AMERICAN
Manufacturing Company, Inc.

Recommended Guidance for The Practice of Drip Dispersal System Design

1. History and Scope

1.1 Wastewater drip has been used in the United States of America since the late 1980's and has evolved considerably. Comprehensive design, installation, operation and monitoring standards are necessary to assure the long term success for this technology. Failure to account for minimum hardware and site design requirements will compromise the ability of the system to function with longevity as intended.

1.2 This pre engineered scope of practice policy should address all systems where effluent is residential strength and mechanical equipment is pre-assembled to provide for the multifunction requirements of controlled preconditioning and dispersal.

1.3 Pre engineered drip systems may disperse that quality of effluent which we know the soils can treat which include septic tank effluent and those effluents which are of better quality.

1.4 Pre engineered drip systems may disperse septic tank effluent and better quality effluents and shall include a pump tank with flow equalization, a filtration system designed to protect the emitters against clogging, small diameter pipe with emitters designed to evenly disperse effluent over an absorption area, and a control center that operates the electromechanical components of the system. The entire system shall be balanced so all components operate within those design parameters they are rated for.

1.5 Siting standards used should be the minimum scientificly based industry standards or applicable regulatory standards which ever has more safety factor in the design. Sites with a minimum of prescribed conditions for traditional installations should be approved to be used with drip dispersal.

1.6 Site specific design must be used when the specific siting conditions prescribed for a pre engineered system are not available.

2. Reference Documents

2.1 Standard Practice for Surface Site Characterization for Onsite Septic Systems. Designation D5879-95*

2.3 Standard Practice for Subsurface Site Characterization of Test Pits for Onsite Septic Systems. Designation D5921-96*.

2.4 Standard Practice for Preliminary Sizing and Delineation of Soil Absorption Field areas for Onsite Septic Systems. Designation D5929-96*.

3. Definitions

3.1 -- Run -- One continuous length of tubing run across contour connected to a supply line or return line or another run.

3.2 -- Lateral -- One run or a series of runs connected at one end to a supply manifold and the other end connected to a return manifold.

3.3 -- Zone -- A group of laterals dosed at the same time.

3.4 -- Field flushing -- The routine maintenance act of cleaning drip tubing by opening the end of a lateral and creating scouring velocities in the same direction of flow in the tubing to remove solids which may plug an emitter.

3.5 -- Flow equalization -- Storage of effluent peak flows to provide for even time dosing of dripper lines. It is designed into system by distance between the enable float and the alarm float.

3.6 -- Mechanical filtration -- Filtration using having surface area and depth for patical size separation for non-biofilter type of filtration of the applied effluent to prevent emitter plugging.

3.7 -- Supply Manifold -- The supply pipe feeding a zone to which laterals are connected.

3.8 -- Return Manifold -- The pipe carrying field flushing wastewater from a zone.

3.9 -- Dripper line loading rate -- The amount of contaminants dispersed by the dripper line. This material shall be described in generally accepted engineering units such as gallons per day of water and pounds per day of contaminant (Water (H_2O), BOD, FOG, Solids, etc).

3.10 -- Standoff -- The vertical and horizontal separation distance from receiving environment limitations.

3.11 -- Monitoring -- Periodic inspection of system for performance.

3.12 -- Pretreatment -- Conditioning of effluent prior to dispersal by drip system.

3.13 -- Draindown -- The action of effluent left in the distribution system after the pump shuts off that drains by gravity to the lower lines in the system.

3.14 -- Control -- Electromechanical Operational interface device used to operate the system. Automatic Control is operation without human physical actions. Manual control operation is the operation of a system which bypasses or is not performed by automatic equipment.

3.15 -- Operational interface -- Those mechenisms provided in the system which allow the operator to test the system for satisfactory operational performance. These interface components or devices may be control panel switches or manual overrides on the components themselves. In either case operator interface components must be easily accessed and trainable to operators of typical skill level and standard training.

3.16 Emitters

3.16.a -- PC Emitters -- "PC" emitters are "Pressure Compensating ". These emitters provide equal flow over a wide range of pressures.

3.16.b -- PC Emitters -- "PD" emitters are "Pressure Dependent ". These emitters provide flow which vary with pressures in a controlled and predetermined rate.

4. Summary of Practice

4.1 Drip dispersal is a method of applying wastewater effluent in a uniform and controlled manner to provide for unsaturated flow over an absorption field area where final treatment and dispersal occurs.

4.2 Drip system components include a septic tank or aerobic treatment unit, a pump tank with flow equalization, a filtration system designed to protect the emitters against clogging, small diameter pipe with those emitters designed to evenly disperse effluent along the tubing and over an absorption area, and a control center that operates the electromechanical components of the system.

4.3 Additional components may be used as deemed appropriate by the manufacturer or designer to treat and evenly disperse wastewater and to prevent emitter clogging.

4.4 Site specific designs are necessary to assure proper siting and the ability to flush the tubing.

5. Significance of use.

Drip technology is characterized by controlled low volume equal distribution of effluent dispersal over an entire soil adsorption. The process allows for enhanced utilization and management of the receiver site. Instantaneous micro dosing increases the residence time of the effluent within the soil media enhancing disinfection and final treatment through reareation and unsaturated flow.

6. Process Description

6.1 -- PRETREATMENT -- Pretreatment criteria for a specific site should be a function of the equipment design and the receiving environment. Near secondary effluent (BOD equal to 30 mg/L plus or minus 50%). Secondary aeration treatment systems may have higher instantaneous loading rates. The size and shape of the dispersal field should be primarily based on the effluent being able to move away from the site. Drip systems may disperse septic tank effluent (BOD equal to 250 mg/L plus or minus 25%). These primary dispersal systems must consider treatment at the tubing/soil interface with unsaturated flow conditions. The size and shape of the dispersal field should also be based on the effluent being able to move away from the site. Reference other attached criteria.

6.2 -- FLOW EQUALIZATION -- Sufficient storage in the pump tank should be provided to allow ¼ day storage above alarm plus ½ to 1 day storage between the enable and alarm for flow equalization. All drip systems should be time dosed, with wastewater in excess of peak design limits causing an alarm and not be pumped to the dispersal area.

6.3 -- FILTRATION -- All drip systems should be designed with mechanical effluent filtration prior to effluent delivery to emitters regardless of effluent quality. The filtration ratio of filter to emitter size should be over 1 to 4. Filter cleaning materials should be returned to the process for recycle or storage and should not overload prior processes.

6.4 -- DISTRIBUTION & AIR RELEASE -- Drip dispersal systems should be designed to provide equal (+/ - 10%) distribution between emitters in a zone. The determination should include evaluation of drain down, which is what happens when the pump turns off. Air release should be provided at the highest elevation in each zone to allow for venting the system preventing drawing in soil fines in the upper tubing emitters during system drain down after the pump shuts off.

6.5 -- FIELD FLUSHING -- Drip system should be designed to field flush at a velocity over 2 fps at the distal end of each lateral. Any common return line may be considered only for return head loss for flushing calculations. Field flush should be automatic when the maintenance frequency of the system is longer than the required flushing frequency.

6.6 -- Mechanical and Hydraulic Balance -- The processes outlined in this section must be designed to

7. DESIGN PROCEDURES

7.1 -- Site Evaluation -- Site evaluation for drip dispersal is similar to traditional methods except shallower installations are possible, in addition to the advantage of economically delivering effluent to smaller areas using equal pressure dosing methodology.

7.1.a -- The site evaluator shall deliniate the suitable area for drip installation.

7.1.b -- The site evaluator shall determine the installation depth of the tubing.

7.1.c -- The deliniated area for installation shall be protected by marking in the field. If at installation the area has been altered the site shall be re-evaluated and may be deemed unsuitable.

7.2 -- Demand analysis and Flow Equalization -- The amount of wastewater and the strength of the wastewater to be treated and recycled should be calculated in the same manner as for traditiona systems. Drip technology does not have capacity to store effluent in a trench. Flow equalization must be provided in the final pump tank or pretreatment system.

7.3 -- Pretreatment -- The amount of pretreatment should be determined based on the receiving environment.

7.4 -- Field Layout -- Standard designs for drip systems are based on placing tubing two feet on center on contour with emitters two feet on center in the tubing. The field layout should be designed to provide equal length laterals in each zone in order to facilitate field flushing. All runs should be layout on contour. Pump sizing for field flushing should be adequate to dose and flush at a rate to clean contruction debris out of tubing in addition to normal flushing of sediment and organic regrowth.

7.5 -- Filtration -- Filtration should be automatic unless regular operational maintenance is provided. The filtration should be at least 4 to 1 ration of emitter openning to particle size, with a higher rate preferred. The pump should be sized to flush the filter and the flushings waste must be designed to be delt with in the system.

7.6 -- Pump Selection -- Pumps shall be rated to handle the fluid and corrosive environments they work in. In the event one pump is used it must be rated to operate over the several conditions present in the system including, dosing, flushing and dosing, and filter cleaning.

8. INSTALLATION & STARTUP

8.1 Installation should be performed by trained and certified installers to assure that installations practices do not destroy the typically shallow soil structure or clog emitters with soil or construction debris or crimp or damage tubing. All aspects of the design objectives should be tested and recorded at startup to confirm site specific design objectives. Reference operational check list enclosed. Operation and maintenance support should be provided by the Manufacturer's Rep.

9. OPERATION

9.1 The operation of the systems can be designed to be monitored for performance or "fixed after it breaks" just like a regular pump system. The monitoring frequency should be based on the most limiting process in the system. Just like in all systems we believe the system should be inspected each year. If unreported repairs are required, the work should be performed at that time. Flow monitoring is necessary to track possible overuse and system damage. Both *flow and pressure* should be monitored in systems with non pressure compensating emitters.

10. Compliance Monitoring

11. DISPERSAL AREA CONSIDERATION

11.1 The total dispersal area required should be the same as for any pretreated wastewater technology such as the basal area of a mound. When domestic waste strength is dispersed, the amount of soil/tubing interface should be considered. It is important on more difficult sites, such as those shallow to a restriction, to consider the landscape or contour loading, gallons per day per linear foot of total system contour.

12. SYSTEM RESPONSIBILITY

12.1 Drip systems are "pre-engineered systems" or "engineered" systems. It takes a combination of accepted engineered processes to provide for a long term successful drip installation. We believe systems should be pre-engineered by a manufacturer and proven, or engineered specific to a site with the manufacturer or engineer taking total responsibility for the performance of the system. Again, we think good standards are necessary to provide long term success for the technology. Attached please find several reference documents for your review.