Understanding the LSTS Ground Water Nitrate Nitrogen Policy

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Contents

This fact sheet presents the Minnesota Pollution Control Agency's (MPCA) Large Subsurface Sewage Treatment System (LSTS) Ground Water Nitrate Nitrogen Policy and provides general information on LSTS planning, design, permitting, construction, and operation.

Background

Subsurface, or soil, systems treat approximately one third of Minnesota's domestic wastewater (sewage). The treated effluent discharges directly to ground water. Poorly designed systems pose potential environmental and human health risks due to pathogens and nitrogen compounds in the discharge.

However, when properly designed, installed, and operated, soil treatment technology has proven to be an effective option for domestic-strength wastewater.

Compared to some other types of wastewater treatment, subsurface systems offer flexibility in operation and design, characteristics that make them a popular treatment alternative. Construction of these systems is on the rise statewide resulting in an increased demand for associated LSTS permits.

MPCA Ground Water Nitrate Nitrogen Policy provides a consistent technical basis for permitting decisions as well as a means to ensure the best, reasonable protection of Minnesota's valuable ground water resources.

Soil treatment systems are categorized by size with individual sewage treatment systems (ISTS) serving flows of 5,000 gallons per day or less, mid-sized sewage treatment systems (MSTS) serving flows between 5,001 and 10,000 gallons per day, and LSTS serving flows of 10,000 gallons per day or greater.

***LSTS**: Large Subsurface Sewage Treatment System serving flows 10,000 gallons per day or greater*

***MSTS:** Mid-sized Sewage Treatment System serving flows between 5,001 and 10,000 gallons per day*

***ISTS:** Individual (on site) Sewage Treatment System serving flows of 5,000 gallons per*

ISTS and MSTS are regulated by the local unit of government (i.e., city, township, or county). Due to the volume of wastewater treated by LSTS systems and the associated potential for environmental and health risks, Minnesota rules require the MPCA to regulate LSTSs.

Frequently asked questions

What is the LSTS Nitrate Nitrogen Policy?

LSTS facility effluent must achieve a ten milligrams per liter (mg/L) or less nitrate-nitrogen concentration in ground water at the property boundary or nearest receptor (i.e., drinking water well) which ever is closer.

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How was this policy limit determined?

This policy is consistent with the health risk limits set by federal and state laws for ground water (see 40 CFR part 141.51 and Minn. Rules 4717.7500 subp. 68).

How does the policy affect LSTS projects and permits?

The environmental and human health goals of the policy are straightforward. However, application of the policy through the MPCA's permitting process is designed to be flexible. The permittee has two permitting options:

Permitting Option #1: Permittees selecting this option build treatment systems with pretreatment units designed to reduce nitrogen compounds in the wastewater. This option requires the LSTS to meet an end-of-pipe (EOP) limit of ten mg/L total nitrogen measured as a rolling annual average. The limit applies to wastewater **before** discharge to the drainfield or soil-treatment portion of the system. This option generally does not require long-term ground-water monitoring.

Permitting Option #2: Permittees selecting this option construct treatment systems that utilize ground water and precipitation dilution to meet the ten mg/L total nitrogen limit at the property boundary or nearest receptor, which ever is closer. For this option, a complete hydrogeologic assessment is required prior to installation of the LSTS. Based on the results of the assessment, an EOP rolling annual average limit above ten mg/L total nitrogen limit will be set. After installation, a ground-water monitoring well network is also required to monitor the effectiveness of the EOP limit.

How long does it take to get a LSTS Permit?

The MPCA attempts to issue permits as quickly as possible. For less complex systems, the goal is to issue the permit within 90 days from the date the permit application is determined to be complete. The evaluation often includes review of submitted soils information, system siting, ground-water mounding analysis, nitrogen removal capabilities, and pathogen treatment capabilities of the proposed system. More complex systems, such as those opting to meet the nitrogen limit at the property boundary, require a more detailed hydrogeologic study and take significantly more review and permitting time.

What if there is a high nitrate concentration in site's existing ground water?

LSTS permittees are required to treat only the wastewater generated by that facility. Permittees are not responsible for cleaning up a previously impacted site.

Under Permitting Option #1, pre-existing ground-water conditions are not a factor since the end of pipe limit is already established.

Under Permitting Option #2, the pre-existing ground-water conditions are determined through actual ground-water sampling prior to construction of the LSTS. Based on sampling results, one of the following two conditions must be met:

- If pre-existing nitrate levels are equal to or greater than ten mg/L, the ground-water modeling results, which are used to establish the EOP limit, must indicate that the predicted nitrate concentrations in down-gradient wells will be equal to or less than the nitrate concentrations found in up-gradient wells. The modeling results must also show that if, after time, the nitrate concentrations decline in up-gradient ground water to ten mg/L or less, down-gradient ground water will be not exceed a concentration of ten mg/L.
- If pre-existing nitrate levels are less than ten mg/L, the ground-water modeling results must indicate that nitrate concentrations in down-gradient ground water will be no greater than ten mg/L once the LSTS is operational.

When should the MPCA be contacted regarding a proposed new LSTS?

Contact the MPCA as soon as possible. Most permittees/project consultants do not involve the MPCA soon enough. A number of factors, such as siting and soils, significantly affect the type and placement of a LSTS. Early involvement by the MPCA can reduce design-approval and permitting time.

Is a previously permitted LSTS subject to this policy?

The nitrate policy was approved on May 6, 2004. Only permit applications received after that date are subject to the policy. Permitting of existing LSTS will be handled on a case-by-case basis. Existing LSTSs determined by the MPCA to represent significant potential or actual harm to the environment or human health may be required to modify or upgrade accordingly.

Additional LSTS Guidance

A number of resources are available to assist with LSTS design, construction, permitting, and operation.

- The MPCA Web site: http://www.pca.state.mn.us/water/wastewater-engineering.html
- University of Minnesota Extension Web site: http://septic.umn.edu/

Applicable rules and regulations

- Minn. R. 7080 - Permitting Requirements
- Minn. Stat. § 115.07 and Minn. R. 7001.1030 - MPCA Permitting Authority
- Minn. R. 7060.0400, 0500 and 0600 – Use and Protection of Minnesota's Underground Waters
- Code of Federal Regulations (40 CFR part 141.51) - Federal Health Risk Standards for Ground Waters
- Minn. R. 4717.7500, subp. 68 – Minnesota Department of Health, Health Risk Standards for Ground Water