AquaGreen
Utility Inc.

I'd like to show why this new rule should not be allowed to be implemented. One must consider the economic impact of this rule change. For instance, the Love's project will not move forward, stopping a $10,000,000 build and ending approximately 50 jobs to be created in an area of East Tennessee (near Greeneville) where jobs are needed. Bear in mind that this is only one of the many projects that these rules will stop or at least scale way down. I should not need to remind anyone that an out of state company spending this much money on a project that gets travelers to stop and spend money in the state is as good as it gets! I have two other projects under construction, one for 67 homes and the other for 114 homes. The average home price is $500,000, so 181 homes would cost $90,5000,000. You can also expect this type of construction to create another 50 jobs. If these projects were under the new rules, they would not have proceeded. As a matter of fact, the developers have told me how close their margins are and almost any change would have stopped their developments.

If you just look at these 3 projects, they would benefit the state of Tennessee with $100,000,000 in development, 100+ jobs, property tax revenue and sales tax on about 1,000,000 gallons of fuel a month. That's why I say, this can't happen! I'm a very small utility compared to other bigger utilities that would have an even bigger economic impact on the state of Tennessee.

The main problem with this rule is that it reduces the amount of sewage that can be disposed of on a piece of property. They are choosing to ignore the currently used EPA chart that determines how much water can be discharged in the soil (hydraulic loading rate). This EPA chart has been used for years and now it appears they have made a new chart with numbers that seem to have been picked out of the air with no scientific backing. In fact, if you look at the USDA chart, it says the EPA chart is conservative and more sewage could be applied. But this new rule/chart will require more soil for sewage costing the developers more money and hence stifling development.

This rule is so bad we should just start over, but this time bring in some stakeholders, not just let TDEC come up with something. TDEC also wants to remove the utility's right to appeal their decisions to the water and gas board. Just looking at the damage this rule could do should be enough reason not to allow that to happen.

Dart Kendall, President 865-908-0432

These rules should have been written by a group of stakeholders and regulators. Whenever anyone writes rules, they will naturally defend their work. This process is now adversarial by nature and not cooperative. I believe these rules should be not be adopted. Below are a few of the reasons on why I think these rules should not be adopted.

I will use our next project, a Love's truck stop, to show what I mean. First of all, there doesn't seem to have been enough consideration to the economic impact of this rule change. This project will not move forward, stopping a $10,000,00 build and ending approximately 50 jobs to be created in an area of East Tennessee (near Greeneville) where jobs are needed. Bear in mind, this is only one of the many projects that these rules will stop or at least scale way down. I should not need to remind anyone that an out of state company spending this much money on a project that gets travelers to stop and spend money in the state is as good as it gets!

**Change in the hydraulic loading rate:**

The hydraulic loading rate basically means how much water the soil will soak up. Under the current rules, we use an EPA loading rate chart (see attached). If this change is approved, we will use new loading rates which seemed to come from who knows where. Currently, this project has a .25 loading rate for 57,225 sq. ft. of approved soils with a 10 ft. buffer. That means >14,300 GPD of sewage can be released on that soil. Bear in mind what approved soils means, you need an approved soils scientist off of a TDEC list to run the most complete soil mapping survey of any approved maps. Then the state sends out their soil scientist who has the other soil scientist make any changes to the map they deem correct. By TDEC's own admission, only the best soils are accepted. Many times soils approved for septic tanks would not be acceptable for these systems.

Under the proposed loading rate chart change, this project would use a loading rate of .1 requiring 5,722 GPD of sewage released on the soil. This is less than half of what is currently approved and would require more land which is not available, thus killing the development. Currently we use .25 which is limited by nitrate uptake, not hydraulic loading rate, which come in at .3 on the EPA chart. What does this mean? For an easily understandable comparison, let's look at a septic tank system.

| Under new rules | Septic Tank |
|---|---|
| Square footage 57225 | 180 x 317 = 57060 square foot |
| at .1 loading rate **5722 GPD** | 36 lines 180' 6480' 150 Gallon per day per 100 foot = 9720 GPD + 30% reduction **12636 GPD** |
| Treatment system: | |
| Trickling filter, settling tank, 130 micron filter | None |
| Certified operator | None |
| TDEC permit ever 5 years | Initial install only |
| Yearly permit cost $350.00 | $0.00 |
| Testing: | |
| BOD, CBOD, TSS, PH, NH3-N | Never |
| Inspected by certified operator every 14 days | Never |

If you want to see what the USDA (the people who write the soils classifications) says the loading of the soil is, let's look at the NRCS soil data for this soil. They say it has an inch/hour rate ranging from 0.0600 to 0.2000 using our same drip field from this example. We should be able to apply 21,768 to 72,561 gallons per day, not 5722 GPD. See attached sheets.

Soils capable of handling 14,300 GPD now only are allowed 5,722 GPD under the new rule.

If you really want to see how bad an idea this is, just calculate a LPP or bed and look at how much smaller they are.

**Added 150% soils area:**

Again using a septic system most people are familiar with: A septic system require 200% soils available, there is good reason for this. All septic system will fail in time because of a natural process where a biomat develops in the soil. In an anaerobic condition (lack of oxygen) the microbes that clean the water become so prevalent that they stop up the spaces between the soil structure. These drip systems are not anaerobic but aerobic, they do not form this biomat. Adding the extra 50% is septic tank thinking and does not apply to these systems. Community systems are very different from septic systems and their loading rates and water quality are very different. With single family systems, the worst case scenario must be used. In other words the family that uses the most water. With community systems it is very different. The family that uses the most water in a neighborhood is balanced by the one who uses the least. With these systems, the flow is an average flow, not worst case, so less disposal area is needed. Example, a 4 bedroom septic system is based on 600 GPD but the national average water use per family is 138 GPD . The minimum TDEC accepts is 300 GPD which in its self gives more than 200% of the needed area reserve. Basically with these drip systems, it is already installed instead of being held in reserve. There is no scientific justification for the 150% rule change.

**Our Example:**
This Love's truck stop with just these two small parts of this new rule have gone from having 14,300 GPD to 3,815 GPD. If this soil were used for septic tanks with no treatment, it would be 12,636 GPD. Their average daily use in this size store is about 8,000 gallons per day. You have killed this project, this should not be allowed to happen. Our legislature works hard to get development, TDEC should not make rules to run it away.

**Retroactive Dating:**

Using a date of June 1, 2019 for a rule that has not even gone to public notice is just immoral. It takes a very long time to get a permit through TDEC, when you change the rules mid stream you put a very large undue financial burden on development. Developments like this Love's, go from approved to cannot be approved with the stroke of a pen. In case you don't understand my point, let me clarify. If a developer or company decides to build in Tennessee and you change the rules stopping their project midstream costing them thousands or hundreds of thousands of dollars, do you think they will come back? Can you see the long term effect on the economy of this state? Rule changes should not affect projects that are already proposed. New rules should have a 1 year wait time after approval so we don't stop development. The rules we have now are not that bad and are actually in line with other states, we have time to do a better job with a rule change if needed.

**Slope limited to 30% or 16.7 degrees:**

I have attached a study done at the University of Wisconsin-Madison. This study shows that the loading rate can be increased with the amount slope, not decreased. Let's just look at the math, Maps are 2 dimensional, but the real world is not. A lot that is 100' x 100' has 10,000 square foot, but if this lot is at a 30 percent slope there would be 10,440 square foot of surface area. If the lot were at 60 percent slope, there would be 11,662 square foot. Since evaporation loss is a big part of water disposal in drip fields this extra area is a big help in disposal. Additionally, extra surface allows for more crop uptake of final waste products. Look at the economic damage, basically in East Tennessee 30 percent slope is considered flat. East Tennessee needs development not just Nashville.

**0400-40-06-03 (2):**

Currently we don't get a completed application until the permit is ready. Many times we submit an application and don't hear anything for months. Now TDEC wants an additional 30 days, why?

**0400-40-06-.06:**

Currently we use an annual BOD of 45 and NH3-N quarterly report only. There is no reason to add these extra test. TSS is not a needed test to effluent that is land applied. The soil will filter out any particulate matter. PH is also not needed. NH3-N is truly the only thing that should be tested as it is a good indicator of how the plant is working. If the NH3-N is low, the BOD will also be low. The septic parameters show how out of touch this rule is. Take a septic tank with no treatment installed in soils that won't qualify for a community drip system installed at a deeper level closer to the water table and let it have a BOD of 200. Why would you allow much dirtier water in septic field lines that allow almost no crop uptake of leftover pollutants?

**0400-40-06-.06:**

Ponding, the definition for dry weather is ridiculous saying that any water on the surface is ponding. It also says that 24 hours after a 1/2" or greater rain event, if there is ponding, you are in violation. Many times we get 1/2" or greater rain events for many days in a row. How many times do you have a puddle in your yard the day after it stops raining? I know I do. Dry weather ponding should just be effluent ponding (with ammonia in it) showing up when it has not rained in at least a couple of weeks. The project we are working on now would be in violation and we haven't even hooked up a single home.

**All dripfields shall be fenced sufficiently to prevent or impede unauthorized entry:**

This statement will kill all reuse operations in parks and golf courses. We make claims of wanting reuse, then make it unrealistic to try.

**Signage:**

There is not much uglier sign than the current sign requirements. We build these systems in very nice neighborhoods' where looks are important. These nicer homes pay more taxes. There is no reason to put a 2x2 sign every 200 feet along with new 6' fence requirements. Who would want something this ugly in their neighborhood when it is just not needed. In Georgia for example, there is no fence or UV requirement and there has been no reported disease outbreaks.

**300 GPD per home or 65 GPD per person max occupants:**

The national average is far less than 300 GPD. At 138 GPD we have a safety margin already built in. Requiring 65 GPD per person based on max occupants will hurt the vacation trade in Tennessee. The most I have seen required is an average of 50 GPD (included). There are many factors to be considered, cabins used on the weekends only may have extra storage available for longer disposal time, etc. Every cabin is different and should not have a hard number like 65.

**Design Basis B:**

This requires each drip emitter to feed 4 square feet. The only realistic way to meet this criteria is to place a drip line every 2 ft. That looks good on paper, but the real world topography will not allow even spacing and follow the topography. If you don't follow the topography, the emitters they will bleed out and cause ponding. This rule will cause the systems to not meet TDECs own ponding requirements. I have included the Netafim drip dispersal guide which states dripper line must be installed along contour. This rule shows a lack of understanding of how these systems work.

TDEC also wants to remove the utility's **right to appeal** their decisions to the water and gas board. Just looking at the damage this rule could do, should be enough reason to not allow that to happen.

CURRENT

upon the results of the nutrient loading rate calculation per Section 17.5.2.

## TABLE 17-2

Hydraulic Loading Rates (GPD/SF) – For Drip Dispersal Systems

| TEXTURE | STRUCTURE | | HYDRAULIC LOADING RATE* GPD / SF BOD ≤ 30 mg/L |
|---|---|---|---|
| | SHAPE | GRADE | |
| Coarse Sand, Loamy Coarse Sand | NA | NA | NA** |
| Sand | NA | NA | NA** |
| Loamy Sand, Fine Sand, Loamy Fine Sand, Very Fine Sand, Loamy Very Fine Sand | Single Grain | Structureless | 1.00 |
| Coarse Sandy Loam, Sandy Loam | Massive | Structureless | 0.60 |
| | Platy | Weak | 0.50 |
| | | Moderate, Strong** | |
| | Blocky, Granular | Weak | 0.60 |
| | | Moderate, Strong | 0.80 |
| Loam | Massive | Structureless | 0.50 |
| | Platy | Weak, Moderate, Strong** | |
| | Angular, Blocky | Weak | 0.70 |
| | Granular, Subangular | Moderate, Strong | 1.00 |
| Silt Loam | Massive | Structureless | 0.20 |
| | Platy | Weak, Moderate, Strong** | |
| | Angular, Blocky, | Weak | 0.60 |
| | Granular, Subangular | Moderate, Strong | 0.80 |
| Sandy Clay Loam, Clay Loam, Silty Clay Loam | Massive | Structureless** | |
| | Platy | Weak, Moderate, Strong** | |
| | Angular, Blocky | Weak** | 0.3 |
| | Granular, Subangular | Moderate, Strong** | 0.6 |
| Sandy Clay Clay, Silty Clay | Massive | Structureless | |
| | Platy | Weak, Moderate, Strong | |
| | Angular, Blocky | Weak** | |
| | Granular, Subangular | Moderate, Strong | 0.30 |

*** Maximum allowable is 0.25 GPD/SF**

**** Requires a special site investigation**

**Drip dispersal will require significantly lower loading rates, or may not be allowed in soils with these characteristics**

**Reference: EPA/R-00/08, February 2002, "*Onsite Wastewater Treatment Systems Manual*"**

NSSH Exhibit 618-9

# Infiltration Rates: for general soil texture groups

| Soil Properties | | Permeability | | | Ksat | | |
|---|---|---|---|---|---|---|---|
| Texture | Classes | Rate In/Hr | | | Rate $um\ s^{-1}$ | | |
| | | Low | Rv | High | Low | Rv | High |
| S, Gr | Very rapid | 20.00 | 60.0000 | 100.00 | >141.00141 | >141.00 | |
| LS, FS | Rapid | 6.0000 | 13.0000 | 20.0000 | 42.0000 | 91.5000 | 141.0000 |
| LFS, FSL, SL | Moderately rapid | 2.0000 | 4.0000 | 6.0000 | 14.0000 | 28.0000 | 42.0000 |
| SCL, L, SIL, VFSL | Moderate | 0.6000 | 1.3000 | 2.0000 | 4.0000 | 9.0000 | 14.0000 |
| CL, SICL, SI, SIC, SC | Moderately slow | 0.2000 | 0.4000 | 0.6000 | 1.4000 | 2.7000 | 4.0000 |
| C, SIC | Slow | 0.0600 | 0.1300 | 0.2000 | 0.4200 | 0.9100 | 1.4000 |
| C W/ > 60% CLAY | Very slow | 0.0015 | 0.0308 | 0.0600 | 0.0100 | 0.2150 | 0.4200 |
| | Impermeable | 0.0000 | 0.0008 | 0.0015 | 0.0000 | 0.0005 | 0.0010 |

0.0600 @ 57,225 ft² 21,768 GPD

0.2000 72,561 GPD

From USDA NRCS

# Greene County, Tennessee

## Na—Needmore silt loam, rolling phase

### Map Unit Setting

*National map unit symbol:* kmh8
*Elevation:* 500 to 1,100 feet
*Mean annual precipitation:* 39 to 48 inches
*Mean annual air temperature:* 43 to 69 degrees F
*Frost-free period:* 169 to 183 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Needmore and similar soils:* 100 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Needmore

#### Setting

*Landform:* Ridges
*Landform position (three-dimensional):* Base slope
*Parent material:* Clayey residuum weathered from calcareous shale

#### Typical profile

*H1 - 0 to 7 inches:* silt loam
*H2 - 7 to 22 inches:* silty clay
*H3 - 22 to 30 inches:* very channery silty clay
*Cr - 30 to 34 inches:* bedrock

#### Properties and qualities

*Slope:* 5 to 12 percent
*Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 4.4 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* C

*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Greene County, Tennessee
Survey Area Data: Version 16, Sep 16, 2018

Table 1. Infiltration rates in gal/d/ft$^2$ for wastewater of >30 mg L$^{-1}$ or wastewater of <30 mg L$^{-1}$ and hydraulic linear loading rates in gal/d/ft for soil characteristics of texture and structure and site conditions of slope and infiltration distance. Values assume wastewater volume of >150 gal/d/bedroom. If horizon consistence is stronger than firm or any cemented class or the clay mineralogy is smectitic, the horizon is limiting regardless of other soil characteristics. {© 2000 by E. Jerry Tyler, printed with permission}.

| Soil characteristics | | | Infiltration loading rate, gal/da/ft$^2$ | | Hydraulic linear loading rate, gal/d/ft | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Slope | | | | | | | | |
| | | | | | 0-4% | | | 5-9% | | | >10% | | |
| | Structure | | | | Infiltration distance, inch | | | Infiltration distance, inch | | | Infiltration distance, inch | | |
| Texture | Shap | Grad | >30 mg/L | <30 mg/L | 8-12 | 12- | 24-48 | 8- | 12- | 24- | 8- | 12- | 24- |
| COS, S, LCOS, LS | -- | 0SG | 0.8 | 1.6 | 4.0 | 5.0 | 6.0 | 5.0 | 6.0 | 7.0 | 6.0 | 7.0 | 8.0 |
| FS,VFS,LFS,LVFS | -- | 0SG | 0.4 | 1.0 | 3.5 | 4.5 | 5.5 | 4.0 | 5.0 | 6.0 | 5.0 | 6.0 | 7.0 |
| CSL, SL | -- | 0M | 0.2 | 0.6 | 3.0 | 3.5 | 4.0 | 3.6 | 4.1 | 4.6 | 5.0 | 6.0 | 7.0 |
| | PL | 1 | 0.2 | 0.5 | 3.0 | 3.5 | 4.0 | 3.6 | 4.1 | 4.6 | 4.0 | 5.0 | 6.0 |
| | | 2, 3 | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PR/B K/G | 1 | 0.4 | 0.7 | 3.5 | 4.5 | 5.5 | 4.0 | 5.0 | 6.0 | 5.0 | 6.0 | 7.0 |
| | | 2,3 | 0.6 | 1.0 | 3.5 | 4.5 | 5.5 | 4.0 | 5.0 | 6.0 | 5.0 | 6.0 | 7.0 |
| FSL, VFSL | -- | 0M | 0.2 | 0.5 | 2.0 | 2.3 | 2.6 | 2.4 | 2.7 | 3.0 | 2.7 | 3.2 | 3.7 |
| | PL | 1,2,3 | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PR/B K/G | 1 | 0.2 | 0.6 | 3.0 | 3.5 | 4.0 | 3.3 | 3.8 | 4.3 | 3.6 | 4.1 | 4.6 |
| | | 2,3 | 0.4 | 0.8 | 3.3 | 3.8 | 4.3 | 3.6 | 4.1 | 4.6 | 3.9 | 4.4 | 4.9 |
| L | -- | 0M | 0.2 | 0.5 | 2.0 | 2.3 | 2.6 | 2.4 | 2.7 | 3.0 | 2.7 | 3.2 | 3.7 |
| | PL | 1,2, 3 | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PR/B K/G | 1 | 0.4 | 0.6 | 3.0 | 3.5 | 4.0 | 3.3 | 3.8 | 4.3 | 3.6 | 4.1 | 4.6 |
| | | 2, 3 | 0.6 | 0.8 | 3.3 | 3.8 | 4.3 | 3.6 | 4.1 | 4.6 | 3.9 | 4.4 | 4.9 |
| SIL | -- | 0M | 0.0 | 0.2 | 2.0 | 2.5 | 3.0 | 2.2 | 2.7 | 3.2 | 2.4 | 2.9 | 3.4 |
| | PL | 1,2,3 | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PR/B K/G | 1 | 0.4 | 0.6 | 2.4 | 2.7 | 3.0 | 2.7 | 3.0 | 3.3 | 3.0 | 3.5 | 4.0 |
| | | 2,3 | 0.6 | 0.8 | 2.7 | 3.0 | 3.3 | 3.0 | 3.5 | 4.0 | 3.3 | 3.8 | 4.3 |
| SCL,CL SICL | -- | 0M | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PL | 1,2,3 | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PR/B K/G | 1 | 0.2 | 0.3 | 2.0 | 2.5 | 3.0 | 2.2 | 2.7 | 3.2 | 2.4 | 2.9 | 3.4 |
| | | 2,3 | 0.4 | 0.6 | 2.4 | 2.9 | 3.4 | 2.7 | 3.0 | 3.3 | 3.0 | 3.5 | 4.0 |
| SC, C, SIC | -- | 0M | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PL | 1,2,3 | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | PR/B K/G | 1 | 0.0 | 0.0 | - | - | - | - | - | - | - | - | - |
| | | 2,3 | 0.2 | 0.3 | 2.0 | 2.5 | 3.0 | 2.2 | 2.7 | 3.2 | 2.4 | 2.9 | 3.4 |

## DRAINBACK CONSIDERATIONS

When the dosing cycle ends, much of the effluent remaining in the system will drain out of the dripperline. The effluent will drain to the lowest parts of the dripperline zone, and even on a nominal (1%) slope, this could cause localized soil overloading. It is important to anticipate where the effluent will flow when the dosing event ends. There are a number of design approaches that address this issue, but the important thing to remember is that caution should be taken to ensure that draindown of the effluent toward the bottom of the slope is minimized.

One of the reasons why Bioline dripperline is a good solution on slopes is due to its pressure compensation feature. Bioline drippers deliver the same flow from 7 to 58 psi, so changes in pressure at the dripper due to elevation-created pressure variances do not affect the delivery rate of the drippers.

Other products allow additional flow anywhere higher pressures exist and as such, the soil can become saturated very quickly at the base of the slope. With Bioline, all areas of the slope are dripped at the same rate. There is no need to increase field size with Bioline. Simply use as much of the slope as possible to deliver to. (See Figures 11 & 12).

**Install With the Contour:** Dripperline must be installed along the contour of the slope (as level as possible), not up and down the slope. Otherwise, all the effluent in the dripperline will drain rapidly to the emitters at the base of the slope, which can overload the soil.

**Feed from the Bottom of the Field:** As a rule, drip fields on a slope should be fed from the bottom. This technique will prevent the main lines and manifolds from draining to the field during rest periods. This strategy assumes that the field is uphill from the supply line. The supply manifold should "stair step" through a series of check valves, with a limited number of lines between each check valve. Check valves limit the down gradient flow of the water when the pump shuts down.

**Less Frequent, Longer Doses:** In more highly permeable soils with no restrictive conditions, longer dosing duration and decreased dosing frequency can help minimize the effects of drainback by reducing the number of cycles per day.

**Zone Valves Location:** To prevent mainline and submain drainage into the drip dispersal fields, zone valves should be installed as close as possible to the distribution field to minimize the volume of effluent subject to drainback. Local regulations often prohibit effluent from mains and submains draining into the drip fields during periods of rest.

**Deeper Line Burial:** Another way to manage potential drainback issues and the chance of surfacing is to bury the dripperline deeper. While this is not an optimal solution, it will at least dose the effluent deeper into the soil.

## COMMERCIAL WATER USE by Fixture or Appliance[a, b]

| Facility | Unit | Flow/Gallons/Unit/Day | | Flow/Liters/Unit/Day | |
|---|---|---|---|---|---|
| | | Range | Typical | Range | Typical |
| Airport | Passenger | 2 - 4 | 3 | 8 - 15 | 11 |
| Apartment House | Person | 40 - 80 | 50 | 150 - 300 | 190 |
| Automobile Service Station[c] | Vehicle Served | 8 - 15 | 12 | 30 - 57 | 45 |
| Automobile Service Station[c] | Employees | 9 - 15 | 13 | 34 - 57 | 45 |
| Bar | Customer | 1 - 5 | 3 | 4 - 19 | 11 |
| Bar | Employees | 10 - 16 | 13 | 38 - 61 | 49 |
| Boarding House | Person | 25 - 60 | 40 | 95 - 230 | 150 |
| Department Store | Toilet Room | 400 - 600 | 500 | 1,500 - 2,300 | 1,900 |
| Department Store | Employee | 8 - 15 | 10 | 30 - 57 | 38 |
| Hotel | Guest | 40 - 60 | 50 | 150 - 230 | 190 |
| Hotel | Employee | 8 - 13 | 10 | 30 - 49 | 38 |
| Industrial Building (sanitary waste only) | Employee | 7 - 16 | 13 | 26 - 61 | 49 |
| Laundry (self-service) | Machine | 450 - 650 | 550 | 1,700 - 2,500 | 2,100 |
| Laundry (self-service) | Wash | 45 - 55 | 50 | 170 - 210 | 190 |
| Office | Employee | 7 - 16 | 13 | 26 - 61 | 49 |
| Public Lavatory | User | 3 - 6 | 5 | 11 - 23 | 19 |
| Restaurant (with toilet) | Meal | 2 - 4 | 3 | 8 - 15 | 11 |
| Restaurant (conventional) | Customer | 8 - 10 | 9 | 30 - 38 | 34 |
| Restaurant (short order) | Customer | 3 - 8 | 6 | 11 - 30 | 23 |
| Restaurant (bar/cocktail lounge) | Customer | 2 - 4 | 3 | 8 - 15 | 11 |
| Shopping Center | Employee | 7 - 13 | 10 | 26 - 49 | 38 |
| Shopping Center | Parking Space | 1 - 3 | 2 | 4 - 11 | 8 |
| Theater | Seat | 2 - 4 | 3 | 8 - 15 | 11 |

*[a] Some systems serving more than 20 people might be regulated under US EPA's Class V Underground Injection Control (UIC) Program. See http://www.epa.gov/safewater/uic.html for more information.*
*[b] These data incorporate the effect of fixtures complying with the U.S. Energy Policy Act (EPACT) of 1994.*
*[c] Disposal of automotive wastes via subsurface wastewater infiltration systems is banned by Class V UIC regulations to protect ground water. See http://www.epa.gov/safewater/uic.html for more information.*

*Source: Crites and Tchobanoglous, 1998.*

***Table 6** - Typical Flow Rates from Commercial Sources*