

Facility Specific Chloride Variance Data Sheet

Directions: Please complete this form electronically. Record information in the space provided. Select checkboxes by double clicking on them. Do not delete or alter any fields. For citations, include page number and section if applicable. Please ensure that all data requested are included and as complete as possible. Attach additional sheets if needed.

Section I: General Information

A. Name of Permittee: Village of Deerfield
 B. Facility Name: Deerfield Wastewater Treatment Facility
 C. Submitted by: Wisconsin Department of Natural Resources
 D. State: Wisconsin Substance: Chloride Date completed: May 20, 2020
 E. Permit #: 0023744-09 WQSTS #: (EPA USE ONLY)
 F. Duration of Variance Start Date: November 1, 2020 End Date: September 30, 2025
 G. Date of Variance Application: 03/07/2018
 H. Is this permit a: First time submittal for variance
 Renewal of a previous submittal for variance (Complete Section IX)

I. Description of proposed variance: This is a proposed variance from the chronic toxicity criteria (CTC) for chloride of 395 mg/L with a calculated weekly average limit of 400 mg/L. The proposed variance limit is 460 mg/L as a weekly average that would be granted under the condition that Deerfield follow a schedule to implement its updated chloride source reduction measures plan.

J. List of all who assisted in the compilation of data for this form

Name	Email	Phone	Contribution
Sean Spencer	Sean.Spencer@wisconsin.gov	608-275-7775	
Amy Garbe	Amy.Garbe@wisconsin.gov	262-574-2135	
Sarah Luck	Sarah.Luck@wisconsin.gov	608-275-3230	Parts II D-H and J
Diane Figiel	Diane.Figiel@wisconsin.gov	608-264-6274	Environmental Analysis portions of datasheet

Section II: Criteria and Variance Information

A. Water Quality Standard from which variance is sought: Chloride CTC of 395 mg/L
 B. List other criteria likely to be affected by variance: None
 C. Source of Substance: Residential with infiltration and inflow of road salt during the winter road maintenance season likely responsible for significant spikes in chloride effluent concentrations in the winter months.
 D. Ambient Substance Concentration: Not applicable because the receiving water flow is 0 cfs. Measured Estimated
 Default Unknown
 E. If measured or estimated, what was the basis? Include citation.
 F. Average effluent discharge rate: 0.393 MGD (design) Maximum effluent discharge rate: 0.711 MGD
 G. Effluent Substance Concentration: 1-day P99 = 584 mg/L Measured Estimated
 4-day P99 = 456 mg/L Default Unknown
 Mean = 350 mg/L
 H. If measured or estimated, what was the basis? Include Citation. January 2014 - April 2020 effluent data.
 I. Type of HAC: Type 1: HAC reflects waterbody/receiving water conditions
 Type 2: HAC reflects achievable effluent conditions
 Type 3: HAC reflects current effluent conditions

J. Statement of HAC: The Department has determined the highest attainable condition of the receiving water is achieved through the application of the variance limit in the permit, combined with a permit requirement that the permittee implement its Chloride SRM plan. Thus, the HAC at commencement of this variance is 460 mg/L, which reflects the greatest chloride reduction achievable with the current treatment processes, in conjunction

Tributary to Mud Creek – Limited Aquatic Life Mud Creek – Limited Forage Fish Koshkonong Creek – Fish and Aquatic Life			
H. Identify all other variance permittees for the same substance which discharge to the same stream, river, or waterbody in a location where the effects of the combined variances would have an additive effect on the waterbody:			
Permit Number	Facility Name	Facility Location	Variance Limit [mg/L]
N/A	N/A	N/A	N/A
I. Please attach a map, photographs, or a simple schematic showing the location of the discharge point as well as all variances for the substance currently draining to this waterbody on a separate sheet			
J. Is the receiving waterbody on the CWA 303(d) list? If yes, please list <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown the impairments below.			
K. Please list any contributors to the POTW in the following categories: <i>May need to contact facility for this information</i>			
Food processors (cheese, vegetables, meat, pickles, soy sauce, etc.)	None		
Metal Plating/Metal Finishing	None		
Car Washes	None		
Municipal Maintenance Sheds (salt storage, truck washing, etc.)	Village of Deerfield Salt Storage		
Laundromats	None		
Other presumed commercial or industrial chloride contributors to the POTW	None		
L. If the POTW does not have a DNR-approved pretreatment program, is a sewer use ordinance enacted to address the chloride contributions from the industrial and commercial users? If so, please describe. There is no sewer use ordinance enacted to address chloride contributions from industrial or commercial users.			
Section IV: Pretreatment (complete this section only for POTWs with DNR-Approved Pretreatment Programs. See w:\Variances\Templates and Guidance\Pretreatment Programs.docx)			
A. Are there any industrial users contributing chloride to the POTW? If so, please list. Other than potential discharge from the Village of Deerfield salt storage, no industrial users have been identified by the Village.			
B. Are all industrial users in compliance with local pretreatment limits for chloride? If not, please include a list of industrial users that are not complying with local limits and include any relevant correspondence between the POTW and the industry (NOVs, industrial SRM updates and timeframe, etc) N/A - The Village of Deerfield has a design flow of <5 MGD so is not required to have a pretreatment program.			
C. When were local pretreatment limits for chloride last calculated? N/A			
D. Please provide information on specific SRM activities that will be implemented during the permit term to reduce the industry's discharge of the variance pollutant to the POTW N/A – no potential industrial sources have been identified at this time			

Section V: Public Notice		
A. Has a public notice been given for this proposed variance?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
B. If yes, was a public hearing held as well?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
C. What type of notice was given? <input type="checkbox"/> Notice of variance included in notice for permit <input type="checkbox"/> Separate notice of variance		
D. Date of public notice: _____ Date of hearing: _____		
E. Were comments received from the public in regard to this notice or hearing? (If yes, see notice of final determination)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Section VI: Human Health		
A. Is the receiving water designated as a Public Water Supply?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
B. Applicable criteria affected by variance: N/A		
C. Identify any expected impacts that the variance may have upon human health, and include any citations: None		
Section VII: Aquatic Life and Environmental Impact		
A. Aquatic life use designation of receiving water: Limited Forage Fish		
B. Applicable criteria affected by variance: Chronic toxicity criteria for chloride = 395 mg/L from NR 105, applicable in all waters in Wisconsin.		
C. Identify any environmental impacts to aquatic life expected to occur with this variance, and include any citations: Estimated instream concentration after mixing is 460 mg/L (equal to the proposed variance limit) as there is zero background flow in the Mud Creek tributary. This concentration exceeds the genus mean chronic value for <i>Ceriodaphnia</i> (417 mg/L). No genus mean chronic values are exceeded by the 395 mg/L criterion.		
D. List any Endangered or Threatened species known or likely to occur within the affected area and include any citations: None that would affect the water quality criterion, as the chronic toxicity criterion for chloride is more stringent than all genus mean chronic values for organisms with chloride toxicity data. As a result, no endangered species with data would need more protection than already provided by the existing criterion.		
County	Species	Status
N/A	N/A	N/A
Citation: U.S. Fish & Wildlife Service – Environmental Conservation Online System (http://www.fws.gov/endangered/) and National Heritage Index (http://dnr.wi.gov/topic/nhi/)		
Section VIII: Economic Impact and Feasibility		
A. Describe the permittee's current pollutant control technology in the treatment process: The Village operates a wastewater treatment facility (WWTF) consisting of activated sludge and final clarification. The WWTF treats approximately 160,000 gpd with a design of 393,000 gpd. Treatment includes raw wastewater screening, biological phosphorus removal units, two aeration basins, activated sludge treatment, final clarifiers, and effluent post-aeration.		
B. What modifications would be necessary to comply with the current limits? Include any citations. Reverse osmosis (RO) would need to be constructed as a tertiary process. The concentrated chloride brine would need to be sent to another treatment plant for disposal. The additional cost of a RO process including capital cost and O&M cost was estimated to result in an average total sewer cost to household that would be 2.87% of the median household income. Additionally, lime softening could be installed at the drinking water source which would remove the need for individual household water softeners; however, the estimated cost would result in an average total sewer cost to household that would be 6.43% of the median household income.		
C. How long would it take to implement these changes? Time frame was not determined by the Department.		
D. Estimate the capital cost (Citation): \$442,125 (Variance Application and adjusted for design flow of the facility instead of actual flow)		
E. Estimate additional O & M cost (Citation): \$143,443 (Variance Application and adjusted for design flow of the facility instead of actual flow)		
F. Estimate the impact of treatment on the effluent substance concentration, and include any citations:		

<p>An interim limit of 460 mg/L with a target value of 420 mg/L, results in a ~10% reduction in chloride discharged. To the final water quality effluent-based limit of 400 mg/L, there would be a total 13% reduction in chloride discharged.</p>
<p>G. Identify any expected environmental impacts that would result from further treatment, and include any citations:</p> <p>End-of-pipe RO wastewater treatment technology for chloride produces concentrated brine that can be as much or more of an environmental liability than the untreated effluent. Since the concentrated brine cannot be further treated, the only recourse for the disposal of the brine is transfer to another community, which is often not feasible. Appropriate chloride source reduction activities are preferable environmentally to effluent end-of-pipe treatment in most cases, since the end product of treatment (production of a concentrated brine) does not remove the load of chloride from the environment.</p> <p>There would be some impacts based on disposal of brine from RO. These include air pollution impacts from trucking brine and increased chloride impacts at the point where brine is discharged.</p>
<p>H. Is it technically and economically feasible for this permittee to modify the treatment process to reduce the level of the substance in the discharge? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p> <p>While it is technically feasible to install a reverse osmosis system to remove chloride from the plants effluent, it is not economically feasible for this permittee to modify the treatment process to reduce the level of chloride in the discharge. The per household cost of installing and operating RO at the Deerfield WWTF is estimated at \$1,509 per household per year. The current cost of existing wastewater treatment is \$591 per household per year. Therefore, the total cost to the consumer to meet the chloride effluent limit along with all other permit limitations would rise to \$2,100 per household per year, or 2.87% of median household income of \$73,281.</p>
<p>I. If treatment is possible, is it possible to comply with the limits on the substance? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown</p>
<p>J. If yes, what prevents this from being done? Include any citations.</p> <p>N/A</p>
<p>K. List any alternatives to current practices that have been considered, and why they have been rejected as a course of action, including any citations:</p> <p>Reverse osmosis at the facility and centralized lime softening of drinking water. Both alternatives to current practices have been rejected as they are economically infeasible.</p>
<p>Section IX: Compliance with Water Quality Standards</p>
<p>A. Describe all activities that have been, and are being, conducted to reduce the discharge of the substance into the receiving stream. This may include existing treatments and controls, consumer education, promising centralized or remote treatment technologies, planned research, etc. Include any citations.</p> <p>Summarizing annual reports and the information presented in the SRM plan, the Village has implemented the following actions:</p> <ol style="list-style-type: none"> 1. Discussed offering the residents a rebate for softener tune-ups. 2. Ongoing maintenance of manholes to inventory and replace manholes with open pick holes. 3. Investigated possible sources of chlorides in public buildings including schools and the library.
<p>B. Describe all actions that the permit requires the permittee to complete during the variance period to ensure reasonable progress towards attainment of the water quality standard. Include any citations.</p> <p>The permit contains a variance to the water quality-based effluent limit (WQBEL) for chloride granted in accordance with s. NR 106.83(2), Wis. Adm. Code. As conditions of the variance the permittee shall (a) maintain effluent quality at or below the interim effluent limitation specified in the permit, (b) implement the chloride source reduction measures specified below, (c) follow the submitted Source Reduction Measures Plan dated October 2019, and (d) perform the actions listed in the schedule.</p> <ol style="list-style-type: none"> 1. Village public works employees to attend annual training seminars and educational programs to raise awareness on chlorides reductions. 2. Present an annual update to Village's public officials on the progress made in reducing chlorides and educate them on why further reductions are needed. 3. Mail water softener information brochure with sewer bill and post on the Village website. The information focuses on timer vs. on-demand systems and how to optimize each. 4. Conduct an open house at the sewer plant (tour and educational sessions).

5. Develop an incentive program for replacing outdated water softening equipment with new on-demand based systems.
6. Implement and track the participation in the incentive program on an annual basis to record the location and number of new on-demand systems installed.
7. Develop an ordinance to offer a rebate for water softener optimization, inspection, and/or replacement.
8. Implement and track new ordinances on an annual basis to record the location and outcome of actions (optimization or replacement).
9. Survey residents of water softening equipment and practices.
10. Meet with all high-volume water users and document visits, inspect their softening equipment.
11. Continue the rehabilitation of sanitary manholes and record this information as part of the Village's CMOM program.
12. Perform inspections of water softeners at all public buildings and implement recommendations based on findings of inspections. This may be optimization to begin with and then a cost-effective systematical approach for replacement.

Section X: Compliance with Previous Permit

A. Date of previous submittal: 8/27/2013 Date of EPA Approval: 11/1/2013
 B. Previous Permit #: WI-0023744-08-0 Previous WQSTS #: _____ (EPA USE ONLY)
 C. Effluent substance concentration: 377 mg/L Variance Limit: 460 mg/L
 D. Target Value(s): 415 mg/L Achieved? Yes No Partial

E. For renewals, list previous steps that were to be completed. Show whether these steps have been completed in compliance with the terms of the previous variance permit. Attach additional sheets if necessary.

Condition of Previous Variance	Compliance
Submit annual progress reports.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Identify sources of chloride to the sewer system.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Educate homeowners on the impact of chloride from residential softeners; discuss options available for increasing softener salt efficiency and request voluntary reductions.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Recommend residential softener tune-ups on a voluntary basis.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Request voluntary support from local water softening businesses in accomplishing items above.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Educate licensed installers and self-installers of softeners on providing water that has not been softened on-site for outside residential faucets.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Request voluntary reductions in chloride input from industrial and commercial contributors.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No