RULES AND REGULATIONS

PERTAINING TO

DRIP DISPERSAL SYSTEMS

ACT 402 of 1977

A.C.A. 14-236-101 et seq.

Effective date

July 4, 2010

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SECTION 1. Authority and Purpose

1.1 The following RULES AND REGULATIONS PERTAINING TO DRIP DISPERSAL SYSTEMS are duly adopted and promulgated by the Arkansas State Board of Health pursuant to the authority expressly conferred by the laws of the State of Arkansas including, without limitation. Act 96 of 1913 (A.C. A. {20-7-109}, and Act 402 of 1977 (A.C. A. {14-236-101} et. Seq.).

1.2 Purpose: A drip dispersal system is a technology for the distribution of treated wastewater uniformly over a large area beneath the soil surface. Drip Dispersal fields are a "bed" design. The use of four (4) to six (6) inch installation cover does not fit the conventional trench design criteria utilized in the Onsite Wastewater Soil Morphology Program for system design.

SECTION 2. Definitions

2.1 **Aerobic Treatment Unit (ATU)**: A mechanical on-site treatment unit that provides secondary wastewater treatment by mixing air and aerobic and facultative microbes with the wastewater. ATU's typically use a suspended growth treatment process or a fixed treatment process.

2.2 **Air/Vacuum (A/V) Relief Valve**: A valve that automatically lets air out of or into liquid carrying pipe as needed in response to changes in system pressure.

2.3 **Aerobic**: Having molecular oxygen as a part of the environment, or growing or occurring only in the presence of molecular oxygen.

2.4 **Backwash**: The process of flow reversal to clean a filter and to restore it to the normal clean condition for filtering with a minimum resistance to flow through the media or screen.

2.5 **Control Panel**: An electronic control panel that controls the quantity and time of dose. This can also control the zone receiving the effluent, automatically flushes the lines, flushes the filters, monitors the flow rates and pump run cycles or times.

2.6 **Decentralized System**: An onsite and/or cluster wastewater system used to treat and disperse or discharge small volumes of wastewater, generally from dwellings or businesses that are located relatively close together.

2.7 **Disk Filter**: A type of filter that utilizes a series of grooved rings that overlay each other to form a network of very small openings to trap contaminants.

2.8 **Distributing Valve**: A valve that distributes flow to multiple drain field laterals, zones or locations by automatically rotating upon each pump cycle.

2.9 **Drain-back**: The process of effluent draining along the laterals and manifolds after the pump shuts off. Drainage occurs both inside and outside the drip tubing and manifolds to lower elevations in the drip field.

2.10 **Drip Line**: Tubing constructed from polyethylene with emitters embedded regularly along the length of the tube.

2.11 **Effluent**: Sewage, water or other liquids, partially or completely treated or in its natural state flowing out of a septic tank, aerobic treatment unit, or other treatment system or systems.

2.12 **Emitters**: Small diameter openings in drip line that can dissipate pressure and allow a slow, controlled discharge normally rated in gallons per hour.

2.13 **Field Flush**: Water is passed through the drip lateral for the purpose of removing particles and other debris from the walls of the drip tubing. The flush water is carried back through the return manifold and return line to the pretreatment unit.

2.14 **Filter**: A device for the main purpose of removing suspended solids and other debris from the wastewater.

2.15 **Hydraulic Conductivity**: The rate of water movement under unit gradient in a specific soil horizon.

2.16 **Interceptor Drain**: A subsurface drain line, usually constructed upgrade from the absorption area to divert seasonal groundwater.

2.17 **Lateral**: One single run or multiple runs of drip tubing connected at one end to a supply manifold and the other end connected to a return manifold.

2.18 **Maintenance Personnel**: An individual certified by the Department to conduct assessments under the Onsite Maintenance and Monitoring Program.

2.19 **Monitoring:** Periodic inspection of system for performance.

2.20 **Pressure Compensating (pc) Emitters**: Drip emitters that allow a constant flow or discharge over a wide range of applied pressure.

2.21 **Pressure Distribution**: A system of small diameter pipes equally distributing effluent through a trench or bed.

2.22 **Pressure Regulator**: A device used to regulate and maintain a constant discharge pressure.

2.23 **Pretreatment**: The treatment of effluent

2.25 **Return Manifold**: A collection manifold or piping that returns excessive wastewater and debris to the primary treatment tank during system flushes.

2.26 **Run**: One continuous length of tubing routed across contour connected to a supply line or return line or another run.

2.27 **Soil Structure**: The combination or arrangement of individual soil particles in definable aggregates, or peds, which are characterized and classified on the basis of size, shape, and degree of distinctness.

2.28 **Solenoid Valve**: An electric valve actuated by a solenoid, used for controlling the flow or liquid in pipes.

2.29 **Spin Filter**: A filter that consist of a screen cylinder enclose in a casing. The typical filter screen mesh size is 150 and a micron rating of 100.

2.30 **Static Plow**: A drip line plow with a shank that remains at a given depth as the plow is pulled through the soil.

2.31 **Supply Line**: The line that extends from the pump to the supply manifold of a given zone.

2.32 **Supply Manifold**: The supply manifold connects the supply line to the drip laterals.

2.33 **Vertical Separation**: The depth of unsaturated, original, undisturbed soil between the bottom of the drip tubing and highest seasonal water table or restrictive layer.

2.34 **Vibratory Plow**: A vibratory plow is a drip line plow with a shank that vibrates vertically as the plow is pulled through the soil.

2.35 **Water Table**: The level in saturated soil at which the hydraulic pressure is zero.

2.36 **Zone**: A group of laterals that are dosed at the same time.

SECTION 3. Site Assessment

3.1 Subsurface Drip System(s) may be utilized on sites that meet the following criteria

3.1.1 The minimum vertical separation between the drip tubing or installed trench bottom and any rock substrata (consolidated or fractured) shall be nine (9) inches or greater of undisturbed, natural soil.

3.1.2. The drip tubing or installed trench bottom shall be above the seasonal water table, whatever the duration. Brief seasonal water tables may be minimized or eliminated by the use of effective interceptor drains. Any design, which incorporates the use of an interceptor drain, shall indicate the effective depth of seasonal water table reduction.

3.1.3 The percent clay of a soil may be interpreted as a Seasonal Water Table Class Clay percentage, as it relates to seasonal water table interpretation, is sited in Section 8 of the Onsite Wastewater Regulations.

3.1.4 Soils that are structure less or with massive structure shall not be approved for onsite sub-surface treatment.

3.1.5 The lot size shall be of sufficient area to accommodate both the primary and secondary dispersal area. Both the primary and secondary dispersal area shall be sized according to the respective loading rates. If the lot can only support the primary dispersal field, a subsurface drip dispersal system shall not be installed. For lots three (3) acres or greater, the use of a surface discharge drip system may be considered. (See Surface Discharge Systems)

SECTION 4. Drip Tubing and Emitters

4.1 Emitter spacing can range from six (6) to twenty-four (24) inches. The emitters used in the tubing shall be pressure compensating. Pressure compensating emitters have a relatively constant discharge rate over a wide range of pressures. Emitter flow rate shall be specified by the designer and stated on the system plans. The drip line pressure can range from 5 to 70 pounds per square inch (PSI).

4.2 Drip tubing shall be installed by one of the following methods: static plow, chain trencher or vibratory plow.

4.3 Static plow is the preferred method for inserting drip tubing into the soil. The static plow shall be pulled not pushed through the soil.

4.4 Chain trencher may be used for placement of the drip tubing in the soil. The maximum chain trench width is four (4) inches.

4.5 Wet soil shall not be plowed because of smearing.

4.6 Drip tubing installed in natural soil shall be installed to a depth of six (6) inches.

4.7 If capping fill material is used as part or all of the cover over the tubing, the installed depth of the tubing can range from one (1) to five (5) inches in the natural soil. Drip tubing shall not be placed in the capping fill material. In no case shall the cover over the tubing be less than six (6) inches.

4.8 Settled depth of the cap shall not be more than eight (8) inches. The capping fill material shall not contain more than 27% clay or 60% sand or 70% silt. Before the capping fill material is delivered to the proposed dispersal site, a textural analysis shall be provided. A credit of up to 50% of the settled cap depth may be allowed in the adjustment of the seasonal water table. The seasonal water table credit is at the sole discretion of the Department.

SECTION 5. Pretreatment Requirements

5.1 The quality of effluent that will be applied to the dispersal field shall meet the American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 40 (revised 2005) requirements for class 1 treatment systems. Only pretreatment units that have obtained approval from the Department shall be used.

5.2 Pretreatment system shall be required as part of any Drip Dispersal System design.

5.3 The daily flow rate capacity of a pretreatment system shall equal or exceed the daily flow rates found in Appendix A.

5.4 Pretreatment systems installed in conjunction with an individual residential structure shall have a daily flow rate capacity of not less than 400 gallon per day.

5.5 Pretreatment systems installation on non-residential [illegible]

SECTION 8. Flow Meters and Pressure Gauges

8.1 A flow meter shall be installed after the filter system but before the drip dispersal field. The flow meter shall incorporate not only a rate of flow gauge but also a total gallons pumped register. The flow rate gauge and total gallons pumped register may be separate devices. The flow meter shall be installed in a protective box that will be of sufficient size for servicing the meter and to allow easy access for reading the meter. The flow meter shall be sized for the dispersal flow as well as the additional field flushing volume.

8.2 Pressure gauges shall be located before the filter, after the filter and on the dispersal field return line. Pressure gauges shall be enclosed in the head works box, which allows easy access for observation. The gauges shall be liquid filled and a minimum of three (3) inches in diameter. The pressure range of the gauge shall be sufficient for the maximum pressure that will be expected in the system.

SECTION 9. Supply Line and Manifold

9.1 The supply line and manifold should be designed with a flow velocity between the 0.5 feet per and 5 feet per second.

9.2 The piping and fittings in the supply line and the manifold shall be Schedule 40. Schedule 80 fittings shall be used at the filter system as well as any point where the piping will be disconnected or subjected to abuse.

9.3 When dosing, the supply manifold shall eliminate the drain back potential from a higher to a lower elevation in the drain field.

SECTION 10. Return Manifold and Line

10.1 The return manifold and line allow the flushing of the drip dispersal field. The flushed wastewater and solids shall be returned back to the settling tank or treatment tank.

SECTION 11. Flexible Hose and Tubing

11.1 Flexible Schedule 40 PVC piping shall be used at all connections to the supply and return manifolds.

SECTION 12. Air/Vacuum Relief Valves

12.1 Air/vacuum relief valves provide a means for releasing air at the start of a dose cycle, so the system will charge quickly with wastewater and allow air to enter the system quickly at the end of dose cycle. Air/vacuum valves shall be located at the highest points of either supply or return manifolds, or both.

12.2 Air/vacuum relief valves shall be sized based on the proposed design flow rate. A valve that is under sized will not provide an adequate amount of airflow.

12.3 A Schrader valve shall be provided at each vacuum valve as a means of checking the pressure of the drip field.

SECTION 13. Flushing Valves

13.1 Automatic flushing controls shall be required for all drip systems. The flush valve shall be a solenoid type valve. Manual flushing valves may be installed in the field flush line. Manually operated valves may be standard ball or gate valves. The flush valve shall be fully opened during a flush cycle regardless of the valve type. The field flushing velocity shall be in accordance with the drip tubing or system manufacturer's recommendations. The minimum field flushing velocity shall not be less than 0.5 feet per second.

SECTION 14. Pipe and Specialty Connectors and Fittings Standard

14.1 PVC pipe, tubing, reducer tees, adapters, elbows, couplers and compression fittings shall be constructed of Schedule 40 PVC.

14.2 Lock-Slip fittings, adapters, tees, elbows, and couplings shall be specifically manufactured for use with wastewater drip dispersal systems.

14.3 Insert Fittings, barbed adapters, tees, elbows, and couplings shall be specifically manufactured and sized for use with wastewater drip dispersal system.

SECTION 15. Headworks Boxes

15.1 Any component or assembly that may need to be routinely serviced shall be located in a headworks box that is readily accessible.

15.2 Headworks boxes may be constructed of high-density PE (polyethylene) fiberglass, PVC, or concrete.

15.3 Headworks boxes shall be large enough to allow ease of service and allow periodic removal and replacement of components as needed. The headworks box shall be of sufficient length and depth to accommodate the various components that will be housed in the box. The lid of the headworks box shall extend above the finished grade. The bottom of the headworks box shall be designed to drain any rainwater or wastewater away from the inside of the box. The headworks box lid shall be easy to remove but also shall be made tamperproof where access to the site is not restricted or controlled. The structural strength of the headworks box and lid shall be sufficient to withstand the weight of any lawn maintenance equipment or other service equipment that may roll over the box. If the box will be subject to excessive wheel loading, additional protection shall be provided.

SECTION 16. Zones and Related Components

16.1 Automatic distributing valves shall include clear Schedule 40 piping on the output of each zone.

16.2 Check valves, shall not be required if separate return lines are used to isolate returned wastewater to the pretreatment system.

SECTION 17. Pressure Regulators

17.1 Regulators shall be selected to allow sufficient pressure and flows for flushing. Pressure regulators shall be designed for use in wastewater drip dispersal system.

SECTION 18. System Installation

18.1 Protect the site prior to and after the installation of the drip system. Activities on the site shall be limited only to what is necessary for the installation of the system.

18.2 Any clearing or grubbing shall be performed based on a site-specific plan, which minimizes the disturbance of the soil and protects the overall soil characteristics. It may be necessary to use flexible PVC tubing to work around or over objects in the dispersal field; however the number of emitters shall not be reduced.

18.3 Drip tubing shall not be installed when the soil is wet or frozen.

18.4 Drip tubing shall be installed on contour.

18.5 Flexible Schedule 40 PVC tubing shall be used at each manifold connection to provide additional crimping protection and to prevent the tubing from being pulled out of the supply or return manifold as the soil settles.

18.6 Drip tubing shall be taped, or plugged or capped when cut. All piping shall be taped or capped at the end of the construction day.

18.7 PVC pipe cutters that cleanly shear the pipe or tubing shall be used rather than sawing the pipe or tubing.

18.8 Complete flushing of the supply line prior to the connection of the drip tubing shall be performed. Sufficient volume of water shall be used to ensure all debris is removed from both the supply line and the drip tubing.

18.9 A start-up system check shall be performed before the system is placed in operation. All operational functions that would be expected during routine operations shall be performed in a specified time period of not less than 24 hours. This operational test shall include but not be limited to: timed dose functions, volume loading, flow rates, pressures at the inlet and outlet of each zone, pressures at the inlet and outlet of filters, leak detection, flushing, and alarms.

18.10 Repairs or modifications shall be made to eliminate any wet spot.

18.11 The establishment of a vegetative cover is critical to the overall performance of a drip dispersal system. The dispersal area shall be covered with sod or mulch as soon as possible after the installation of the drip tubing.

SECTION 19. System Operation and Maintenance

19.1 Periodic servicing shall be required. The frequency of the service period is dependent on the operational parameters set for the system by its designer. The minimal service period shall not be less than once every three (3) months.

19.2 Alarms resulting from mechanical break downs shall be investigated and the situation causing the alarm resolved.

19.3 Owners of Drip Dispersal Systems are required to maintain a Maintenance and Monitoring Contract with Maintenance Personnel certified by the Department for the life of the system.

SECTION 20. System Design

20.1 The following procedure shall be used to determine the minimum surface area required for drip dispersal system.

20.2 The depth and duration of the seasonal water table shall be determined.

20.3 The sizing or loading rate chart found in Table 1 of this manual shall be used to determine the amount of surface area required for installation.

20.4 The spacing between drip tube laterals shall not be less than two (2) ft. center to center. Drip tube laterals spacing may be greater than two (2) ft. however, for the purpose of determining the length of tubing required for a dispersal field, all length calculation shall be two (2) ft. center to center.

20.5 The effective area of the dispersal field shall be calculated by dividing the daily wastewater flow rate (DWF) in gallons per day (gpd) by the soil loading rate (SLR) in gallons per foot square per day (g/ft ft^2/d). [Area of the dispersal field (DF) = design wastewater flow (DWF) ÷ soil loading rate (SLR).]

20.6 The length of the drip tubing shall be determined by dividing the dispersal field (DF) required by the drip tube spacing (DT) of two (2) Ft. [Drip tube length (DTL = dispersal field area (DF) ÷ drip tube spacing (DT) of two (2) ft.]

20.7 The number of emitters required shall be determined by dividing the drip tube length (DTL) by the emitter spacing (E) ft. [Drip line lateral length (ft.) ÷ emitter spacing (ft.) = Number of emitters.]

20.8 The loading rate for a soil which has a rock substrata (consolidated or fractured) and no seasonal water tables present above the rock substrata shall be sized as a moderate seasonal water table.

SECTION 21. Training and Certification

21.1 All Designated Representatives, Installers, Environmental Health Specialists, and Certified Maintenance Personnel shall be certified in the design, construction and maintenance of a drip dispersal system. The certification program will be provided or approved by the Department Onsite Wastewater Section.

SECTION 22. Surface Discharge Drip System

22.1 Under certain conditions, Drip Dispersal Systems may be approved as a surface discharge system.

22.2 The requirements for surface discharge are:

22.2.1. The site is unsuited for a subsurface drip dispersal system.

22.2.2. Pre-treatment shall be a Class 1 treatment unit as approved by the Department. (See Section 5 Pretreatment Requirements)

22.2.3 Lot size shall not be less than three (3) acres. The lot size shall not include road or highway right of ways or utility easements.

22.2.4. A one hundred (100) foot setback from any property lines shall be maintained in all directions from the drip dispersal field.

22.2.5. A maximum loading rate of 0.09 gallons per square foot per day shall be utilized.

22.2.6. Ultraviolet light disinfection units shall be used as the primary method of disinfection. Ultraviolet light (UV) units shall be approved by the Department. UV units shall be installed and maintained in accordance with manufacturers recommended practices.

SECTION 23. Variances and Exemptions

23.1 Requested variations from these Rules and Regulations will be considered and may be approved at the sole discretion of the Department.

23.2 Submission of proposed experimental onsite wastewater systems may be approved, disapproved, or approved on a trial basis for a specific period of time. Such approval or disapproval shall be at the sole discretion of the Department. Submission of an experimental design shall include data as to the efficiency of operation of the proposed experimental system. A monitoring plan shall be submitted for approval in addition to the system design.

23.3 Good management practices are additions or modifications to systems which will make such systems more efficient, or which could make such systems acceptable in certain soil conditions. Where good management practices are proposed for inclusion in a drip dispersal system, approval shall be at the sole discretion of the Department or its Authorized Agent.

SECTION 24. Fees

24.1 A fee shall be levied for the review of individual drip dispersal system permit application pursuant to A. C. A. § 14-236-116.

24.2 For structures one thousand five hundred square feet (1,500 sq. ft.) or less, the fee to review a permit application is thirty dollars ($30.00).

24.3 For structures more than one thousand five hundred square feet (1,500 sq. ft.) and less than two thousand square feet (2,000 sq. ft.), the fee to review a permit application is forty-five dollars ($45.00).

24.4 For structures more than two thousand square feet (2,000 sq. ft.) and less than three thousand square feet (3,000 sq. ft.), the fee to review a permit application is ninety dollars ($90.00).

24.5 For structures more than three thousand square feet (3,000 sq. ft.) and less than four thousand square feet (4,000 sq. ft.), the fee to review a permit application is one hundred twenty dollars ($120.00).

24.6 For structures four thousand (4,000 sq. ft.) and greater, the fee to review a permit application is one hundred fifty dollars ($150.00)

24.7 For the alteration, repair, or extension of any individual drip dispersal system, the fee to review a permit application is thirty dollars ($30.00).

24.8 In calculating the square footage of a residential structure for purposes of determining the applicable fee under this section the square footage of all auxiliary areas of the residential structure shall not be considered.

24.9 Auxiliary areas include garages, carports, porches, and other similar areas as determined by the Department.

24.10 Non-individual or multi structure permit submittals shall include a *Cost Estimate Worksheet (EHP-17).*

SECTION 25. Penalties

25.1 Any person, firm, corporation or association who violates any of the provisions of Act 402 of 1977, as Amended, or any Rules and Regulations promulgated under the authority of Act 402 of 1977, as Amended, shall upon conviction, be deemed guilty of a misdemeanor and shall be punished by a fine of not less than one hundred dollars ($100.00) nor more than one thousand dollars ($1,000.00)

SECTION 26. Severability

26.1 If any provisions of these Rules and Regulations, or the application thereof to any person is held invalid, such invalidity shall not affect other provisions or applications of these Rules and Regulations, which can effect without the invalid provisions of application, and to this end the provisions hereto are declared to be severable.

Section 27. Repeal

27.1 All Regulations and parts of Regulations in conflict herewith are hereby repealed.

SECTION 28. Certification

This is to certify that the foregoing Rules and Regulations for Mass Gatherings in Arkansas were adopted by the Arkansas State Board of Health at a regular session of said Board held in Little Rock, Arkansas on the 22nd day of April, 2010.

Paul Halverson, DrPH, FACHE

Director and State Health Officer

The foregoing Rules and Regulations, copy having been filed in my office, are hereby approved this 25th day of May, 2010.

Mike Beebe

Governor

TABLE I

DRIP DISPERSAL FIELD SIZE

AND

SOIL LOADING RATES

	Brief SWT		Mod SWT		Long SWT	
Dept to RMF	(g/ft^2/d)	FT^2/100 Gal./Day	(g/ft^2/d)	FT^2/100 Gal./Day	(g/ft^2/d)	FT^2/100 Gal./Day
1	0.021	4878.05	0.007	14634.1	0.003	29268.3
2	0.041	2439.02	0.014	7317.07	0.007	14634.1
3	0.062	1626.02	0.021	4878.05	0.010	9756.1
4	0.082	1219.51	0.027	3658.54	0.014	7317.07
5	0.103	975.61	0.034	2926.83	0.017	5853.66
6	0.123	813.008	0.041	2439.02	0.021	4878.05
7	0.144	696.864	0.048	2090.59	0.024	4181.18
8	0.164	609.756	0.055	1829.27	0.027	3658.54
9	0.185	542.005	0.062	1626.02	0.031	3252.03
10	0.205	487.805	0.068	1463.41	0.034	2926.83
11	0.226	443.459	0.075	1330.38	0.038	2660.75
12	0.246	406.504	0.082	1219.51	0.041	2439.02
13	0.267	375.235	0.089	1125.7	0.044	2251.41
14	0.287	348.432	0.096	1045.3	0.048	2090.59
15	0.308	325.203	0.103	975.61	0.051	1951.22
16	0.328	304.878	0.109	914.634	0.055	1829.27
17	0.349	286.944	0.116	860.832	0.058	1721.66
18	0.369	271.003	0.123	813.008	0.062	1626.02
19	0.390	256.739	0.130	770.218	0.065	1540.44
20	0.410	243.902	0.137	731.707	0.068	1463.41
21	0.431	232.288	0.144	696.864	0.072	1393.73
22	0.451	221.729	0.150	665.188	0.075	1330.38
23	0.472	212.089	0.157	636.267	0.079	1272.53
24	0.492	203.252	0.164	609.756	0.082	1219.51
25	0.513	195.122	0.171	585.366	0.085	1170.73
26	0.533	187.617	0.178	562.852	0.089	1125.7
27	0.554	180.668	0.185	542.005	0.092	1084.01
28	0.574	174.216	0.191	522.648	0.096	1045.3
29	0.595	168.209	0.198	504.626	0.099	1009.25
30	0.615	162.602	0.205	487.805	0.103	975.61
31	0.636	157.356	0.212	472.069	0.106	944.138
32	0.656	152.439	0.219	457.317	0.109	914.634
33	0.677	147.82	0.226	443.459	0.113	886.918
34	0.697	143.472	0.232	430.416	0.116	860.832
35	0.718	139.373	0.239	418.118	0.120	836.237

	Brief SWT		Mod SWT		Long SWT	
Dept to RMF	(g/ft^2/d)	FT^2/100 Gal./Day	(g/ft^2/d)	FT^2/100 Gal./Day	(g/ft^2/d)	FT^2/100 Gal./Day
36	0.738	135.501	0.246	406.504	0.123	813.008
37	0.759	131.839	0.253	395.517	0.126	791.035
38	0.779	128.37	0.260	385.109	0.130	770.218
39	0.800	125.078	0.267	375.235	0.133	750.469
40	0.820	121.951	0.273	365.854	0.137	731.707
41	0.841	118.977	0.280	356.93	0.140	713.861
42	0.861	116.144	0.287	348.432	0.144	696.864
43	0.882	113.443	0.294	340.329	0.147	680.658
44	0.902	110.865	0.301	332.594	0.150	665.188
45	0.935	106.952	0.308	325.203	0.154	650.407
46	0.943	106.045	0.314	318.134	0.157	636.267
47	0.964	103.788	0.321	311.365	0.161	622.73
48	0.984	101.626	0.328	304.878	0.164	609.756

APPENDIX A

-QUANTITIES OF WASTEWATER FLOW FOR VARIOUS TYPES OF ESTABLISHMENTS

ESTABLISHMENT TYPE	**GALLONS PER DAY**
Airports, bus terminals, train stations	
Per passenger	5
Add per employee per 8 hour shift	20
Barber & beauty shops per chair	100
Bowling alleys	
Toilet wastes per line	100
For food service, add restaurant usage below	
Camps	
Campground with central comfort stations per camper	35
Day camps (no meals served) per camper	15
Per non- resident camper	50
Per resident camper or employee	75
Churches	
Per seat/no food service	5
For food service, add restaurant usage below	
For daycares, add school usage below	
Commercial establishments excluding deli, bakery, or meat department	
Per 100 square feet of floor space	10
Add per 100 square feet of deli floor space	50
Add per 100 square feet of bakery floor space	50
Add per 100 square feet of meat market floor space	100
Country clubs	
Per resident member	100
Per non-resident member present	25
Dentists offices	
Per wet service chair	200
Add per non wet service chair	50
Doctors office	
Per practitioner	250
Add per employee per 8 hour shift	20
Factories, exclusive of industrial waster	
Gallons per employee per 8 hour shift	
No showers provided	20
Showers provided	35
Hospitals	
Per bed space	200

For food service excluding patients, add restaurant usage below	
Hotels & Motels	
Regular per room	150
Resort hotels & cottages	75
Add for establishments with self service laundry facility per machine	750
Institutions per meal served per day	65
Mobile home parks	
Per single wide mobile home space	300
Per double wide mobile home space	450
Nursing homes, rest homes, adult congregate living facilities	
Per bed	100
Add for food service (see Institutions, this chart)	
Office buildings per employee per 8 hour shift	15
Parks, public picnic	
Toilets only per person	5
With bath house, showers, & toilets per person	10
Recreation vehicle park	
Recreational vehicle space for overnight stay,	
Without water & sewer hookup per vehicle space	75
Recreational vehicle space for overnight stay,	
With water & without sewer hookup per vehicle space	100
Recreational vehicle space for overnight stay	
With water & sewer hookup per vehicle space	150
Restaurants	
Per day per seat per meal setting	30
Using single service articles only per seat	25
Bar and cocktail lounge per seat	30
Carry out only	
Per meal served without public restrooms	5
Per meal served with public restrooms	10
Add per employee per 8 hour shift	15
Residences	
Single or multiple family per dwelling unit	
1 bedroom	150
2 bedroom	270
3 bedroom	370
4 bedroom	450
For each additional bedroom add	50
Rooming houses per occupant space	75
Schools per student	
Day schools & day cares	15
Add for showers	10
Add for food service	5
Add for day school workers	20
Boarding schools	75

Service stations & convenience stores	
Per vehicle served	10
Food service, per meal served	5
Stadiums, race tracks, ball parks per seat	5
Swimming pools and bathhouses per patron	10
Theaters	
Indoor, movies/auditorium per seat	5
Outdoor, drive-ins per space	10
Veterinary clinic	
Per practitioner	250
Add per employee per 8 hour shift	20
Add per kennel, stall, or cage	20

FOOTNOTES:

The estimated flows for residential systems assume a maximum occupancy of 2 persons per bedroom. Where residential care facilities (non-institutional) will house more than 2 persons in any bedroom, estimated flows are to be increased by 75 gallons per each additional occupant.

Waste from food service operations is commercial in nature and may require special system sizing and treatment/disposal considerations. For food service operations, kitchen wastewater flows are normally to be calculated at 66% of the total wastewater flow. Estimated daily flow is based on 3 meals served per seat per meal setting.

Systems serving high volume establishments, such as fast food restaurants, convenience stores, and service stations require special sizing consideration due to above average wastewater volume expected from restroom facilities.