

MINNESOTA POLLUTION CONTROL AGENCY
Water Quality Program
Water Quality Seasonal Variance Preliminary Determination
Proposed Subsequent Variance
Southern Minnesota Beet Sugar Cooperative
NPDES/SDS Permit MN0040665

I. ISSUE STATEMENT

Southern Minnesota Beet Sugar Cooperative, NPDES/SDS Permit Number MN0040665, has applied for a seasonal variance from the following Minnesota water quality standards:

500 mg/L Hardness, Ca+Mg as CaCO₃ – Minn. R. 7050.0223, Subp. 4

5 meq/L Bicarbonate – Minn. R. 7050.0224 Subp. 2

1000 µmhos/cm Specific Conductance – Minn. R. 7050.0224 Subp. 2

700 mg/L total dissolved salts – Minn. R. 7050.0224 Subp. 2

MPCA is given authority to issue variances by EPA (40 CFR 131.13). A variance is a temporary modification to the water quality-based effluent limit or water quality standard associated with a receiving water's beneficial use. Southern Minnesota Beet Sugar has applied for a seasonal variance on the basis of Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, and controls necessary to meet effluent limitations based on these standards would result in substantial and widespread economic and social impact. Upon preliminary review of the application, MPCA staff have determined that they have satisfied the conditions necessary to grant a variance and as a result supports the inclusion of the variance in the facility's NPDES/SDS.

II. BACKGROUND:

The U.S Environmental Protection Agency (EPA) uses 40 Code of Federal Regulations (CFR) 131.10(g) as the criteria for approving a variance. This is the same criteria used for a downgrade of a use classification. EPA finds this approach acceptable as it would lead to only a temporary change in a water quality standard rather than a permanent downgrade.

As the State agency delegated to implement the CWA, the Minnesota Pollution Control Agency(MPCA) has the authority to grant variances from water quality standards (see Minnesota Statutes 115.03, 115.44, 116.02 and 116.07) and governs the issuance of variances through Minnesota Rules (See Minn. Rs. 7050.0190, 7000.7000, 7052.0280, and 7053.0195).

III. INTRODUCTION

Southern Minnesota Beet Sugar Cooperative has applied for a seasonal variance from the standards named above designed to protect the Class 3C and 4A beneficial uses of industrial cooling/materials transport and agricultural irrigation, respectively. EPA authorizes States and Tribes to include variance provisions in their water quality standards. (40 CFR 131.13). In accordance with Minn. R. 7000.7000, permitted facilities are authorized to apply for a variance from standards. A variance is a short-term exemption from meeting certain otherwise applicable water quality standards.

In accordance with Minnesota Rules 7050.0190 and Federal Regulations 40 CFR 131.10(g), to qualify for a variance an applicant must satisfy at least one of the following:

- (1.) Naturally occurring pollutant concentrations prevent the attainment of the use; or

- (2.) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
- (3.) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
- (4.) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or
- (5.) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
- (6.) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

Southern Minnesota Beet Sugar Cooperative has applied for a variance on the basis of items 2 and 6 above.

IV. HISTORY

The proposed variance is a primarily a subsequent issuance of a variance that was first issued in 2004. The initial variance was sought on the basis that strict conformance with standard dissolved mineral effluent limits was not technically practical or economically feasible and that the seasonal variance would not result in environmental harm or adverse impacts to the existing uses of the receiving water resource. The MPCA supported and issued the variance in NPDES/SDS Permit MN0040665, effective since December 29, 2004. The permit expired November 30, 2009, and has been administratively continued pending review of Southern Minnesota Beet Sugar's application which was submitted in May of 2009, and amended in March of 2012. The variance has been under review in conjunction with the requested permit reissuance.

V. DISCUSSION or REASONS WHY THE VARIANCE APPEARS JUSTIFIED

Upon preliminary review of the variance, MPCA staff have determined that they have satisfied the conditions necessary to grant a variance and as a result does support the inclusion of the variance in the NPDES/SDS permit for the facility.

A. Demonstration on Why a Variance is Needed

The water quality standards at issue are summarized in the following table. Technology-based effluent limitations for these pollutants have not been promulgated for the sugar beet processing category of point sources, so effluent limitations for these parameters would only apply as needed to protect water quality.

The MPCA has calculated the maximum daily effluent limitations necessary to achieve the applicable water quality standards during the permitted annual discharge window from September-April based on the procedures described in EPA's "Technical Support Document for Water Quality-Based Toxics Control" dated 1999. The designated uses for receiving waters associated with these

standards are industrial consumption for the purposes of cooling and materials transport for the 3C classification, and agricultural irrigation for the 4A classification.

PARAMETER	USE CLASS	STANDARD	MAX EFFLUENT LIMITATION	PROJECTED EFFLUENT QUALITY
HARDNESS	3C	500 mg/L	761 mg/L	871 mg/L
BICARBONATE	4A	5 meq/L	305 mg/L	1420 mg/L
SPECIFIC CONDUCTANCE	4A	1000 µmhos/cm	1492 µmhos/cm	2435 µmhos/cm
TOTAL DISSOLVED SALTS	4A	700 mg/L	1101 mg/L	1970 mg/L
TOTAL SALINITY	4B	1000 mg/L	N/A – TDS Class 4A standard would be more restrictive	1970 mg/L

Southern Minnesota Beet Sugar's projected effluent quality using data obtained during the last permit cycle indicates that existing processes at the facility cannot reasonably meet the calculated effluent limitations. The cooperative requested subsequent issuance of this variance on the grounds that after extensive source control efforts, the current discharge concentrations represent the best attainable condition without the installation of additional treatment, and the costs of implementing additional treatment would cause widespread social and economic impacts. The MPCA agrees with this justification based on the projected costs installation and operation for the necessary treatment technology, and a review of the cooperative's recent financial information.

B. Description of Treatment Alternatives Considered

Under the previous variance, Southern Minnesota Beet Sugar Cooperative implemented an extensive dissolved mineral reduction program to minimize the concentrations of the pollutants for which the variance was necessary, and to make progress toward meeting the water quality standards for those pollutants. This program focuses on prevention and source control measures as a means of reducing concentrations of salinity-related parameters in the wastewater from the facility. This program has effectively reduced the concentrations to the extent possible, however it has not resulted in concentrations low enough to meet the water quality standards, therefore treatment would be necessary in order to meet water quality-based effluent limitations for these parameters.

Given the nature of the pollutants in question, three main technologies were evaluated for potential implementation to meet the necessary effluent limitations: chemical precipitation, ion exchange, and membrane treatment. The composition of the influent wastewater and coupled with the resulting water quality from application of each of the evaluated technologies led to reverse osmosis membrane treatment with associated pretreatment systems being evaluated as the primary technology that could meet effluent limitations based on the water quality standards. The other evaluated technologies (namely chemical softening, ion exchange softening, and nanofiltration) did not prove feasible due to limited capabilities of the treatment technologies or the fact that they contributed additional salinity-related parameters to the discharge.

The treatment system on which cost estimates were prepared for the economic analysis associated with this variance consists of two-stage reverse osmosis filtration, preceded by lime softening and microfiltration processes.

C. Characterization of risk to human health and aquatic life as a result of the variance to conclude that any increased risk is consistent with the protection of the public health, safety, and welfare.

The proposed variance does not require any deviation from use classes that affect human health or aquatic life. The proposed variance does not include alternate standards for drinking water (Class 1) or aquatic life (Class 2) uses, therefore the standard effluent limits analysis is protective of these uses. The permit for discharge of process wastewater includes an effluent limitation for whole effluent toxicity, which demonstrates that any impacts on aquatic life are minimized. Furthermore, the biological monitoring program conducted during the last permit cycle has not indicated any adverse downstream impacts to aquatic life resulting from the discharge.

D. Proposed Permit

The proposed permit contains requirements to ensure continued progress toward meeting the water quality standards. As with the last permit action, the proposed reissuance contains an alternate effluent limit for specific conductance as an indicator for the dissolved minerals under the variance. Based on performance during the last variance, the alternate limit was lowered to a calendar month average of 3675 micromhos/cm (previously 3750). This value is based on values observed during the past five years of operation; the variability is expected to be similar during the next permit cycle due to the seasonal and weather-dependent nature of facility operations.

Additionally, the proposed reissuance requires Southern Minnesota Beet Sugar Cooperative to continue in-stream pollutant sampling upstream and downstream of the discharge to characterize the chemical impacts of the discharge. The proposed permit also requires the continuation of biological monitoring and whole effluent toxicity testing to verify that aquatic life uses are not compromised as a result of the variance from the standards addressed by this variance.

The permit also requires the cooperative to continue its dissolved mineral reduction programs to continue to identify and implement opportunities for source reduction to keep dissolved minerals from contributing to waste streams in lieu of treatment prior to discharge. This requirement will be in effect for the entire duration of the variance and the associated permit.

VI. CONCLUSIONS / RECOMMENDATIONS

MPCA staff recommend the inclusion of a variance in NPDES/SDS Permit MN0040665 for the Southern Minnesota Beet Sugar Cooperative. Based on this recommendation, a permit has been drafted that assumes approval of the variance by the MPCA and U.S. EPA.

VII. SUPPORTING DOCUMENTATION

The following documents are included to support the preliminary determination as summarized in this memorandum:

Attachment 1: Southern Minnesota Beet Sugar Cooperative's Application for a Seasonal Variance from Dissolved Minerals-Related Water Quality Standards for Industrial Use, Irrigation Use and Cattle and Wildlife Watering Use

Attachment 2: Economic Analysis for Southern Minnesota Beet Sugar Cooperative Variance Request

Attachment 3: Calculation of SMBSC Alternate Effluent Limitation for Specific Conductance

Attachment 4: Request for MPCA Evaluation and Support of Variance on Basis of MN Rule Ch. 7050.0190 Subp. 4.A.(2)