quality and variability, to detect events of noncompliance, and to ensure fairness and consistency in permits issued across the state. Requirements in administrative code (NR 108, 205, 210 and 214 Wis. Adm. Code) and Section 283.55, Wis. Stats. were considered, where applicable, when determining the appropriate monitoring frequencies for pollutants that have final effluent limits in effect during this permit term. For more information see the March 22, 2021 version of the Bureau of Water Quality Program Guidance Document "Monitoring Frequencies for Individual Wastewater Permits". After consideration of the above factors, along with the fact the permittee has not discharged to surface water for three permit terms the monitoring frequency for the following parameters has increased: BOD, TSS, phosphorus, DO, pH, chloride and temperature. The increased monitoring frequencies will allow for a clear, comprehensive evaluation of effluent quality.

Other significant monitoring and/or limits changes are as follows:

1) the addition of quarterly effluent monitoring for total nitrogen, nitrite + nitrate nitrogen and total Kjeldahl nitrogen per he Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, 2) addition of chronic WET testing three times during the permit term, 3) reduction in the chloride weekly average mass limit from 560 lbs/day to 372 lbs/day based on the concentration limit and the maximum annual average flow, and 4) monitoring for PFOS and PFOA every other month has been added in accordance with s. NR 106.98(2)(d), Wis. Adm. Code.

## Explanation of Limits and Monitoring Requirements

**INDUSTRIAL EFFLUENT LIMITS –** In accordance with the federal regulation 40 CFR 122.45(d), limits in this permit are to be expressed as daily maximum and monthly average limits whenever practicable. Minor changes have been made to chlorine and ammonia limits.

Limits were determined for Kerry Ingredients' existing discharge to Brick Creek Pond the using chs. NR 102, 104, 105, 106, 207, 210, 212 and 217 of the Wisconsin Administrative Code (where applicable). For more information see the February 5, 2024 memo from Benjamin Hartenbower to Holly Heldstab titled "Water Quality-Based Effluent Limitations for Kerry Ingredients WPDES Permit No. WI-0000027".

**BOD, TSS and pH:** Categorial limits for BOD, total suspended solids and pH are based on past and expected production data. Chapter NR 240, Wis. Adm. Code, specifies effluent guidelines for discharges from dairy product categories of point sources and subcategories. However, the nature of the products and production methodologies at Kerry-Owen do not lend themselves to categorical limitations based on those categories. Therefore, BOD and TSS limits are best professional judgement (BPJ) limits given the size and nature of the receiving water and the size of the proposed discharge.

**Dissolved Oxygen (DO):** Because the receiving water is classified as impaired for dissolved oxygen on the official Clean Water Act 303(d) list, a dissolved oxygen limit that varies with seasons is included in the permit.

**Ammonia**: Current acute and chronic ammonia toxicity criteria for the protection of aquatic life are included in Tables 2C and 4B of ch. NR 105, Wis. Adm. Code. Subchapter IV of ch. NR 106 establishes the procedure for calculating water quality based effluent limitations (WQBELs) for ammonia. Available effluent data submitted with the permit application

indicates there is no reasonable potential for the discharge to exceed the calculated ammonia limits, however quarterly monitoring is required.

**Chloride**: Daily max, weekly average and monthly average chloride limits are required in the permit. Acute and chronic chloride toxicity criteria for the protection of aquatic life are included in Tables 1 and 5 of ch. NR 105, Wis. Adm. Code. Subchapter VII of ch. NR 106, Wis. Adm. Code, establishes the procedure for calculating WQBELs for chloride. If the permittee's effluent data shows that a calculated WQBEL for chloride cannot be met, then the permit will include a chloride effluent limitation. Based on a comparison of effluent chloride concentration data and calculated effluent limitations, it has been determined that chloride effluent limits are required. Monitoring is four times per month collected on consecutive days. The chloride weekly average mass limit reduced from 560 lbs/day to 372 lbs/day based on the concentration limit and the maximum annual average flow.

**PFOS and PFOA –** NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. At the first reissuance of a WPDES permit after August 1, 2022, the new rule requires WPDES permits for industrial dischargers to be evaluated on a case-by-case basis to determine if monitoring is required pursuant to s. NR 106.98(2)(d), Wis. Adm. Code. The department evaluated the need for PFOS and PFOA monitoring taking into consideration industry type and other potential sources of PFOS or PFOA, as well as the fact that the permittee has not discharged to surface water in the past three permit terms. Based on information available at the time the proposed permit was drafted, it was identified that the industrial discharger category may be a potential source of PFOS/PFOA. Bi-monthly monitoring is included in the permit. The initial determination of need for sampling shall be conducted for up to two years in order to determine if the permitted discharge has the reasonable potential to cause or contribute to an exceedance of the PFOS or PFOA standards under s. NR 102.04(8)(d)1, Wis. Adm. Code.

**Total Nitrogen Monitoring (NO2+NO3, TKN and Total N)**: The Department has included quarterly effluent monitoring for Total Nitrogen in the permit through the authority under §§ 283.55(1)(e), Wis. Stats., which allows the department to require the permittee to submit information necessary to identify the type and quantity of any pollutants discharged from the point source, and through s. NR 200.065(1)(h), Wis. Adm. Code, which allows for this monitoring to be collected during the permit term. More information on the justification to include total nitrogen monitoring in wastewater permits can be found in the "Guidance for Total Nitrogen Monitoring in Wastewater Permits" dated October 1, 2019.

**Thermal**: Requirements for Temperature are included in NR 102 Subchapter II Water Quality Standards for Temperature and NR 106 Subchapter V Effluent Limitations for Temperature. Thermal discharges must meet the Public Health criterion of 120 degrees F and the Fish & Aquatic Life criteria which are established to protect aquatic communities from lethal and sub-lethal thermal effects. Based on the procedures in s. NR 106.56, Wis. Adm. Code, and an evaluation of available effluent data, daily maximum and weekly average limits are required. The following limits and monitoring apply:

| Month | Daily Max Limit (°F) | Weekly Avg. Limit (°F) |
|---|---|---|
| **JAN** | 112 | 61 |
| **FEB** | 112 | 68 |
| **MAR** | 112 | 72 |
| **APR** | 110 | 76 |
| **MAY** | 104 | 77 |
| **JUN** | 105 | 84 |
| **JUL** | 104 | 88 |
| **AUG** | 106 | 89 |
| **SEP** | 107 | 82 |
| **OCT** | 104 | 69 |
| **NOV** | 108 | 56 |
| **DEC** | 112 | 61 |

**Phosphorus-** Phosphorus requirements are based on the Phosphorus Rules that became effective 12/1/2010 as detailed in NR 102 Water Quality Standards and NR 217 Effluent Standards and Limitations for Phosphorus. Chapter NR 217 of the Wis. Adm. Code addresses point source dischargers of phosphorus to surface waters. The code categorically limits industrial dischargers of more than 60 pounds of phosphorus per month and municipal dischargers of more than 150 pounds of phosphorus per month to 1.0 mg/L unless an alternative limit is approved. NR 217 also specifies WQBELs (water quality based effluent limits) for discharges of phosphorus to surface waters of the state from publicly and privately owned wastewater facilities, noncontact cooling water discharges which contain phosphorus, concentrated animal feeding operations that discharge through alternative treatment facilities and a facility/site that is regulated under NR 216 where the standards in NR151 and 216 are not sufficient to meet phosphorus criteria. WQBELs for phosphorus are needed whenever the discharge contains phosphorus at concentrations or loadings that will cause or contribute to an exceedance of the water quality standards.

For the reasons explained in the April 30, 2012 paper entitled 'Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin', WDNR has determined that it is impracticable to express the phosphorus WQBEL for the permittee as a maximum daily, weekly or monthly values. The final effluent limit for phosphorus is expressed as a six-month average. It is also expressed as a monthly average equal to three times the derived WQBEL. This final effluent limit was derived from and complies with the applicable water quality criterion.

**Whole Effluent Toxicity** Whole effluent toxicity (WET) testing requirements and limits (if applicable) are determined in accordance with ss. NR 106.08 and NR 106.09 Wis. Adm. Code, as revised August 2016. (See the current version of the Whole Effluent Toxicity Program Guidance Document and checklist and WET information, guidance and test methods at http://dnr.wi.gov/topic/wastewater/wet.html). WET testing at outfall 006 shall be in the following quarters:

- Acute and Chronic: 1st quarter (Jan – March) 2025
- Chronic: 2nd quarter (April – June) 2027
- Acute and Chronic: 3rd quarter (July – Sept) 2028

# 2 Land Application - Sludge (industrial only)

## Sample Point Number: 002- WASHWATER WASTE

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Nitrogen, Total Kjeldahl | | Percent | Monthly | Composite | |
| Chloride | | Percent | Monthly | Composite | |
| Phosphorus, Total | | Percent | Monthly | Composite | |
| Phosphorus, Water Extractable | | % of Tot P | Monthly | Composite | |
| Potassium, Total Recoverable | | Percent | Monthly | Composite | |

## Changes from Previous Permit:

None

## Explanation of Limits and Monitoring Requirements

Requirements for land application of industrial sludge are determined in accordance with ch. NR 214 Wis. Adm. Code.

## Sample Point Number: 003- TREATMENT PLANT SLUDGE

| Monitoring Requirements and Limitations | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **Limit Type** | **Limit and Units** | **Sample Frequency** | **Sample Type** | **Notes** |
| Solids, Total | | Percent | Quarterly | Grab | |
| Nitrogen, Total Kjeldahl | | Percent | Quarterly | Grab | |
| Nitrogen, Ammonium (NH4-N) Total | | Percent | Quarterly | Grab | |
| Chloride | | Percent | Quarterly | Grab | |
| pH Field | | su | Quarterly | Grab | |
| Phosphorus, Total | | Percent | Quarterly | Grab | |
| Phosphorus, Water Extractable | | % of Tot P | Quarterly | Grab | |
| Potassium, Total Recoverable | | Percent | Quarterly | Grab | |
| PFOA + PFOS | | ug/kg | Annual | Calculated | Report the sum of PFOA and PFOS. See PFAS Permit Sections for more information. |
| PFAS Dry Wt | | | Annual | Grab | Perfluoroalkyl and Polyfluoroalkyl Substances based on updated DNR PFAS List. See PFAS Permit Sections for more information. |

## Changes from Previous Permit:

PFAS – Annual monitoring added in the permit pursuant to s. NR 214.18(5)(b), Wis. Adm. Code.

## Explanation of Limits and Monitoring Requirements

Requirements for land application of industrial sludge are determined in accordance with ch. NR 214 Wis. Adm. Code.

PFAS- The presence and fate of PFAS in municipal and industrial sludges is an emerging public health concern. EPA is currently developing a risk assessment to determine future land application rates and expects to release this risk assessment by the end of 2024. In the interim, the department has developed the "Interim Strategy for Land Application of Biosolids and Industrial Sludges Containing PFAS".

Collecting sludge data on PFAS concentrations from a wide range of wastewater treatment facilities will help protect public health from exposure to elevated levels of PFAS and determine the department's implementation of EPA's

recommendations. To quantitate this risk, PFAS sampling has been included in the proposed WPDES permit pursuant to ss. NR 214.18(5)(b) and NR 204.06(2)(b)9., Wis. Adm. Code.

# 3 Schedules

## 3.1 PFOS/PFOA Minimization Plan Determination of Need

| Required Action | Due Date |
|---|---|
| **Report on Effluent Discharge:** Submit a report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations. This analysis should also include a comparison to the applicable narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code.<br><br>This report shall include all PFOS and PFOA data collected including any voluntary influent, intake, in-plant, collection system sampling, and blank sample results. | 06/01/2025 |
| **Report on Effluent Discharge and Evaluation of Need:** Submit a final report on effluent PFOS and PFOA concentrations and include an analysis of trends in monthly and annual average PFOS and PFOA concentrations of data collected over the last 24 months. The report shall also provide a comparison on the likelihood of the facility needing to develop a PFOS/PFOA minimization plan.<br><br>This report shall include all PFOS and PFOA data collected including any voluntary influent, intake, in-plant, collection system sampling, and blank sample results.<br><br>The permittee shall also submit a request to the department to evaluate the need for a PFOS/PFOA minimization plan.<br><br>If the Department determines a PFOS/PFOA minimization plan is needed based on a reasonable potential evaluation, the permittee will be required to develop a minimization plan for Department approval no later than 90 days after written notification was sent from the Department. The Department will modify or revoke and reissue the permit to include PFOS/PFOA minimization plan reporting requirements along with a schedule of compliance to meet WQBELs. Effluent monitoring of PFOS and PFOA shall continue as specified in the permit until the modified permit is issued.<br><br>If, however, the Department determines there is no reasonable potential for the facility to discharge PFOS or PFOA above the narrative standard in s. NR 102.04(8)(d), Wis. Adm. Code, no further action is required and effluent monitoring of PFOS and PFOA shall continue as specified in the permit. | 06/01/2026 |

**Explanation of PFOA/PFOA Schedule**: As stated above, NR 106 Subchapter VIII – Permit Requirements for PFOS and PFOA Dischargers became effective on August 1, 2022. S. NR 106.98, Wis. Adm. Code, specifies steps to generate data in order to determine the need for reducing PFOS and PFOA in the discharge. Data generated per the effluent monitoring requirements will be used to determine the need for developing a PFOS/PFOA minimization plan. As part of the schedule, the permittee is required to submit two annual Reports on Effluent Discharge.

If the department determines that a minimization plan is needed, the permit will be modified or revoked/reissued to include additional requirements.

## 3.2 Land Application Management Plan

A management plan is required for the land application system.

| Required Action | Due Date |
|---|---|
| **Land Application Management Plan**: Submit an update to the management plan to optimize the land application system performance and demonstrate compliance with Wisconsin Administrative Code NR 214. | 07/31/2024 |

**Explanation of Schedule**: An up-to-date Land Application Management plan is a standard requirement in reissued industrial permits per s. NR 214.17(6)(c) Wis. Adm. Code

## 3.3 Operator Certification

| Required Action | Due Date |
|---|---|
| **Operator Certification:** Per s. NR 114.53(1) Wis. Adm. Code, the permittee shall have an operator in charge with the proper certification by the due date. The permittee shall notify the department in writing of the certified operator's name and certification number with all proper certifications. | 06/30/2024 |

**Explanation of Operator Certification Schedule**: Due to the request by the Kerry Ingredients to activate surface water outfalls, per 114.53(1) Wis. Adm. Code, Kerry Ingredients must have an operator in charge (OIC) that holds all certifications at the proper level. The OIC is required at surface water outfall activation which is concurrent to permit reissuance in this case.

# Special Reporting Requirements: None

# Other Comments: Publishing Newspaper: Owen/Withee Enterprise, P.O. Box F, Withee, WI 54498-0906

# Attachments:

- Water Quality Based Effluent Limits: February 5, 2024 memo from Benjamin Hartenbower to Holly Heldstab titled "Water Quality-Based Effluent Limitations for Kerry Ingredients WPDES Permit No. WI-0000027"

# Expiration Date: March 31, 2029

# Justification Of Any Waivers From Permit Application Requirements

N/A

**Prepared By:** Holly Heldstab, Wastewater Specialist **Date:** April 2, 2024

# CORRESPONDENCE/MEMORANDUM

**State of Wisconsin**

DATE: February 5, 2024

TO: Holly Heldstab– WCR/Eau Claire

FROM: Benjamin Hartenbower – WCR/Eau Claire

SUBJECT: Water Quality-Based Effluent Limitations for Kerry Ingredients
WPDES Permit No. WI-0000027

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from Kerry Ingredients in Clark County. This industrial discharge is to Brick Creek Pond, located in the Popple River Watershed in the Black River Basin. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 006:

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Six-Month Average | Footnotes |
|---|---|---|---|---|---|---|
| Flow Rate | | | | | | 1,2 |
| $BOD_5$ | 10 mg/L | | | 5.0 mg/L | | 1 |
| TSS | 13 mg/L | | | 6.0 mg/L | | 1 |
| pH | 9.0 s.u. | 6.0 s.u. | | | | 1 |
| Dissolved Oxygen<br>May – October<br>November - April | | <br>6.0 mg/L<br>7.0 mg/L | | | | 1 |
| Ammonia Nitrogen | | | | | | 2 |
| Chloride | **1200 mg/L** | | 743 mg/L,<br>372 lbs/day | **743 mg/L** | | 3 |
| PFOS and PFOA | | | | | | 4 |
| Temperature<br>January<br>February<br>March<br>April<br>May<br>June<br>July<br>August<br>September<br>*October*<br>November<br>December | <br>112 deg F<br>112 deg F<br>112 deg F<br>110 deg F<br>104 deg F<br>105 deg F<br>104 deg F<br>106 deg F<br>107 deg F<br>104 deg F<br>108 deg F<br>112 deg F | | <br>61 deg F<br>68 deg F<br>72 deg F<br>76 deg F<br>77 deg F<br>84 deg F<br>88 deg F<br>89 deg F<br>82 deg F<br>69 deg F<br>56 deg F<br>61 deg F | | | |
| Phosphorus | | | | 0.225 mg/L | 0.075 mg/L,<br>0.038 lbs/day | |
| TKN, Nitrate+Nitrite, and Total Nitrogen | | | | | | 5 |
| Acute WET | | | | | | 6 |
| Chronic WET | | | | | | 6,7 |

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. Additional limits to comply with the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, are included in bold.
4. Monitoring once every two months is required in accordance with s. NR 106.98(2), Wis. Adm. Code.
5. As recommended in the Department's October 1, 2019 Guidance for Total Nitrogen Monitoring in Wastewater Permits, quarterly total nitrogen monitoring is recommended for all Class A dairy product processors. Total Nitrogen is the sum of nitrate ($NO_3$), nitrite ($NO_2$), and total kjeldahl nitrogen (TKN) (all expressed as N).
6. Two Acute and three Chronic WET tests are recommended in the reissued permit. Sampling WET concurrently with any chemical-specific toxic substances is recommended. Tests should be done in rotating quarters, to collect seasonal information about this discharge and should continue after the permit expiration date (until the permit is reissued).
7. The Instream Waste Concentration (IWC) to assess chronic test results is 52%. According to the State of Wisconsin Aquatic Life Toxicity Testing Methods Manual (s. NR 219.04, Table A, Wis. Adm. Code), chronic testing shall be performed using a dilution series of 100%, 75%, 50%, 25% & 12.5% and the dilution water used in WET tests conducted on Outfall 006 shall be a grab sample collected from Brick Creek Pond.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Benjamin Hartenbower at (715) 225-4705 or Benjamin.Hartenbower@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, Thermal Table, & Map

PREPARED BY: _____ Date: 02/05/2024

Benjamin Hartenbower, PE,
Water Resources Engineer

E-cc:

Jenna Monahan, Wastewater Engineer – WCR/Eau Claire
Geisa Thielen, Regional Wastewater Supervisor – WCR/Eau Claire
Diane Figiel, Water Resources Engineer – WY/3
Chris Willger, Water Quality Biologist – WCR/Eau Claire
Kari Fleming, Environmental Toxicologist – WY/3
Michael Polkinghorn, Water Resources Engineer – NOR/Rhinelander
Nate Willis, Wastewater Engineer – WY/3

Attachment #1

**Water Quality-Based Effluent Limitations for**
**Kerry Ingredients**
**WPDES Permit No. WI-0000027**

Prepared by: Benjamin P. Hartenbower

## PART 1 – BACKGROUND INFORMATION

**Facility Description:**
The Kerry Ingredients plant in Clark County uses vegetable oil, corn syrup, and sodium hydroxide in the production of bulk ingredients for food products (dairy-based sauces). The plant operates nine main production lines with manufacturing capabilities in spray drying, dry blending, cold processing, multiprocessing, and modified dairy ingredient processing year-round. Raw materials are dry blended together or blended into a liquid and converted via liquid processing and pasteurization to form various products. Manufacturing products at the facility include cheese powders, shortening powders, cheese sauce, pizza and sandwich sauce, etc. The final powder products are extended by blending and packaged after evaporation and spray drying, then sold in bulk form. Processing aids are utilized in the production process. Some are consumed in the process while others are utilized for cleaning.

Attachment #3 is a map of the area showing the approximate location of Outfall 006.

**Existing Permit Limitations**
The current permit, which expired on December 31, 2023, includes the following effluent limitations and monitoring requirements.

| Parameter | Daily Maximum | Daily Minimum | Weekly Average | Monthly Average | Six-Month Average | Footnotes |
|---|---|---|---|---|---|---|
| Flow Rate | | | | | | 1,2 |
| $BOD_5$ | 10 mg/L | | | 5.0 mg/L | | 1 |
| TSS | 13 mg/L | | | 6.0 mg/L | | 1 |
| pH | 9.0 s.u. | 6.0 s.u. | | | | 1 |
| Dissolved Oxygen<br>May – October<br>November - April | | <br>6.0 mg/L<br>7.0 mg/L | | | | 1 |
| Ammonia | | | | | | 2 |
| Chloride | **1200 mg/L** | | 750 mg/L,<br>560 lbs/day | **750 mg/L** | | |
| Temperature<br>January<br>February<br>March<br>April<br>May<br>June<br>July<br>August<br>September | <br>112 deg F<br>112 deg F<br>112 deg F<br>110 deg F<br>104 deg F<br>105 deg F<br>104 deg F<br>106 deg F<br>107 deg F | | <br>61 deg F<br>68 deg F<br>72 deg F<br>76 deg F<br>77 deg F<br>84 deg F<br>88 deg F<br>89 deg F<br>82 deg F | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| October<br>November<br>December | 104 deg F<br>108 deg F<br>112 deg F | | 69 deg F<br>56 deg F<br>61 deg F | | | |
| Phosphorus | | | | 0.225 mg/L | 0.075 mg/L,<br>0.038 lbs/day | |
| Acute WET | | | | | | 3 |

Footnotes:

1. These limitations are not being evaluated as part of this review. Because the water quality criteria (WQC), reference effluent flow rates, and receiving water characteristics have not changed, limitations for these water quality characteristics do not need to be re-evaluated at this time.
2. Monitoring only.
3. Acute WET testing required: Jan - March 2020 and July - Sept 2023.

**Receiving Water Information**

- Name: Brick Creek Pond
- Waterbody Identification Code (WBIC): 1753300
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The Brick Creek Pond (or Owen Pond) is an impounded section of Brick Creek. The pond will be treated as a water which does not exhibit significant unidirectional flow (inland lake) for temperature limit calculation purposes. However, Brick Creek Pond does not meet the definition of a reservoir in NR 102.06(4) Wis. Adm. Code for consideration of phosphorus limits. Low flows from USGS for Station 05380897 near Owen, in the Poplar River will be used for all other limit calculations.

  $7\text{-}Q_{10}$ = 0.34 cfs (cubic feet per second)

  $7\text{-}Q_{2}$ = 1.70 cfs

  Harmonic Mean Flow = 6.98 cfs using a drainage area of 142.0 $mi^2$.

  The Harmonic Mean has been estimated based on average flow and the $7\text{-}Q_{10}$ using an equation from U.S. EPA's *Technical Support Document for Water Quality-Based Toxics Control* (March 1991, EPA/505/2-90-001, pgs. 88-89).
- Hardness = 94 mg/L as $CaCO_3$. This value represents the geometric mean of 14 samples collected in the Poplar River from 07/09/1992 to 12/08/1993.
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: 25%
- Source of background concentration data: Metals data from Black River at Hemlock is used for this evaluation because there is no data available for Brick Creek Pond and the Black River is within the same ecological landscape so ambient water quality characteristics are expected to be similar. The geometric mean of available background chloride data in the Popple River in Clark County is 15 mg/L. The numerical values are shown in the tables below. If no data is available, the background concentration is assumed to be negligible and a value of zero is used in the computations. Background data for calculating effluent limitations for ammonia nitrogen are described later.
- Multiple dischargers: None
- Impaired water status: The Popple River is listed as impaired for phosphorus ¼ mile downstream from Brick Creek Pond.

**Effluent Information:**

- Flow Rates(s):
  Maximum Annual Average = 0.060 MGD (Million Gallons per Day)
- Hardness = 142 mg/L as $CaCO_3$. This value represents the geometric mean of 4 effluent samples collected from 06/07/2023 to 06/13/2023.
- Acute dilution factor used in accordance with s. NR 106.06 (3) (c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water Source: wastewater from food product processing
- Additives: sodium hydroxide and ferric sulfate
- Effluent characterization: This facility is categorized as a primary industrial discharger, so the permit application required effluent sample analyses for all the "priority pollutants" except for the Dioxins and Furans as specified in s. NR 200.065, Table 1, Wis. Adm. Code. The permit application monitoring from 2015 and 2023 is used in this evaluation.

**Chemical Specific Effluent Data at Outfall 006**

| Sample Date | Chloride mg/L | Sample Date | Copper µg/L |
|---|---|---|---|
| 03/02/2015 | 180 | 06/07/2023 | <3 |
| 03/04/2015 | 180 | 06/08/2023 | <3 |
| 03/09/2015 | 190 | 06/10/2023 | <3 |
| 03/12/2015 | 200 | 06/13/2023 | <3 |
| mean | 188 | mean | <3 |

"<" means that the pollutant was not detected at the indicated level of detection. The mean concentration was calculated using zero in place of the non-detected results.

Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled "MEAN EFFL. CONC.".

## PART 2 – WATER QUALITY-BASED Effluent Limitations for Toxic Substances – EXCEPT AMMONIA NITROGEN

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper $99^{th}$ percentile (or $P_{99}$) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

**Acute Limits based on 1-$Q_{10}$**

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-$Q_{10}$ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

$$\text{Limitation} = \frac{(WQC)\,(Qs + (1-f)\,Qe) - (Qs - f\,Qe)\,(Cs)}{Qe}$$

Where:

WQC =Acute toxicity criterion or secondary acute value according to ch. NR 105, Wis. Adm. Code.

Qs = average minimum 1-day flow which occurs once in 10 years (1-day $Q_{10}$) if the 1-day $Q_{10}$ flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day $Q_{10}$).

Qe = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

Cs = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-$Q_{10}$ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is not the case for Kerry Ingredients and the limits are set based on two times the acute toxicity criteria.

The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L).

**Daily Maximum Limits based on Acute Toxicity Criteria (ATC)**

RECEIVING WATER FLOW = 0.27 cfs, (1-$Q_{10}$ (estimated as 80% of 7-$Q_{10}$)), as specified in s. NR 106.06 (3) (bm), Wis. Adm. Code.

| SUBSTANCE | REF. HARD. mg/L | ATC | MEAN BACK-GRD. | MAX. EFFL. LIMIT** | 1/5 OF EFFL. LIMIT | MEAN EFFL. CONC. | 1-day P99 | 1-day MAX. CONC. |
|---|---|---|---|---|---|---|---|---|
| Arsenic | | 339.8 | | 679.6 | 135.9 | <1 | | |
| Cadmium | 142 | 15.46 | 0.009 | 30.9 | 6.2 | <2 | | |
| Chromium | 142 | 2408.58 | 0.622 | 4817.2 | 963.4 | <3 | | |
| Copper | 142 | 21.66 | 1.265 | 43.3 | 8.7 | <3 | | |
| Lead | 142 | 150.46 | 0.178 | 300.9 | 60.2 | <1 | | |
| Nickel | 142 | 632.75 | | 1265.5 | 253.1 | <8 | | |
| Zinc | 142 | 163.99 | 1.710 | 328 | 65.6 | 41 | | |
| Chloride | | 757 | 15 | 1514 | 303 | 188 | | 200 |

* * The 2 × ATC method of limit calculation yields a more restrictive limit than consideration of ambient concentrations and 1-$Q_{10}$ flow rates per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016.

**Weekly Average Limits based on Chronic Toxicity Criteria (CTC)**
RECEIVING WATER FLOW = 0.09 cfs (¼ of the 7-$Q_{10}$), as specified in s. NR 106.06 (4) (c), Wis. Adm. Code

| SUBSTANCE | REF. HARD. mg/L | CTC | MEAN BACK-GRD. | WEEKLY AVE. LIMIT | 1/5 OF EFFL. LIMIT | MEAN EFFL. CONC. | 4-day P99 |
|---|---|---|---|---|---|---|---|
| Arsenic | | 152.2 | | 291.6 | 58.3 | <1 | |
| Cadmium | 94 | 2.34 | 0.009 | 4.5 | 0.9 | <2 | |
| Chromium | 94 | 125.48 | 0.622 | 239.8 | 48 | <3 | |
| Copper | 94 | 9.81 | 1.265 | 17.6 | 3.5 | <3 | |
| Lead | 94 | 26.36 | 0.178 | 50.3 | 10.1 | <1 | |
| Nickel | 94 | 49.49 | | 94.8 | 19 | <8 | |
| Zinc | 94 | 113.94 | 1.710 | 216.7 | 43.3 | 41 | |
| **Chloride** | | 395 | 15 | 743 | **149** | **188** | |

**Monthly Average Limits based on Wildlife Criteria (WC)**
The effluent characterization did not include any effluent sampling results for substances for which Wildlife Criteria exist.

**Monthly Average Limits based on Human Threshold Criteria (HTC)**
RECEIVING WATER FLOW = 1.74 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

| SUBSTANCE | HTC | MEAN BACK-GRD. | MO'LY AVE. LIMIT | 1/5 OF EFFL. LIMIT | MEAN EFFL. CONC. |
|---|---|---|---|---|---|
| Cadmium | 370 | 0.009 | 7321 | 1464 | <2 |
| Chromium | 3818000 | 0.622 | 75543348 | 15108670 | <3 |
| Lead | 140 | 0.178 | 2766.7 | 553.3 | <1 |
| Nickel | 43000 | | 850803 | 170161 | <8 |

**Monthly Average Limits based on Human Cancer Criteria (HCC)**
RECEIVING WATER FLOW = 1.74 cfs (¼ of Harmonic Mean), as specified in s. NR 106.06 (4), Wis. Adm. Code.

| SUBSTANCE | HCC | MEAN BACK-GRD. | MO'LY AVE. LIMIT | 1/5 OF EFFL. LIMIT | MEAN EFFL. CONC. |
|---|---|---|---|---|---|
| Arsenic | 13.3 | | 263.2 | 52.6 | <1 |

In addition to evaluating the need for limits for each individual substance for which HCC exist, s. NR 106.06(8), Wis. Adm. Code, requires the evaluation of the cumulative cancer risk. Because no effluent limits are needed based on HCC, determination of the cumulative cancer risk is not needed per s. NR 106.06(8), Wis. Adm. Code.

**Conclusions and Recommendations:** Based on a comparison of the effluent data and calculated effluent limitations, limits are required for Chloride.

Chloride – Considering available effluent data from the permit application, the mean effluent concentration is 187.5 mg/L. This value exceeds 1/5 of the calculated weekly limit, therefore concentration and mass limits, as well as monthly monitoring, are required.

The weekly mass limitation of 372 lbs/day is based on the concentration limit and the maximum annual average flow of 0.06 MGD (743 mg/L * 0.06 MGD * 8.34) in accordance with s. NR 106.07(2)(c), Wis. Adm. Code.

Sections NR 106.07(4) and NR 205.067(7), Wis. Adm. Code require WPDES permits contain daily maximum and monthly average limitations for industrial dischargers whenever practicable and necessary to protect water quality. **Therefore a daily max limit of 1200 mg/L and a monthly average limit of 743 mg/L are required** to meet expression of limits requirements in addition to the weekly average limits.

PFOS and PFOA

The need for PFOS and PFOA monitoring is evaluated in accordance with s. NR 106.98, Wis. Adm. Code. **Based on the type of discharge and the facility being a new discharger, PFOS and PFOA monitoring is recommended once every two months.**

## PART 3 – WATER QUALITY-BASED Effluent Limitations for AMMONIA NITROGEN

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that Kerry Ingredients does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

**Daily Maximum Limits based on Acute Toxicity Criteria (ATC):**

Daily maximum limitations are based on acute toxicity criteria in ch. NR 105, Wis. Adm. Code, which are a function of the effluent pH and the receiving water classification. The acute toxicity criterion (ATC) for ammonia is calculated using the following equation.

$$\text{ATC in mg/L} = [A \div (1 + 10^{(7.204 - pH)})] + [B \div (1 + 10^{(pH - 7.204)})]$$

Where:

A = 0.411 and B = 58.4 for a Warm Water Sport fishery, and
pH (s.u.) = that characteristic of the effluent.

**Daily Maximum Ammonia Nitrogen Effluent Limitations Calculation Method**

In accordance with s. NR 106.32(2), Wis. Adm. Code daily maximum ammonia limitations are calculated using the 1-$Q_{10}$ receiving water low flow if it is determined that the previous method of acute ammonia limit calculation (2×ATC) is not sufficiently protective of the fish and aquatic life. The more restrictive calculated limits shall apply.

The calculated daily maximum ammonia nitrogen effluent limits using the mass balance approach with the 1-$Q_{10}$ (estimated as 80 % of 7-$Q_{10}$) and the 2×ATC approach are shown below.

**Daily Maximum Ammonia Nitrogen Determination**

| | Ammonia Nitrogen Limit mg/L |
|---|---|
| 2×ATC | 72.19 |
| 1-$Q_{10}$ | 141.66 |

The 2×ATC method yields the most stringent limits for Kerry Ingredients.

Presented below is a table of daily maximum limitations corresponding to various effluent pH values. Use of this table is not necessarily recommended in the permit, but it is presented herein for informational purposes.

**Daily Maximum Ammonia Nitrogen Limits – WWSF/WWFF**

| Effluent pH s.u. | Limit mg/L | Effluent pH s.u. | Limit mg/L | Effluent pH s.u. | Limit mg/L |
|---|---|---|---|---|---|
| 6.0 ≤ pH ≤ 6.1 | 108 | 7.0 < pH ≤ 7.1 | 66 | 8.0 < pH ≤ 8.1 | 14 |
| 6.1 < pH ≤ 6.2 | 106 | 7.1 < pH ≤ 7.2 | 59 | 8.1 < pH ≤ 8.2 | 11 |
| 6.2 < pH ≤ 6.3 | 104 | 7.2 < pH ≤ 7.3 | 52 | 8.2 < pH ≤ 8.3 | 9.4 |
| 6.3 < pH ≤ 6.4 | 101 | 7.3 < pH ≤ 7.4 | 46 | 8.3 < pH ≤ 8.4 | 7.8 |
| 6.4 < pH ≤ 6.5 | 98 | 7.4 < pH ≤ 7.5 | 40 | 8.4 < pH ≤ 8.5 | 6.4 |
| 6.5 < pH ≤ 6.6 | 94 | 7.5 < pH ≤ 7.6 | 34 | 8.5 < pH ≤ 8.6 | 5.3 |
| 6.6 < pH ≤ 6.7 | 89 | 7.6 < pH ≤ 7.7 | 29 | 8.6 < pH ≤ 8.7 | 4.4 |
| 6.7 < pH ≤ 6.8 | 84 | 7.7 < pH ≤ 7.8 | 24 | 8.7 < pH ≤ 8.8 | 3.7 |
| 6.8 < pH ≤ 6.9 | 78 | 7.8 < pH ≤ 7.9 | 20 | 8.8 < pH ≤ 8.9 | 3.1 |
| 6.9 < pH ≤ 7.0 | 72 | 7.9 < pH ≤ 8.0 | 17 | 8.9 < pH ≤ 9.0 | 2.6 |

**Weekly and Monthly Average Limits based on Chronic Toxicity Criteria (CTC)**

The ammonia limit calculation also warrants evaluation of weekly and monthly average limits based on chronic toxicity criteria for ammonia, since those limits relate to the assimilative capacity of the receiving water.

Weekly average and monthly average limits for ammonia nitrogen are based on chronic toxicity criteria in ch. NR 105, Wis. Adm. Code.

The 30-day chronic toxicity criterion (CTC) for ammonia in waters classified as Warm Water Sport Fish Community is calculated by the following equation, according to subchapter IV of NR 106, Wis. Adm. Code.

$$CTC = E \times \{[0.0676 \div (1 + 10^{(7.688 - pH)})] + [2.912 \div (1 + 10^{(pH - 7.688)})]\} \times C$$

Where:

pH = the pH (s.u.) of the receiving water,

E = 0.854,

C = the minimum of 2.85 or $1.45\times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Present), or

C = $1.45\times 10^{(0.028 \times (25 - T))}$ – (Early Life Stages Absent), and

T= the temperature (ºC) of the receiving water – (Early Life Stages Present), or
T = the maximum of the actual temperature (ºC) and 7 - (Early Life Stages Absent)

The 4-day criterion is equal to the 30-day criterion multiplied by 2.5. The 4-day criteria are used in a mass-balance equation with the 7-$Q_{10}$ (4-Q3, if available) to derive weekly average limitations. And the 30-day criteria are used with the 30-$Q_5$ (estimated as 85% of the 7-$Q_2$ if the 30-$Q_5$ is not available) to derive monthly average limitations. The stream flow value is further adjusted to temperature; 100% of the flow is used if the Temperature ≥ 16 ºC, 25% of the flow is used if the Temperature < 11 ºC, and 50% of the flow is used if the Temperature ≥ 11 ºC but < 16 ºC.

Section NR 106.32 (3), Wis. Adm. Code, provides a mechanism for less stringent weekly average and monthly average effluent limitations when early life stages (ELS) of critical organisms are absent from the receiving water. This applies only when the water temperature is less than 14.5 ºC, during the winter and spring months. Burbot, an early spawning species, are believed to be present in the Poplar River. So "ELS Absent" criteria apply from October through December, and "ELS Present" criteria will apply from January through September for a WWSF classification.

The "default" basin assumed values are used for temperature and background ammonia concentrations, because minimum ambient data is available. The values for pH are based on data collected from the Popple River. These values are shown in the table below, with the resulting criteria and effluent limitations.

**Weekly and Monthly Ammonia Nitrogen Limits – WWSF**

| | | January-April | May-September | October-December |
|---|---|---|---|---|
| **Effluent Flow** | Qe (MGD) | 0.060 | 0.060 | 0.060 |
| **Background Information** | 7-$Q_{10}$ (cfs) | 0.34 | 0.34 | 0.34 |
| | 7-$Q_2$ (cfs) | 1.70 | 1.70 | 1.70 |
| | Ammonia (mg/L) | 0.14 | 0.03 | 0.17 |
| | Temperature (°C) | 8.9 | 20.6 | 10.0 |
| | pH (s.u.) | 7.36 | 7.75 | 7.38 |
| | % of Flow used | 25 | 100 | 25 |
| | Reference Weekly Flow (cfs) | 0.085 | 0.340 | 0.085 |
| | Reference Monthly Flow (cfs) | 0.361 | 1.445 | 0.361 |
| **Criteria mg/L** | 4-day Chronic | | | |
| | Early Life Stages Present | 12.18 | 5.73 | 12.05 |
| | Early Life Stages Absent | 17.51 | 5.73 | 16.12 |
| | 30-day Chronic | | | |
| | Early Life Stages Present | 4.87 | 2.29 | 4.82 |
| | Early Life Stages Absent | 7.00 | 2.29 | 6.45 |
| **Effluent Limitations mg/L** | Weekly Average | | | |
| | Early Life Stages Present | 23.20 | 26.61 | |
| | Early Life Stages Absent | | | 30.73 |
| | Monthly Average | | | |
| | Early Life Stages Present | 23.28 | 37.50 | |
| | Early Life Stages Absent | | | 30.88 |

**Effluent Data**
The following table evaluates the statistics based upon ammonia data reported from January to March 2015, with those results being compared to the calculated limits to determine the need to include ammonia limits in the Kerry Ingredients permit for the respective month ranges.

**Ammonia Nitrogen Effluent Data**

| | Ammonia Nitrogen mg/L |
|---|---|
| 1-day $P_{99}$ | 0.12 |
| 4-day $P_{99}$ | 0.065 |
| 30-day $P_{99}$ | 0.030 |
| Mean* | 0.024 |
| Std | 0.028 |
| Sample size | 23 |
| Range | <0.025 - 0.10 |

*Values lower than the level of detection were substituted with a zero

**Conclusions and Recommendations**
Based on this comparison, there is no reasonable potential for the discharge to exceed any of the calculated ammonia nitrogen limits. **No limits are needed however monthly monitoring is recommended.**

## PART 4 – PHOSPHORUS

**Water Quality-Based Effluent Limits (WQBEL)**
Revisions to administrative rules regulating phosphorus took effect on December 1, 2010. These rule revisions include additions to s. NR 102.06, Wis. Adm. Code, which establish phosphorus standards for surface waters. Subchapter III of NR 217, Wis. Adm. Code, establishes procedures for determining WQBELs for phosphorus, based on the applicable standards in ch. NR 102, Wis. Adm. Code.

Section NR 102.06(3)(a), Wis. Adm. Code, specifically names river segments for which a phosphorus criterion of 0.100 mg/L applies. For other stream segments that are not specified in s. NR 102.06(3)(a), Wis. Adm. Code, s. NR 102.06(3)(b), Wis. Adm. Code, specifies a phosphorus criterion of 0.075 mg/L. The phosphorus criterion of 0.075 mg/L applies for Brick Creek.

The conservation of mass equation is described in s. NR 217.13(2)(a), Wis. Adm. Code, for phosphorus WQBELs and includes variables of water quality criterion (WQC), receiving water flow rate (Qs), effluent flow rate (Qe), and upstream phosphorus concentrations (Cs) provided below.

$$\text{Limitation} = [(WQC)(Qs+(1-f)\ Qe) - (Qs-f\ Qe)\ (Cs)]/Qe$$

Where:

WQC = 0.075 mg/L for Brick Creek.
Qs = 100% of the 7-$Q_2$ of 1.7 cfs
Cs = background concentration of phosphorus in the receiving water pursuant to s. NR 217.13(2)(d), Wis. Adm. Code
Qe = effluent flow rate = 0.060 MGD = 0.093 cfs
f = the fraction of effluent withdrawn from the receiving water = 0

The impaired water listing of the Poplar River also points towards the notion that effluent phosphorus limits equal to the water quality criterion are needed to prevent the discharge from contributing to further impairment of the receiving water. The Guidance for Implementing Wisconsin's Phosphorus Water Quality Standards for Point Source Discharges (2020) suggests setting effluent limits equal to the criterion in the absence of an EPA approved total maximum daily load for discharges of phosphorus to phosphorus impaired waters.

**Effluent Data**

The following table summarizes effluent total phosphorus monitoring data from January 2015 to March 2015.

| | **Phosphorus mg/L** |
|---|---|
| 1-day $P_{99}$ | 0.20 |
| 4-day $P_{99}$ | 0.13 |
| 30-day $P_{99}$ | 0.10 |
| Mean | 0.085 |
| Std | 0.036 |
| Sample size | 23 |
| Range | 0.024 - 0.15 |

**Reasonable Potential Determination**

Since the 30-day $P_{99}$ of reported effluent total phosphorus data is greater than the calculated WQBEL, the discharge **has reasonable potential to cause or contribute to an exceedance of the water quality criterion** because the 30-day $P_{99}$ of reported effluent total phosphorus data is greater than the calculated WQBEL**.** Therefore, **a WQBEL is required.**

**Limit Expression**

According to s. NR 217.14(2), Wis. Adm. Code, because the calculated WQBEL is less than or equal to 0.3 mg/L, the effluent limit of 0.075 mg/L may be expressed as a six-month average. If a concentration limitation expressed as a six-month average is included in the permit, a monthly average concentration limitation of 0.225 mg/L, equal to three times the WQBEL calculated under s. NR 217.13, Wis. Adm. Code shall also be included in the permit. The six-month average should be averaged during the months of May – October and November – April.

**Mass Limits**

Because the discharge is to a surface water that is to or upstream of a phosphorus impaired water, a mass limit is also required, pursuant to s. NR 217.14(1)(a), Wis. Adm. Code. **This final mass limit shall be 0.075 mg/L × 8.34 × 0.060 MGD = 0.038 lbs/day expressed as a six-month average.**

## PART 5 – WATER QUALITY-BASED Effluent Limitations for THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. However, no actual effluent flow rate measurements are available for Outfall 006. The peak daily design flow at Outfall 006 of 0.120 MGD will be used to determine effluent limitations.

**Monthly Temperature Effluent Data & Limits**

| Month | Representative Highest Monthly Effluent Temperature | | Calculated Effluent Limits | | Current Effluent Limits | |
|---|---|---|---|---|---|---|
| | Weekly Maximum (°F) | Daily Maximum (°F) | Weekly Average Effluent Limitation (°F) | Daily Maximum Effluent Limitation (°F) | Weekly Average Effluent Limitation (°F) | Daily Maximum Effluent Limitation (°F) |
| JAN | | | NA | 120 | 61 | 112 |
| FEB | | | NA | 120 | 68 | 112 |
| MAR | | | NA | 120 | 72 | 112 |
| APR | | | NA | 120 | 76 | 110 |
| MAY | | | NA | 120 | 77 | 104 |
| JUN | | | NA | 120 | 84 | 105 |
| JUL | | | NA | 120 | 88 | 104 |
| AUG | | | NA | 120 | 89 | 106 |
| SEP | | | NA | 120 | 82 | 107 |
| OCT | | | 107 | 120 | 69 | 104 |
| NOV | | | 86 | 120 | 65 | 108 |
| DEC | | | NA | 120 | 61 | 112 |

**Antidegradation**
The calculated temperature limits are less restrictive than the limits in the current permit. Without a demonstration of need for higher limits in accordance with s. NR 207.04, Wis. Adm. Code, **the current temperature limits must be continued in the reissued permit.**

## PART 6 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document (2022).*

- Acute tests predict the concentration that causes lethality of aquatic organisms during a 48 to 96-hour exposure. To assure that a discharge is not acutely toxic to organisms in the receiving water, WET tests must produce a statistically valid LC50 (Lethal Concentration to 50% of the test organisms) greater than 100% effluent, according to s. NR 106.09(2)(b), Wis. Adm Code.

- Chronic tests predict the concentration that interferes with the growth or reproduction of test organisms during a seven-day exposure. To assure that a discharge is not chronically toxic to organisms in the receiving water, WET tests must produce a statistically valid $IC_{25}$ (Inhibition Concentration) greater than the instream waste concentration (IWC), according to s. NR 106.09(3)(b), Wis. Adm Code. The IWC is an estimate of the proportion of effluent to total volume of water (receiving water + effluent). The IWC of **52%** shown in the WET Checklist summary below was calculated according to the following equation, as specified in s. NR 106.03(6), Wis. Adm Code:

$$IWC\ (as\ \%) = Q_e \div \{(1 - f)\ Q_e + Q_s\} \times 100$$

Where:

$Q_e$ = annual average flow = 0.060 MGD = 0.093 cfs
f = fraction of the $Q_e$ withdrawn from the receiving water = 0
$Q_s$ = ¼ of the 7-$Q_{10}$ = 0.34 cfs ÷ 4 = 0.09 cfs

- According to the *State of Wisconsin Aquatic Life Toxicity Testing Methods Manual*, a synthetic (standard) laboratory water may be used as the dilution water and primary control in acute WET tests, unless the use of different dilution water is approved by the Department prior to use. The primary control water must be specified in the WPDES permit.

- Receiving water must be used as the dilution water and primary control in chronic WET tests, unless the use of different dilution water is approved by the Department prior to use. The dilution water used in WET tests conducted on Outfall 006 shall be a grab sample collected from the receiving water location, upstream and out of the influence of the mixing zone and any other known discharge. The specific receiving water location must be specified in the WPDES permit.

Attachment #1

The WET checklist was developed to help DNR staff make recommendations regarding WET limits, monitoring, and other related permit conditions. The checklist indicates whether acute and chronic WET limits are needed, based on requirements specified in s. NR 106.08, Wis. Adm. Code. The checklist steps the user through a series of questions, assesses points based on the potential for effluent toxicity, and suggests monitoring frequencies based on points accumulated during the checklist analysis. As toxicity potential increases, more points accumulate, and more monitoring is recommended to ensure that toxicity is not occurring. A summary of the WET checklist analysis completed for this permittee is shown in the table below. Staff recommendations based on best professional judgment are provided below the summary table.

For guidance related to reasonable potential and the WET checklist, see Chapter 1.3 of the WET Guidance Document: https://dnr.wisconsin.gov/topic/Wastewater/WET.html.

**WET Checklist Summary**

| | Acute | Chronic |
|---|---|---|
| **AMZ/IWC** | Not Applicable.<br>**0 Points** | IWC = 52%.<br>**10 Points** |
| **Historical Data** | No Acute data available.<br>**5 Points** | No Chronic Data Available<br>**5 Points** |
| **Effluent Variability** | Little variability, no violations or upsets, consistent WWTF operations.<br>**0 Points** | Same as Acute.<br>**0 Points** |
| **Receiving Water Classification** | WWSF (5 pts)<br>**5 Points** | Same as Acute.<br>**5 Points** |
| **Chemical-Specific Data** | No reasonable potential for limits based on ATC; Ammonia, Chloride, and Zinc detected. (3 pts)<br>Additional Compounds of Concern: None<br>**3 Points** | Reasonable potential for chloride limits based on CTC; (5 pts)<br>Ammonia and Zinc detected. (2 pts)<br>Additional Compounds of Concern: None<br>**7 Points** |
| **Additives** | Two water quality conditioners.<br>Permittee has proper P chemical SOPs in place.<br>**2 Points** | All additives used more than once per 4 days.<br>**2 Points** |
| **Discharge Category** | Food processing category (5 pts)<br>**5 Points** | Same as Acute.<br>**5 Points** |
| **Wastewater Treatment** | Secondary or Better<br>**0 Points** | Same as Acute.<br>**0 Points** |
| **Downstream Impacts** | No impacts known<br>**0 Points** | Same as Acute.<br>**0 Points** |
| **Total Checklist Points:** | **20 Points** | **34 Points** |
| **Recommended Monitoring Frequency (from Checklist):** | 2 tests during permit term | 3 tests during permit term |
| **Limit Required?** | No | No |
| **TRE Recommended? (from Checklist)** | No | No |

- After consideration of the guidance provided in the Department's WET Program Guidance Document (2022) and other information described above two acute and three chronic WET tests are recommended in the reissued permit. Tests should be done in rotating quarters to collect seasonal information about this discharge. WET testing should continue after the permit expiration date (until the permit is reissued).

Attachment #2

## Temperature limits for receiving waters without unidirectional flow

(calculation using default ambient temperature data)

**Facility:** Kerry Ingredients

**Outfall(s):** 006

**Date Prepared:** 01/18/2024

**Design Flow (Qe):** 0.12 MGD

**Lake Type:** Northern Inland Lakes

**Discharge Type:** Inland lake or impoundment shore discharge

**Maximum area of mixing zone allowed (coefficient "A"):** 15,708 $ft^2$

| Month | Water Quality Criteria | | | Representative Highest Effluent Flow Rate (Qe) | | B | $e^{-a}$ (for SL-WQBEL) | $e^{-a}$ (for A-WQBEL) | Representative Highest Monthly Effluent Temperature | | **Calculated Effluent Limit** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ta (default) | Sub-Lethal WQC | Acute WQC | 7-day Rolling Average (Qesl) | Daily Maximum Flow Rate (Qea) | | | | Weekly Average | Daily Maximum | **Weekly Average Effluent Limitation** | **Daily Maximum Effluent Limitation** |
| | (°F) | (°F) | (°F) | (MGD) | (MGD) | | | | (°F) | (°F) | (°F) | (°F) |
| JAN | 35 | 49 | 76 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | NA | 120 |
| FEB | 34 | 52 | 76 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | NA | 120 |
| MAR | 35 | 55 | 76 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | NA | 120 |
| APR | 41 | 60 | 78 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | NA | 120 |
| MAY | 55 | 67 | 81 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | NA | 120 |
| JUN | 67 | 75 | 85 | 0.12 | 0.12 | 0.555 | 0.115 | 0.115 | | | NA | 120 |
| JUL | 72 | 79 | 86 | 0.12 | 0.12 | 0.667 | 0.088 | 0.088 | | | NA | 120 |
| AUG | 71 | 79 | 86 | 0.12 | 0.12 | 0.667 | 0.088 | 0.088 | | | NA | 120 |
| SEP | 63 | 72 | 84 | 0.12 | 0.12 | 0.555 | 0.115 | 0.115 | | | NA | 120 |
| OCT | 52 | 61 | 80 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | 107 | 120 |
| NOV | 43 | 50 | 78 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | 86 | 120 |
| DEC | 35 | 49 | 76 | 0.12 | 0.12 | 0.405 | 0.163 | 0.163 | | | NA | 120 |

Attachment #3