Illinois Department of
PUBLIC HEALTH

Pat Quinn, Governor

525-535 West Jefferson Street • Springfield, Illinois 62761-0001 • www.idph.state.il.us

November 22, 2011

Mr. Curtis Cluckey
Infiltrator Systems Inc.
1519 Dartmouth Dr.
Liberty, MO 64068

Dear Mr. Curtis Clucky:

The Department has reviewed the materials submitted for the proposed low pressure piping (LPP) private sewage disposal system for the State of Illinois. The Department will approve the installation of LPP private sewage disposal system based upon compliance with the following conditions:

1. LPP private sewage disposal systems shall be installed per the Illinois Low Pressure Piping (LPP) Design Guidelines (see attached.), which are based off of the independent studies and other state's approvals for the design parameters, materials requirements, installation and maintenance for LPP private sewage disposal systems.

2. LPP private sewage disposal systems shall be compliant with all applicable provisions of the Private Sewage Disposal Licensing Act and Code not specified in the LPP Design Guidelines.

3. The Department, local health department or municipality must be contacted prior to the installation of a LPP private sewage disposal system.

4. This approval does not waive or alter the responsibility of the applicant or property owner from obtaining or paying local fees associated with an application by the Department, local health department or municipality associated with an installation or construction approval.

5. Approval of the LPP private sewage disposal system by the Illinois Department of Public Health is limited to design and is in no way intended to guarantee the proper function of the unit.

If you have any questions, contact me at (217) 524-4137 or chad.moorman@illinois.gov.

Sincerely,

Chad Moorman, LEHP
Program Manager
Private Sewage Disposal Program
Division of Environmental Health

cc: Regional Offices

Attachments

Illinois Low Pressure Piping (LPP) Design Guidelines

Sizing

The absorption capacity for the soils utilizing LPP private sewage disposal systems shall be determined by Section 905.55 a) of the Private Sewage Disposal Code (Code). Unless stated or address within this document, the remainder of the private sewage disposal system and all other components shall be sized or in compliance with the Private Sewage Disposal Licensing Act and Code.

Design

Primary treatment

LPP private sewage disposal systems for residential property may utilize an NSF Standard 40 unit, septic tank utilizing an approved effluent filter, or an alternative primary treatment unit approved by the Department. When a septic tank is used the outlet effluent filter shall have been tested and met NSF Standard 46, Section 10 requirements. LPP private sewage disposal systems for non-residential properties treating waste that is not typical of residential strength waste shall utilize an NSF Standard 40 unit or an alternative primary treatment unit approved by the Department.

Any LPP private sewage disposal system that is designed to have a daily flow of 801 gallons or above shall be timed dosed.

It is not mandatory but highly recommended that an elapsed time meter and cycle counter be incorporated for each pump in the control panel.

No reduction in the size of the subsurface seepage system shall be given for utilizing a NSF Standard 40 or alternative primary treatment unit approved by the Department.

The width of the subsurface seepage system material shall determine the square feet per liner feet required for LPP private sewage disposal system. See Subsurface Seepage Systems section below.

There shall be a minimum of 12 inches of vertical separation from the bottom of the trench to any limiting layer or seasonal high water table.

See the Low Pressure Piping (LPP) Private Sewage Disposal System Worksheet (Attachment A) for calculating LPP private sewage disposal system design and specifications.

Slopes

LPP private sewage disposal system shall be installed on sites with less than a 10% slope. For sites that have a slope of 10% or greater the LPP private sewage disposal system shall be designed by a Professional Engineer licensed by the State of Illinois, to ensure proper system configuration and design.

Pump and Dosing Chamber Tank

Submersible sewage effluent pumps with appropriate on/off controls for controlling dosing and a high water alarm shall be provided. A sump pump is not an approved pump.

The submersible sewage effluent pump shall be rated and designed to provide efficient pressure for a 3 foot squirt height for each individual distribution line at the same time to meet the total dynamic head required for the system design.

The system shall be designed to be dosed 2-8 times a day, so as to allow the field to rest and absorb effluent between doses. The dosing and resting periods allows for aerobic conditions in the soil and around the subsurface seepage system.

The dosing chamber tank shall be designed to have a one day capacity above the high water alarm. The dosing chamber tank shall be a minimum of 500 gallons.

The dosing chamber tank shall be designed so effluent will not leave the chamber when not being dosed. This will require the use of an anti-siphon hole or other controlling measure. This will be required for private sewage disposal system with the dosing chamber tank located higher in elevation than the subsurface seepage system.

Manifold Piping

The piping material from the pump and dosing chamber tank to the manifolds and the manifold shall be 2 inch scheduled 40 pipe. A different size of pipe may be utilized for the private sewage disposal system if it is designed and certified by a Professional Engineer licensed by the State of Illinois. The piping system shall be designed to drain after each dose is complete.

Distribution Piping

The piping material from the manifold and throughout the distribution system shall be 1 ½ inch scheduled 40 pipe. A schedule 40, 90° bend turned up with a threaded end shall be installed on the distribution line at the distal end of the line for all distribution lines in the distribution piping system of the subsurface seepage system.

5/32 inch diameter holes shall be drilled every 5 feet on the top of the distribution line. One 5/32 inch diameter hole shall be drilled on the bottom of both ends of each distribution line located 1

to 2 feet from the end of the trench to allow for the distribution and manifold pipe to drain completely.

A different size of pipe and hole diameter may be utilized for the distribution system if it is designed and certified by a Professional Engineer licensed by the State of Illinois.

Subsurface Seepage Systems

Each individual subsurface seepage trench shall be no more than 70 feet in length.

LPP private sewage disposal systems may utilize any of the following approved subsurface seepage system:

- Chambers systems
- Gravel systems
- EPS aggregate systems
- Any other subsurface seepage system that has been approved by the Department, for LPP private sewage disposal systems.

Gravel systems will be required to utilize orifice shields to protect from infiltration into the pipe if the distribution pipe is not inserted into a secondary pipe such as a corrugated or perforated pipe.

Chamber systems, EPS aggregate systems, and any other approved subsurface seepage system shall have the distribution lines suspended underneath and within the top of the subsurface seepage system. If the subsurface seepage system contains a pipe integrated within product the distribution line may be inserted within this pipe.

Minimum product height for any subsurface seepage system of an LPP private sewage disposal system is 8 inches.

The maximum trench width for a subsurface seepage system is 3 feet for a LPP private sewage disposal system.

Subsurface seepage systems shall be sized as follows:

LPP Subsurface Seepage System Product Width (Inches)	Bottom Area Ratting (Square Feet/Linear Foot)
$8 \leq X \leq 12$	3.0
$12 < X \leq 16$	4.0
$16 < X \leq 36$	5.0

Ball Valves

Ball valves shall be installed between the manifold and the subsurface seepage systems on each distribution line. The ball valves shall be adjusted so as to achieve the pressure required for a 3 foot squirt height for each individual distribution line at the same time.

Each ball valve shall be housed in a compartment with access to the ground surface so that the valve can be easily accessed and adjustments can be made to the ball valves after installation.

Surface and Site Drainage

It is critical to the performance of the LPP private sewage disposal system that the following issues area address:

1. Diversion of surface water over the subsurface seepage systems.
2. Interception of shallow or seasonal perched water upslope of the system.

Addressing these issues is critical on sites with concave or lower slope positions with soils having a restrictive horizon near the surface. If these conditions occur modifications to the site to redirect or intercept surface and ground water will be required.

Installation

Trenches

The trenches shall have a maximum depth of 18 inches. The subsurface seepage system shall be installed in native soil, but may be covered by fill. The bottom of each trench shall be level. Level for this Part shall mean plus or minus ½ inch in any direction over the entire length of the trench on each individual distribution line.

There shall be a minimum of a two feet earthen dam of undisturbed soil between the end of the subsurface seepage system and the ball valve and the 90° turn on the distal end of the distribution line. The dam must separate the subsurface seepage system trench from the ball valve and 90° turn.

Pressure Requirements

The dosing pump for the LPP private sewage disposal system shall be required to provide the required total dynamic head (TDH) to achieve the 3 foot of squirt pressure required for each distribution line. The TDH can be calculated using Attachment A.

Separation distance

The trenches of the subsurface seepage system shall have a minimum of 5 feet center-to-center spacing.

Maintenance and Operation Inspections

LPP private sewage disposal system shall be inspected annually to ensure the system is operating as designed. The system will need to be inspected at a more frequent interval if it utilizes an NSF Standard 40 unit or if it is mandated by the manufacture of a specific component within the private sewage disposal system.

Annual routine maintenance shall at a minimum consist of the following:

- Evaluate the pump to ensure it is providing the proper dose volume. If it is not reset pressure head via the ball valves.
- Evaluate the pressure and squirt height for each individual line to ensure operation at the required design rate.
- If there is a line clogged it may require shutting off the ball valves to all other distribution lines to flush forward the individual line. Upon completion reset the ball valves for each line to achieve the 3 foot squirt height required.
- Evaluate the septic tank to assure proper function and sound condition. Determine if it needs to be serviced or pumped to remove excess solids.
- The septic tank filter located in the outlet baffle shall be inspected and cleaned as is necessary to assure performance of the filter.
- If the LPP private sewage disposal system utilizes a NSF Standard 40 unit, then this unit will have to be serviced as mandated by the manufacture or as established by the Department.
- The screens on the dosing pump need to be checked and cleaned.
- Assure that the timer or float dosing switch is properly dosing the appropriate amount of effluent and adjust the time of does or the length of the float to meet the designed requirements for the system.
- The ground surface above and around the subsurface seepage field needs to be evaluated for signs of failure or improper performance.
- Evaluate the dosing chamber tank to ensure it is in sound condition and free of solids or fats, oils and grease.

Alternative Design

Alternative specifications may be proposed for the design, configuration or materials established within this document for the installation of a LPP private sewage disposal system, but the following requirements must be met for the system to be approved:

1. The system must be designed and certified by a Professional Engineer licensed by the State of Illinois,

2. The absorption capacity and design loading rate cannot be reduced to decrease the size of system.
3. The application shall be accompanied by a written explanation justifying why an alternative design is being proposed.

Attachment

November 2011

Illinois Department of Public Health

Low Pressure Piping (LPP) Private Sewage Disposal (PSD) System Worksheet

Date: _____ Name (Site/Owner): _____

Address: _____

PSD Installation Contractor: _____ License #: _____

LPP private sewage disposal system constants for the State of Illinois

Schedule 40, 1½ inch distribution lines
Schedule 40, 2 inch manifold lines
3 foot of pressure head
5/32 hole diameter every 5 foot
5 foot minimum center-to-center spacing on subsurface seepage trenches

CHECKLIST

Depth of trench: _____

Slope: _____

Designed Daily Flow: _____

Septic Tank Size: _____

Dose Chamber Tank Size: _____

Dosing Chamber Tank Manufacturer:

_____

Total Lateral Line Length: _____

Limiting Layer: _____

Depth to Limiting Layer: _____

Dosing Volume: _____

TDH: _____

Measured Length + Fitting Loss = _____

Pumping: ○ Uphill ○ Downhill

Curtain Drain: ○ Yes ○ No

Completed worksheet: ○ Yes ○ No

Distance Between Trenches: _____

Elevation of Highest Point on Supply line: _____

Dosing Chamber Tank Elevation: _____

Septic Tank Elevation: _____

Brand of Effluent Pump: _____

Size of Effluent Pump: _____

Brand of Effluent Filter in Septic Tank:

_____

Number of subsurface seepage trenches: _____

Total Square Feet:

_____ GPM at _____ Ft. of Head

Calculations/Worksheet Completed by: ○ PSD Installation Contractor ○ Property Owner

○ IL. P.E. ○ L.E.H.P. ○ Other: _____

Name: _____

Soil Analysis Provided by: _____

ILLINOIS LPP WORKSHEET

Determine Maximum Daily Design Flow

Residential

(1) ____ bedrooms at 200 gallons/day/bedroom = _____ gallons/day

Non-residential

(2) Gallons/day determined by Code Appendix A, Illustration A = _____ gallons/day

Absorption Area

Residential

(3) Design Group: ____ (4) Square feet/ bedroom: _____

(5) Total Square Feet ((1) x (4)) = _____ Square Feet

Non-residential

(6) Loading rate from soil analysis & Appendix A, Illustration A of the Code: ____

(7) Square feet/Day ((2) ÷ (6)) = _____

Liner feet of subsurface seepage system:

(8) Residential ((5) ÷ (Bottom Area Ratting (Table 1 below)): _____ Liner Feet

(9) Non-residential ((7) ÷ (Bottom Area Ratting (Table 1 below)): _____ Liner Feet

(10) Number of Lateral Lines*: _____ *(*Note: Lateral Lines cannot exceed 70 feet.)*

(11) Length of lateral lines: _____

Table 1

LPP Subsurface Seepage System Product Width (Inches)	Bottom Area Ratting (Square Feet/Linear Foot)
$8 \leq X \leq 12$	3.0
$12 < X \leq 16$	4.0
$16 < X \leq 36$	5.0

Dosing Rate

Holes

(12) Holes per line (___ (feet in each line) ÷ 5 (Spacing in feet between holes) = _____

(13) Total number holes ((12) x (10)) = _____

Flow Rate

5/32 inch holes at 3 feet pressure head = .50 gallons/minute (GPM).

(14) Flow rate (.50 (GPM) x (13) = _____ GPM

Pump Selection

Total Dynamic Head (TDH) = Static Head (15) +Operating Head (16) +Friction Head (19)

(15) Static Head (vertical distance from pump turn off level to the point of discharge) = _____

(16) Operating Head = 3 (feet of pressure)

(17) (Total pipe length in distribution system) + (Total of all equivalents for every fittings (**Table 3**))

= ____ feet

Table 2 – Friction loss per 100 Feet of Plastic Pipe

Flow Rate GPM	Pipe size (inches) 1 ½	2
5	0.20	
6	0.30	
7	0.40	
8	0.50	
9	0.60	
10	0.70	0.20
12	1.10	0.30
14	1.30	0.40
16	1.70	0.50
18	2.10	0.60
20	2.50	0.90
21		0.95
25	3.80	1.30
30	5.20	1.80
35		2.40
40		3.10
45		3.80
50		4.70

Table 3 – Friction Losses Through Plastic Fittings In Terms of Equivalent Lengths of Plastic Pipe

Type of Fitting (Inches)	Nominal Size Fitting & Pipe Equivalent Length of Pipe – Feet 1 ½	2
90° Standard Elbow	8.0	9.0
45° Elbow	3.0	4.0
Standard Tee	9.0	11.0
Check Valve	13.0	17.0
Coupling or Quick Disconnect	1.0	2.0
Ball Valve	1.1	1.4

(18) (17) ÷ 100 = _____ (This gives you feet in 100' increments)

(19) Calculate Friction Head = (18) multiplied by the value for the flow rate (14) in Table 2.
(18) x (value from (14) for 2" pipe in **Table 2**) = ____ Friction head in gal/min in 2" pipe.

TDH = (15) + (16) + (19) = _____

The TDH value will allow you to determine what type of pump will be best for the system size and design. To assure proper design and performance make sure that you use the right pump curve chart that is designed for the system specifications and type of pump to be used. Compare the TDH in feet by the total gallons per minute, to assure the correct pump size.

Dosing Volume

Volume Dose = Volume Supply Lines + Volume Lateral Lines

(20) Supply line = _____ feet of 2 inch pipe

(21) Volume Supply = ((20) ÷ 100 ft.) X 16.2 gallons (gallons/100 feet of Sch. 40) = _____ gallons

(22) Lateral Lines = _____ feet (total of 1½ inch pipe)

(23) Volume Lateral = ((22) ÷ 100 ft.) x 9.2 gallons (gallons/100 feet of Sch. 40) = _____ gallons

(24) Volume Dose = (21) + (23)

(25) Gallons per inch for the dose tank being used = _____ (provided by manufacturer of tank.)

(26) Dosing volume = ((2) ÷ (number of doses per day *(2 to 8)*) + (24) = _____ gallons

(27) Minimum Tank capacity required = (2) + (26) = ____ gallons *(500 gallon minimum)*

(28) Float switch depth = (26) ÷ (25) = _____ inches.

(28) Timed Dosing = (26) x (14) = ___ pump run time in minutes.