



# Understanding the Large Subsurface Sewage Treatment System Groundwater Nitrogen Policy

This fact sheet presents the Minnesota Pollution Control Agency's (MPCA) Large Subsurface Sewage Treatment System (LSTS) Groundwater 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 groundwater. 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.

The MPCA Groundwater 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 groundwater 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.

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 LSTS.

### **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 day or less*

## Frequently asked questions

### What is the LSTS Nitrogen Policy?

The discharge of LSTS facility effluent must result in a 10 milligrams per liter (mg/L) or less nitrogen concentration in groundwater at the property boundary or nearest receptor (i.e., drinking water well) whichever is closer. Each site specific wastewater treatment state disposal system permit will define how nitrogen is regulated.

## How was this policy limit determined?

This policy is consistent with the health risk limits set by federal and state laws for groundwater (see 40 CFR part 141.51 and Minn. R. 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 10 mg/L total nitrogen (TN) measured as a calendar month 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 groundwater monitoring.

**Permitting Option #2:** Permittees selecting this option construct treatment systems that utilize groundwater and precipitation dilution to meet the 10 mg/L nitrate-nitrogen limit at the property boundary or nearest receptor, whichever 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 calendar month average limit may be set above 10 mg/L TN. A groundwater monitoring well network may also be required to monitor the effectiveness of the EOP limit.

## How long does it take to get an 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, groundwater 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 high nitrate concentrations (>10 mg/L) exist in upgradient groundwater?

*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 groundwater conditions are not a factor since the end of pipe limit is already established at 10 mg/L TN and will not change.

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

- If upgradient nitrate levels are equal to or greater than 10 mg/L, the groundwater 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 10 mg/L if/when the upgradient nitrate concentrations were ever to decrease in the future. Required up and down-gradient groundwater monitoring must continue to demonstrate that the LSTS effluent does not cause the groundwater to exceed upgradient concentrations (if greater than 10 mg/L) or 10 mg/L if nitrate concentrations decline in up-gradient groundwater to 10 mg/L or less. At a minimum MPCA will re-evaluate EOP limits during permit re-issuance to verify compliance with permit limits and this policy.

## 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 an LSTS. Early involvement by the MPCA can reduce design approval and permitting time.

## Is a previously permitted LSTS subject to this policy?

This nitrogen policy was first developed in May 2004. Future permitting of LSTS which were in existence prior to this time will be handled on a case-by-case basis. The goal is to ultimately have all LSTS meet the intent of this Nitrogen Policy. Existing LSTS determined by the MPCA to represent significant potential or actual harm to the environment or human health may be required to modify or upgrade immediately.

## Additional LSTS guidance

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

- The MPCA website: <http://www.pca.state.mn.us/0agxb2d>. University of Minnesota Extension website: <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