EPA's Review of the Wisconsin Department of Natural Resources Request
For Approval of a Variance from Water Quality Standards
Village of Turtle Lake, Wisconsin
WPDES Permit No. WI-0025631-10-0
Under Section 303(c) of the Clean Water Act
WQSTS # WI2015-635

Date: JUN 15 2015

I. Summary

A. **Date Received by EPA:** May 12, 2015

B. **Submittal History:** On May 11, 2015, Wisconsin Department of Natural Resources (WDNR) signed a request to the U.S. Environmental Protection Agency for approval of a water quality standard variance for chloride discharge by the Turtle Lake Wastewater Treatment Facility (Turtle Lake WWTF), WPDES Permit No. WI-0025631-10, located in Barron County, Wisconsin.

C. **Documents in the official submittal from WDNR to EPA included:**

- Transmittal letter from WDNR to U.S. EPA, 5/11/2015, with background information, 2 pp.
- WDNR Certification Statement of Approval of a Variance to Water Quality Standards, Village of Turtle Lake, WI-0025631-10-1, 5/11/2015.
- Facility Specific Standard Variance Data Sheet for Village of Turtle Lake, 10/6/2014,
- 6 pp.
- Substantial Compliance Determination, Village of Turtle Lake. Signed by Michelle Balk, 9/9/2013.
- Municipal Preliminary Screener Calculation for use of RO in Wisconsin, for Turtle Lake WWTF, prepared by Keith W. Pierce, 2/23/2015, 6 pp.
- Draft (Modified) WPDES Permit No. WI-0025631-10-0, Village of Turtle Lake, with proposed effective dates from 7/1/2015 to 6/30/2019, 28 pp.
- Permit Fact Sheet (WI-0025631-10) 2/18/2015, 10 pp.
- Memo to Sheri Snowbank (NOR) from Dan Peerenboom (NOR), with Effluent Limit Recommendations for the Village of Turtle Lake, 2/19/2014, 7 pp.
- Public Notice of Intent to Reissue a Wisconsin Pollutant Discharge Elimination System (WPDES) Permit No. WI-0025631-10, to Incorporate a Variance to a Water Quality Standard used to Establish Effluent Limitations, 3/5/2015, 2 pp., plus streamlined version for newspaper.
- Chloride Variance Application for Village of Turtle Lake, 2/24/2015 (initial 8/14/14), 2 pp., with 2 pp. attachment.
- Turtle Lake Chloride Variance Data (excel spreadsheet) of Cl concentrations (mg/L) collected from 3/15/2007-1/29/2015.

- Village of Turtle Lake WWTF Diagram, undated.
- Surface Water Dave Viewer Map, view of Turtle Lake outfall.

D. Documents submitted by WDNR to EPA upon request

- No other documents were necessary for EPA evaluation.

E. Description of Action:

WDNR proposes to grant the Turtle Lake WWTF a variance from Wisconsin's chronic water quality criterion for chloride to protect aquatic life. In the absence of this variance, Wisconsin Adm. Code. NR 105 specifies the most stringent, chronic chloride criterion is 395 mg/L. WDNR calculated the Water Quality Based Effluent Limit (WQBEL) to be 400 mg/L, as a weekly average. The point of discharge is into a wetland which flows into an unnamed stream, and then into Moon Creek, within the Hay River Watershed in the Lower Chippewa Drainage Basin in Barron County, Wisconsin. The use designation of the wetland is limited aquatic life (LAL), and the use designation of the connected waters of both Moon Creek and the unnamed creek are Fish and Aquatic Life. The proposed variance specifies interim permit limits of 920 mg/L, as a weekly average, and an effective target chloride limit of 830 mg/L (10% reduction), also as a weekly average, at the end of the permit term (June 30, 2019).

F. Basis of Action:

NR 106.05(4) specifies that a limit for a toxicant applies if the 4-day 99th percentile (P99) of the available effluent data is greater than the chronic toxicity criterion (CTC) based limit. Wisconsin Administrative Code § NR 106.82(9) specifies that a weekly average interim limit may equal (a) the upper 99th percentile of the permittee's 4-day average of the representative data to the department, or (b) a value no greater than 105% of the permittee's calculated highest weekly average of the representative effluent data. The variance of 920 mg/L requested for the Turtle Lake WWTF is essentially equal to 105% of the highest representative sample collected, in accordance with NR 106.82(9)(b).

Wisconsin Adm. Code Ch. NR 106.91 specifies that if a POTW accepts wastewater from a public water supply system which treats water to meet a primary maximum contaminant level specified in Wisconsin's Safe Drinking Water Chapter NR 809, that no calculated limit, interim limit, target value, or source reduction requirement shall interfere with the attainment of the primary maximum contaminant level. The source reduction measures proposed below will not conflict with the treatment of the water supply. The agreed upon, interim chloride effluent limitation is 920 mg/L, as a weekly average, and the target value is 830 mg/L, effective upon permit expiration.

As a condition of this variance, WDNR has specified that Turtle Lake WWTF shall (a) maintain effluent quality at or below the interim effluent limit, (b) identify sources of chloride in effluent from the wastewaster treatment facility; and 3) implement the Tier I and Tier II chloride source reduction measures (SRMs) outlined in the Permit (Section 2.2.1.8), as listed below:

Tier I SRMs will be implemented and include:

Industrial Sources:

1. Require commercial contributors to identify sources of chloride in their effluent to the WWTF.

2. Educate plant personnel on the need to minimize salt and softened water demands and promote better housekeeping practices that will reduce chloride and softened water consumption.

Street Maintenance:

1. Investigate streets and other areas that require high salt use in winter whereby salt is entering the collection system; conduct appropriate maintenance.

2. Complete an inventory of all manhole covers, and upgrade as needed to reduce salt runoff.

Residential Sources:

1. Identify sources of chloride in influent to the wastewater treatment facility.

2. Complete a survey of all residents to document water softener usage such as type (time or flow-based), the amount of salt used, and other pertinent information. Develop a list of action items (with a timeline) for potential corrective actions.

3. Develop a series of informational and educational materials for homeowners on the impact of chloride from residential softeners. Discuss available options for increasing softener efficiency and request voluntary compliance.

Tier II Source Reduction Measures (SRMs) also will be implemented and include:

Requiring significant commercial contributors to evaluate their water treatment systems with regard to softened water requirements, with the results of the evaluation forming the basis for potential restrictions of chloride inputs.

Turtle Lake WWTF will work with Lake Country Dairy, specifically, to:

1. Improve the handling of salt brines and the handling of cheese into and out of brine systems, and have them consider capital improvements, such as automating the brine system and installing design-specific drip pans and splash guards.

2. Optimize softener operations to ensure the appropriate regeneration interval and salt dosages are used.

3. Evaluate the feasibility of switching to a demand-initiated regeneration (DIR) controller, if regeneration currently is manual or timer-initiated.

4. Evaluate the feasibility of reclaiming brine from any water softeners used in operations.

5. Determine which subprocesses can tolerate unsoftened water and make appropriate changes to reduce softened water use.

6. Determine whether once-through cooling systems can be closed-loop, and change accordingly if possible.

7. For plants that condense whey (i.e., World Foods Processing and Lake Country Dairy), Turtle Lake WWTF will work with them to evaluate the feasibility of using the whey condensate water for the first rinse for clean-in-place systems and for boiler makeup water.

EPA has also directed WDNR staff to encourage Turtle Lake WWTF to discuss applicable discharges as they relate to chloride with Sanmina, a manufacturer of metallic and plastic parts (plastics & aluminum die casting), and with the St. Croix Casino and Lodge, a large entertainment facility which may soften its water for its guests. Both facilities are within village boundaries.

WDNR evaluated the costs for the Turtle Lake WWTF to install and maintain a reverse osmosis (RO) system to remove chloride from the plant effluent. The Village of Turtle Lake states that it services 475 households. The median household income (MHI) of Turtle Lake residents is $40,952. Documentation submitted shows the estimated annualized cost of installation of a new RO system is $628,140 and operations and maintenance is $208,050. Compulsory installation could impose a nearly six-fold increase in costs to each customer annually. Current household costs for wastewater treatment average $300 annually; installation of an RO system would increase average customer costs to $1760. The combined total cost of a new treatment system to address chlorides could impose an added burden to each household equivalent to 4.3% percent of each resident's MHI. EPA Economic Analysis screening tools indicate an impact on a town's MHI over 2% may pose substantial and widespread social and economic impacts to the community. Thus, compelling the Turtle Lake WWTF to acquire and maintain an RO system to meet the chronic chloride standard for Wisconsin exceeds this cap of 2%, thus meeting the standard for relief from the water quality standard.

The permittee is required to perform acute and chronic whole effluent toxicity (WET) tests on samples taken from the Moon River, four times during the course of the permit, at intervals 6-9 months apart, using a 9% instream waste concentration. WET testing will continue according to the same schedule until the permit is reissued. Permittee is required to report results in their Discharge Monitoring Reports (DMRs). If any of the chronic WET tests result in an exceedance of the chronic WET limit of 1.0 TUC (pursuant to NR 106.08 Wis. Adm. Code.), the permittee is required repeat the test twice within 90 days. The permittee shall submit the results of the two retests on the same species used in the initial test to the State Biomonitoring Coordinator (Permit Section 2.2.1.7).

The permittee also must submit an annual progress report that specifies which chloride source reduction measures have been implemented, an analysis of trends, and total annual effluent chloride concentrations and mass chloride discharge, based on sampling and flow data. After the first progress report is submitted, the permittee may submit a written request to the department to waive further annual progress reports. If WDNR decides to accommodate the request based on progress of SRMs, the department shall notify the permittee in writing and the subsequent annual reports will be waived.

The final chloride report cannot be waived and shall be due no later than June 30, 2019. It shall document the permittee's success in meeting the 830 mg/L target value, as well as anticipated future reductions in chloride sources and effluent concentrations. If the permittee fails to meet the target chloride value of 830 mg/L, and must seek to renew this chloride variance, they shall include a proposed target value and source reduction measures in the final report for the WDNR to consider, per s. NR 106.83, Wis. Adm. Code.

II. Area Affected and Environmental Impacts

A. Area Affected:

The area affected includes an open water wetland flowing to an unnamed stream which then flows into Moon Creek, within the Hay River Watershed in the Lower Chippewa Drainage Basin in Barron County, Wisconsin. The designated use of the wetland is limited aquatic life. Moon Creek and the unnamed stream are also limited aquatic life, however, there is a short segment just downstream of the wetland that is designated limited forage fish. Turtle Creek, into which Moon Creek flows is designated fish and aquatic life.

B. Environmental Impacts:

According to Wis. Adm. Code s. NR 105.04(2), a substance shall be deemed to have adverse effects on fish or other aquatic life if it exceeds either the acute toxicity criterion (1514 mg/L for chloride), as specified in s. NR 105.05, or the chronic toxicity criterion, (395 mg/L) as specified in s. NR 105.06, more than once every 3 years. The low flow estimate WDNR used in their WQBEL calculations for Turtle Lake WWTF is 0 cfs. The estimated instream concentration at the outfall is equal to the proposed interim limit of 920 mg/L and the target limit of 830 mg/L for chloride.

The continuous 7Q10 for Moon Creek is zero. The tributary enters Moon Creek about 2.5 miles from the WWTF outfall, just short of where Moon Creek flows into Turtle Creek. The 7Q10 of Turtle Creek at Highway 8, which traverses the Creek between the Upper and Lower Turtle Lakes, is 0.48 cfs. Approximately four miles downstream, the 7Q10 of Turtle Creek (at Highway D) is estimated to be 5.2 cfs. Based on aerial photos, there is a high probability that Turtle Creek stream flow increases as it departs Lower Turtle Lake but an accurate, measured flow has not been taken. There is a tributary that comes from Mud Lake, just east of the Village of Turtle Lake, which appears to merge with Turtle Creek downstream, prior to reaching Moon

Creek, thus additional flow may be expected at the point where Turtle Creek meets Moon Creek. WDNR has calculated that the 400 mg/L criterion (WQBEL) would likely be achieved less than one mile downstream of the point at which Moon Creek and Turtle Creek merge.

- **Aquatic Life**

The chronic water quality criterion for chloride in Wisconsin is designated to protect 95% of aquatic life, the equivalent of protecting one in 20 genera. Thirteen recognized genera with calculated toxicity limits for chloride are listed in the Great Lakes Mississippi River database for this area. The requested variance would relieve the Turtle Lake WWTF from complying with the WQBEL of 400 mg/L needed to attain Wisconsin's chronic chloride criterion for the protection of 100% of aquatic life. Consequently, some aquatic organisms sensitive to chloride will be adversely affected within and downstream of the area of discharge. The discharge does flow through an extensive wetland prior to reaching Moon Creek.

WDNR estimated the proposed interim chloride limit of 920 mg/L and the final target value of 830 mg/L are equal to the expected instream chloride concentrations since there is no dilution at the 7Q10 low flow (0 cfs) conditions. Toxicity data exists for 13 genera of aquatic organisms in the Great Lakes and Upper Mississippi River basin database of freshwater aquatic organisms. Using this information, it is probable that at least some *Ceriodaphnia* (417 mg/L), *Daphnia* (639 mg/L), *Physa* (663 mg/L), and *Lirceus* (770 mg/L) will be impacted by the interim variance limit of 920 mg/L in the receiving water. The remaining 9 of 13 genera (69%) with known toxicity data will be protected downstream by the interim and target limits for the Turtle Lake discharge. EPA's aquatic life criteria are based on an estimated level of protection of 95% of genera. Upon implementation of the target chloride variance at the end of the permit term, *Ceriodaphnia, Daphnia, Physa* and *Lirceus* may still suffer adverse impacts, thus EPA has stressed the importance of the Turtle Lake WWTF acting to reduce chloride levels as much and as quickly as possible, and has recommended actions to be taken by the industrial users of the WWTF.

WDNR determined that the chronic water quality criteria for chloride would be met downstream of where Turtle Creek and Moon Creek merge. Because the actual low flow of Moon Creek as it leaves Moon Lake is unknown, and the actual flow of Turtle Creek at the point at which it meets Moon Creek, it is difficult to estimate the exact location at which the criteria will be met. By granting an interim, weekly average chloride variance of 920 mg/L, four genera will likely be adversely affected by the variance in immediate region of the outfall and in Moon Creek. According to the University of California-Davis, "*Ceriodaphnia dubia*, a tiny aquatic invertebrate, is used as an indicator organism to measure toxicity in water. *C. dubia* is considered to be a representative of important creek organisms at the bottom of the food web. Toxicity to this species is believed to indicate poor water quality." The target chloride variance of 830 mg/L will continue to be above the chronic criteria to protect *Ceriodaphnia, Daphnia, Physa* and *Lirceus*. Organisms such as cladocerans and insects represent key links in the food chain of native fish species; thus, indirect impairment of the ecological balance of fish and other aquatic life inhabiting the receiving waters may occur until the chronic chloride criterion is met.

- **Human Health & Wildlife**

According to Wis. Adm. Code s. NR 105.04(2), a substance shall be deemed to have adverse effects on public health and welfare if it exceeds any of the following: (a) the human threshold criterion as specified in s. NR 105.08; or (b) the human cancer criterion as specified in s. NR 105.09. Wisconsin has not determined a need for a chloride water quality criterion to protect public health. The receiving water is not used as a public water supply. Drinking water in the area is supplied by the local groundwater. The variance will have no effect on human health.

Wildlife or fish dependent upon the four genera discussed in the previous section may be affected by this chloride variance for the Turtle Lake WWTF, due to the probable toxicity of chloride levels to *Ceriodaphnia, Daphnia, Physa* and *Lirceus* in the receiving wetlands and Moon Creek. WDNR is requiring annual WET testing by the Turtle Creek WWTF. Once Moon Creek merges with Turtle Creek, the chloride criteria will be met with dilution just downstream in the receiving waters of Turtle Creek.

- **Endangered Species**

The action area for the Village of Turtle Lake's chloride variance is from the point of discharge from the WWTF to the effluent stream flowing from the wetlands and unnamed stream into Moon Creek. The stream flows for approximately 5 miles before chloride levels become dilute enough to meet the chloride WQS to protect aquatic life. On March 30, 2015, EPA reviewed the USFWS Midwest Region Section 7 Consultation Technical Assistance website. The two species listed by USFWS in Barron County, WI, include:

- Gray wolf (*Canis lupus*) -endangered
- Northern long-eared bat (*Myotis septentrionalis*) – proposed as endangered

These two terrestrial species are not expected to be found within the action area. EPA has determined that this variance will have no effect. The Gray wolf (*Canis* lupus) and the Northern long-eared bat (*Myotis septentrionalis*), proposed for listing as endangered by USFWS on October 2, 2013, are not aquatic nor aquatic-dependent species. Since the federally listed species that occur in Barron County, Wisconsin are not located within the action area for the Turtle Lake discharge, EPA concludes that its approval of the chloride variance will have no effect on the federally listed species in Barron County.

III. Clean Water Act (CWA) Section 303(c)/40 CFR 131 Review

A. EPA's authority under CWA section 303(c)(2):

Water quality standard requirements of CWA 101(a)(2) and 303(c)(2) are implemented via federal regulations contained in 40 CFR 131. Federal regulations at 40 CFR 131.21 require EPA to review and approve or disapprove state-adopted water quality standards. In making this determination, EPA must consider the requirements of 40 CFR 131.5 as follows:

1. Whether the State-designated uses are consistent with the CWA requirements;
2. Whether the State has adopted criteria protective of designated uses;
3. Whether the State has followed legal procedures for standards revisions;
4. Whether State standards are based on appropriate technical and scientific data and analyses; and
5. Whether the State's submission includes certain basic elements as specified in 40 CFR 131.6 (see below).

Section 101(a)(2) of the CWA specifies that designated uses "provide for the protection and propagation of fish, shellfish, and wildlife and provide for recreation in and on the water." Section 303(c)(2) of the CWA requires that standards shall protect the public health and shall take into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational, agricultural, industrial, and navigational purposes.

EPA is required to review and approve new and revised water quality standards submitted by States and Tribes. Possible EPA actions include:

- **Approval** (where EPA concludes that approval of certain revisions will have no effect on listed species, or is otherwise not subject to ESA consultation),
- **Approval subject to ESA consultation** (where EPA concludes that certain revisions may affect listed species (including beneficial effects)),
- **Disapproval** (where EPA concludes that certain revisions do not meet the requirements of the CWA or federal regulations and guidance), and
- **No EPA action** (where EPA concludes that certain revisions are not revisions to the State's or Tribe's WQS and therefore do not need to be reviewed under Section 303(c) of the CWA.

Consistent with Federal regulations at 40 CFR 131.21, new or revised water quality standards do not become effective for CWA purposes until they are approved by EPA.

B. Public participation, comments and issues regarding WDNR's draft variance determination:

WDNR issued a public notice for the Turtle Lake WWTF WPDES permit on March 5, 2015. The EPA Water Quality Standards Branch provided extensive comments regarding necessary actions for the WWTF to take with local industries (Lake Country Dairy, World Foods Processing, St. Croix Casino, and Sanmina Inc.). WDNR included Tier II requirements in their proposed final permit.

C. EPA's review of the WDNR's final chloride variance determination

1. **Review of package completeness**

Regulatory Requirement:	**Wisconsin Rule Submittal:**
Use designations consistent with the provisions of section 101(a) (2) and 303(c) (2) of the Clean Water Act **(40 CFR 131.6 (a))**	The wetland, unnamed creek and Moon Creek are classified as limited aquatic life. Further downstream (3 miles), flow increases and classification changes to limited forage fish. Turtle Creek, into which Moon Creek flows (and where chloride levels come into compliance) is designated fish and aquatic life. Wisconsin's variance does not change the designated uses as they currently exist.
Methods used and analyses conducted to support WQS revisions **(40 CFR 131.6 (b))**	Documents submitted by WDNR in support of this variance include all items listed above under sections I.C. of this document.
Water quality criteria sufficient to protect the designated uses of Wisconsin surface waters, which include *Limited Aquatic Life* **(40 CFR 131.6 (c))**	Under the conditions of the variance, the applicable interim water quality criterion for chloride is limited to 920 mg/L as a weekly average. The interim chloride effluent level will result in four genera not being fully protected under this variance. Their chronic toxicity limits are: *Ceriodaphnia*, 417 mg/L; *Daphnia*, 639 mg/L, *Physa*, 663 mg/L, and *Lirceus*, 770 mg/L. The required target chloride effluent level of 830 mg/L also is above the chronic criteria to protect these four genera. Wisconsin's chronic criterion to protect aquatic life is 395 mg/L and the Water Quality Based Effluent Limit is 400 mg/L, respectively. This is the reason for the variance. Tier I and Tier II reduction measures are required, as are chronic WET tests, to be done in conjunction with chloride sampling.
An anti-degradation policy consistent with §131.12 **(40 CFR 131.6 (d))**	WDNR has included chloride source reduction measures in the permit for the Village of Turtle Lake. These include identifying a number of Tier I and Tier II chloride reduction measures which the WWTF is initiating, with the participation of local industries and residents, as outlined in Section I.F. of this document. The measures to be taken by the Village of Turtle Lake and its' users are designed to achieve the highest statutory and regulatory requirements under the conditions of the variance.
Certification by the State Attorney General or other appropriate legal authority within the State that the WQS were duly adopted pursuant to State law. **(40 CFR 131.6(e))**	WDNR's Office of General Counsel certified the variance in a letter to Tinka Hyde, R5 WD Director. The letter, dated May 11, 2015, was signed for Mr. Andryk (Chief Counsel) by Robin Nyffeler.
General information that will aid the Agency in determining the adequacy of the scientific basis of the standards which do not include uses specified in CWA section 101(a)(2) as well as information on general policies applicable to State standards **(40 CFR 131.6(f))**	Wisconsin provided information and analyses, as listed in sections I.C. above to support this variance.

2. EPA action on the final variance determination submitted by WDNR:

The information provided by WDNR meets the substantive requirements for a water quality standard submittal according to 40 CFR 131.6. The information provided by WDNR also demonstrates that the Wisconsin chronic chloride criterion for protection of some aquatic life in the discharge waters, encompassing wetlands, an unnamed creek and Moon Creek, is not attainable in the immediate future, as demonstrated by the applicant, consistent with 40 CFR 131.10(g). The genera, *Ceriodaphnia*, *Daphnia*, *Physa*, and *Lirceus* that reside in the discharge waters of the wetland, unnamed creek, and Moon Creek will be exposed to higher levels of chloride during the period of the variance, and while WDNR implements chloride the target value of 830 mg/L at the end of the permit cycle, unless the limit of 395 mg/L is met. EPA determines, however, that without this variance, substantial and widespread social and economic impacts may occur to the Turtle Lake residents if the Turtle Lake WWTF were required to comply with the water quality standard at this time. As the Village of Turtle Lake implements their chloride reduction plan, the levels of chloride are expected to decrease in the wetland discharges moving to the unnamed creek and Moon Creek of the Hay River Watershed of the Lower Chippewa Drainage Basin.

WDNR's final chloride variance determination is consistent with the CWA and federal regulations and guidance. EPA approves WDNR's final chloride variance determination for the Village of Turtle Lake (WPDES Permit #WI-0025631-10) in Wisconsin.

IV. Endangered Species Act (ESA) Section 7 Evaluation

Consistent with section 303(c) of the CWA and federal regulations at 40 CFR 131.21, EPA is required to review and approve state water quality standards. EPA has reviewed the information submitted in support of the proposed chloride variance and hereby approves the proposed variance pursuant to section 303(c) of the CWA and federal regulations at 40 CFR 131.21.

As required under section 7 of the Endangered Species Act and federal regulations at 50 CFR Part 402, EPA evaluated whether approval of this chloride variance would affect federally-listed threatened or endangered species or designated critical habitat. As described in the record, EPA determined that the action will have no effect on listed species and will not destroy or adversely modify designated critical habitat.

V. Tribal Consultation Requirements

On May 4, 2011, EPA issued the "EPA Policy on Consultation and Coordination with Indian Tribes" to address Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments." The EPA Tribal Consultation Policy states that "EPA's policy is to consult on a government-to-government basis with federally recognized tribes when EPA actions and decisions may affect tribal interests."

On March 4, 2015 EPA verified that there are no federally recognized tribal lands identified in the vicinity of, or downriver from, the Turtle Lake WWTF discharge. EPA concludes that tribal consultation for this chloride variance is not required.

VI. Documents Considered by EPA

U.S. Fish and Wildlife Service web reference: http://www.fws.gov/midwest/endangered/lists/wisc-cty.html County Distribution of Wisconsin's Federally Threatened, Endangered, Proposed, and Candidate Species. Examined for species in Barron County, WI on March 30, 2015

Draft Tribal Consultation Map for the Village of Turtle Lake, WI – March 4, 2015