



State of Delaware  
Department of Natural Resources & Environmental Control  
Division of Water Resources  
Ground Water Discharges Section

**Innovative and Alternative System Approval**

**ISSUED TO:** Geoflow, Inc.  
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**FROM:** Hilary Moore – Environmental Engineer  
Ground Water Discharges Section

**FOR:** Geoflow Subsurface Drip System

**APPROVAL DATE:** November 18, 2003

**AMENDED DATES:** May 15, 2007

May 9, 2008 (to reflect new products and design  
parameters contained in the revised  
manual published in October 2007)

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In accordance with the Regulations Governing the Design, Installation, and Operation of On-Site Wastewater Treatment and Disposal Systems (Regulations), an application dated July 12, 2006 has been submitted by Geoflow, Inc. for the approval of the Geoflow Subsurface wastewater drip dispersal system as an Innovative & Alternative On-Site Wastewater Treatment and Disposal System.

Based on the information submitted, the Department approves the use of the Geoflow Subsurface wastewater drip dispersal system as an Innovative & Alternative On-Site Wastewater Treatment Disposal System. The following conditions, limitations, and requirements must be adhered to:

## 1. Product Description

The Geoflow Subsurface Drip Dispersal System disperses effluent below the ground surface through the use of ½” pressurized tubing. The system incorporates filtration, time and level controlled application with ultra low rate drip distribution.

Following a minimum of the settling process in the treatment tanks (sized in accordance with the Regulations), the wastewater is to collect in a final dosing chamber sized to hold minimum storage for emergency and flow equalization. The effluent will be time dosed via a float operating system. An effluent pump will be required to dose the effluent under pressure to the drip field, and will be controlled by GEO programmable logic controls. The Geoflow system utilizes a self cleaning Vortex Filter with a stainless screen 100 micron element to filter the effluent prior to final dispersal through emitters typically located every two feet on-center inside the ½” tubing. The tubing shall be Geoflow WASTEFLOW pressure compensating dripper tubing or WASTEFLOW classic.

The system contains the following

- a. Filtration: Automatic self cleaning Geoflow Vortex Screen filters that are capable of screening particles larger than or equal to 100 microns.
- b. Air Vents: Air vacuum breakers installed at the high points of each drip field to keep soil from being sucked into the drip emitters due to back siphoning or back pressure after the pump shuts off.
- c. Field Flushing: Automatic field flushing valve used to enable accumulated debris and sediment to be flushed from the dripline back to the pretreatment units.
- d. Dripline: Geoflow’s Wasteflow PC dripline with pressure compensating emitter, or Wasteflow Classic. Both tubings have emitters spaced uniformly throughout (typically 24”). The tubing consists of three layers: the inside layer is a bactericide protector, the middle layer is black and the outside layer is purple-striped for easy identification. The emitters are impregnated with Treflan to inhibit root intrusion.
- e. Controls: Control/software package controlling all functions required for proper system operation which includes system timed dosing; filter flushing, field flushing and audible/visible alarms.

## 2. Approved Geoflow Drip System Package

All components including tubing, controllers, filters, pressure regulators, air vacuum breakers, filter flush valves, field flush valves, zone valves, headwrks shall be those specified in the Geoflow Wastewater, Design, Installation and Maintenance Guideline, dated October 2007. All components that are not in this guideline must seek the approval of the manufacturer and the Department prior to use.

## 3. Scope of Use

The drip dispersal system may be used for residential waste with flows <2,500 gallons per day. Other usages will be based on a case by case basis. This system may dispose of primary and secondary treated effluent.

## 4. Siting Criteria

- a. Loading rates are to be based on the most restrictive texture within the upper 24" of the surface. See the attached chart for loading rate associated with a percolation rate.
- b. For at-grade systems, the tillage depths are to be 6-8", although slightly deeper depths may be necessary in the case of shallow thick plow pans or similar restrictive layers within 12" of the surface.
- c. Landscape position is also a necessary consideration. Systems are not to be sited within a closed depression or where water tends to pond during heavy rainfall events.

## 5. Separation Requirements

### New Construction:

Separation requirements;

- 18" from limiting zone
  - \* Full Depth installation = 24" limiting zone, 6" trench
  - \* Surface installation (At-grade systems) = 18-22" limiting zones require that 3" sandy fill be added, then place tubing 1" into sandy fill and add 6" topsoil cap (*See Design and Construction Notes for Site Preparation*).
  - \* *No advanced treatment required* \*
- 10 – 17" from limiting zone **requires advanced treatment**. A 12" separation distance must be maintained from the limiting zone. For limiting zones 10-16", 3" of suitable sandy fill must be added, then place tubing 1" into fill and add 6" topsoil cap.

## **Replacement System:**

Separation requirements:

- 18” from limiting zone – Same installation parameters as above
- 10 – 17” limiting zone – Suitable sandy fill added to establish 20” separation, place tubing 1” into sandy fill and add 6” topsoil cap

*\* No advanced treatment required unless site evaluator determines otherwise\**

- Less than 10” limiting zone **requires advanced treatment** – Suitable sandy fill added to establish 13” separation, place tubing 1” into sandy fill and add 6” topsoil cap. This shall be determined on a case by case basis.

## **6. Design Criteria**

- a. The drip dispersal system may be designed for new and replacement disposal systems.
- b. Advanced treatment requirements shall be in accordance with the above siting limitations.
- c. An on-site wastewater treatment and disposal system permit application incorporating an Geoflow Subsurface Drip Dispersal system must be designed in accordance with the Regulations, and manufacturer’s specifications. The design shall be completed by a DNREC Class C Design Engineer. The permit application shall include system specifications, zone layout and calculations.
- d. The design shall utilize the components as outlined in the Geoflow Wastewater Design, Installation and Operation Guideline dated January 2004. If any other system or components are to be utilized, they must seek prior approval from the Department and the manufacturer.
- e. The attached guideline dated November 18, 2003 shall be utilized for sizing the disposal area.
- f. The design shall be in accordance with both the Department’s and Geoflow’s drip design guidelines.
- g. The dose volume shall be 3.5X the internal volume of the laterals, or otherwise approved by the Department.
- h. Flushing velocity of 2 ft./sec. is required at the distal end of the laterals.
- i. The headworks box shall be placed on an aggregate base and be made accessible from grade.

- j. If a pressure regulator is to be utilized outside of the hydraulic unit, it shall be encased in protective housing and be accessible from grade.
- k. The control panel may not be placed in an enclosed structure for residential applications.
- l. The system shall be designed so that it is installed on contour, on at least two foot centers. Any other separation distances must be approved by the Department.
- m. The system must incorporate automatic field and filter cleaning.
- n. The design must incorporate pressure compensating WASTEFLOW tubing or Wasteflow Classic depending upon application.

## **7. Installation Procedures**

- a. The drip dispersal system shall be installed by a DNREC Class E System Contractor under the supervision of a manufacturer's representative, or by a DNREC Class E System Contractor who has been certified for unit installation. Proof of certification shall be provided in writing to the Department.
- b. Start up of the system and initial operational checks shall be conducted by the Class E System Contractor (trained by the manufacturer), Design Engineer, and a Ground Water Discharges Section (Large System Branch) representative. If the Class E System Contractor is not certified, a manufacturer's representative shall perform the operational checks of the system at start up. If the manufacturer's representative can not be on site at the time of start up, they must provide final start up approval to the Department in writing.
- c. Fields shall be staked out and kept free from disturbance
- d. Fields shall be installed in accordance with manufacturer's recommendations for each site. A vibratory plow, static plow or trencher is most typically used and soil moisture must be dry enough so that soil compaction will not occur.
- e. Fields shall be finished to shed surface water. A vegetative cover shall be established to prevent erosion and to allow for effective system operation.

## **8. Operation and Maintenance**

- a. The Geoflow Subsurface Drip Dispersal System shall be operated and maintained in accordance with the manufacturer's specifications.
- b. The manufacturer shall comply with all Department mandated

requirements as specified in permit conditions. This shall include operation and maintenance requirements.

## **9. General Conditions**

- a. Use of the system for wastes other than residential shall be on a case by case basis.
- b. In the event that the system does not perform as claimed by the applicant, the use of the system for new installations shall cease. Use of the system shall not resume until such time the applicant and the Department have reached an acceptable agreement for resolving the situations.
- c. Any changes that deviate from the specifications as submitted with this approval shall be approved by the Department prior to use.
- d. The manufacturer is responsible in ensuring the Department is aware of all local distributors, representatives and certified contractors. An updated list with contact information shall be provided to the Department annually.