LARIMER COUNTY DEPARTMENT OF HEALTH AND ENVIRONMENT

LARIMER COUNTY

COMMITTED TO EXCELLENCE

ON-SITE WASTEWATER TREATMENT SYSTEM REGULATIONS

ADOPTED: April 10, 2014
EFFECTIVE: May 27, 2014
AMENDED: April 19, 2018
EFFECTIVE: June 04, 2018

1525 Blue Spruce Drive, Fort Collins, Colorado 80524

43.1 Authority

This regulation is promulgated pursuant to the On-site Wastewater Treatment System Act, 25-10-101, et seq. C.R.S.

43.2 Scope and Purpose

A. Declaration

1. The Larimer County Board of Health declares the intent of these Regulations is to preserve the environment and protect the public health and water quality; to eliminate and control the causes of disease, infection, and aerosol contamination; and to reduce and control the pollution of the air, land, and water; it is declared to be in the public interest to establish minimum standards, rules, and regulations for on-site wastewater treatment systems (OWTS) in the County of Larimer and to provide the authority for the administration and enforcement of such minimum standards, rules, and regulations. Further, the Board recognizes that some sites in Larimer County may be unsuitable for any type of OWTS and ownership of the property, or the fact that the site is part of a platted subdivision, shall not guarantee to any person that a sewage system application will be approved for the site.

2. This regulation will apply to On-site Wastewater Treatment Systems as defined in section 25-10-103(12), C.R.S.

B. Purpose

1. The purpose of this regulation as authorized by the OWTS Act is to establish minimum standards for the location, design, construction, performance, installation, alteration and use of OWTS within the state of Colorado, and establish the minimum requirements for regulations adopted by local boards of health including but not limited to permit application requirements; requirements for issuing permits; the inspection, testing, and supervision of installed systems; the maintenance and cleaning of systems; the disposal of waste material and the issuance of cease and desist orders.

C. Effluent Discharged to Surface Waters

1. Any system that will discharge into surface waters must be designed by a professional engineer. The discharge permit application must be submitted for preliminary approval to the local Board of Health. Once approved by the local Board of Health, the application must be submitted to the Water Quality Control Division for review in accordance with the Water Quality Control Act, 25-8-101, et seq .C.R.S, and all applicable regulations of the Water Quality Control Commission. Compliance with such a permit will be deemed full compliance with this regulation.

D. Jurisdiction of Local Health Agencies

1. The jurisdiction of any local health agency extends over all unincorporated areas and over all municipal corporations within the territorial limits of the county or the counties comprising the district public health agency, but not over the territory of any municipal corporation that maintains its own public health agency.

43.3 Definitions

1. "Absorption system" means a leaching field and adjacent soils or other system for the treatment of sewage in an On-site Wastewater Treatment System by means of absorption into the ground. See Soil treatment area.

2. “Accessible” means easily reached, attained or entered by the necessary equipment or maintenance provider.

3. "Applicant" means a person who submits an application for a permit for an On-site Wastewater Treatment System.

4. “Basal Area” means the effective surface area available to transmit the treated effluent from the filter media in a mound system into the in-situ receiving soils. The perimeter is measured at the interface of the imported fill material and in-situ soil. On sloping sites, only the area down-gradient from the up-slope edge of the distribution media may be included in this calculation.

5. "Bed" means a below-grade soil treatment area with a level sub-base, consisting of a shallow excavation greater than three feet wide containing distribution media and more than one lateral.

6. "Bedrock" means continuous rock that underlies the soil or is exposed at the surface. Bedrock is generally considered impervious, but if fractured or deteriorated, it may allow effluent to pass through without adequate treatment.

7. “Bedroom” means a room with an egress window and door, closet, and/or is intended for sleeping purposes.

8. "Biochemical Oxygen Demand, Five-Day" (BOD_5) means quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating biodegradable organic matter under aerobic conditions over a five-day incubation period; expressed in milligrams per liter (mg/L).

9. "Biochemical Oxygen Demand, Carbonaceous Five Day" ($CBOD_5$) means quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating the organic matter under aerobic conditions over a five-day incubation period while in the presence of a chemical inhibitor to block nitrification; expressed in milligrams per liter (mg/L).

10. “Board of Health” means the Board of Health appointed by the Board of County Commissioners of Larimer County, Colorado.

11. "Building sewer" means piping that conveys wastewater to the first system component or the sewer main.

12. "Carbonaceous Biochemical Oxygen Demand" See Biochemical Oxygen Demand, Carbonaceous.

13. "Cesspool" means an unlined or partially lined underground pit or underground perforated receptacle into which raw household wastewater is discharged and from which the liquid seeps into the surrounding soil. Cesspool does not include a septic tank.

14. "Chamber" means an open, arch-shaped structure providing an open-bottom soil interface with permeable sidewalls used for distribution of effluent in a soil absorption system.

15. “Cistern” means an underground, enclosed unpressurized reservoir or tank for storing water as part of a water well or potable water supply system.

16. "Cleaning" means the act of removing septage or other wastes from a wastewater treatment system component or grease/waste from a grease interceptor.

17. "Colorado Plumbing Code" means Rules and Regulations of the Colorado State Plumbing Board (3 CCR 720-1).

18. "Commission" means the Water Quality Control Commission created by section 25-8-201, C.R.S.

19. “Competent Technician” means a person working under the supervision of a Professional Engineer or Professional Geologist or an employee of the Department who has received training in soil and site evaluations per the requirements of section 43.5.I, and who is able to conduct and interpret the results of soil profile test pit excavations, percolation tests, and site evaluations.

20. "Component" means a subsection of an On-site Wastewater Treatment System; a component may include multiple devices.

21. 'Composting toilet" means a self-contained waterless toilet designed to decompose non-water-carried human wastes through microbial action and to store the resulting matter for disposal.

22. "Consistence" means the degree and kind of cohesion and adhesion that soil exhibits and/or the resistance of soil to deformation or rupture under an applied stress to an extent that the soil density would restrict permeability. Aspects of consistence are used to determine if the horizon will have permeability lower than that of the defined soil type. Additional insight to consistence can be found in the UDSA-NRCS Field book for Describing and Sampling Soils; Version 3.0, Sept. 2012.

23. "Crest" means the highest point on the side of a dry gulch or cut bank.

24. “Cut-bank” means a nearly vertical slope caused by erosion or construction that has exposed historic soil strata.

25. "Deep gravel system" means a soil treatment area for repairs only where the trenches utilize a depth of gravel greater than 6 inches below the distribution pipe and sidewall area is allowed according to a formula specified in this regulation.

26. “Deficiency” See Malfunction.

27. “Department” means the Larimer County Department of Health and Environment.

28. "Design" means 1. the process of selecting, sizing, locating, specifying, and configuring treatment train components that match site characteristics and facility use as well as creating the associated written documentation; and 2. written documentation of size, location, specification and configuration of a system.

29. "Design capacity" See Flow, Design.

30. "Design flow" See Flow, Design.

31. "Designer, on-site wastewater treatment system" means a practitioner who utilizes site evaluation and investigation information to select an appropriate OWTS and prepares a design document in conformance with this regulation.

32. "Distribution" means the process of conveying wastewater or effluent to one or more components, devices, or throughout a soil treatment area.

33. "Distribution box" means a watertight component that receives effluent from a septic tank or other treatment unit and distributes effluent via gravity in approximately equal portions to two or more distribution laterals in the soil treatment area.

34. "Division" means the division of administration of the department of which the Water Quality Control Division is a part.

35. "Domestic wastewater" See Wastewater, domestic.

36. "Domestic Wastewater Treatment Works" means a system or facility for treating, neutralizing, stabilizing, or disposing of domestic wastewater which system or facility has a designed capacity to receive more than 2,000 gallons of domestic wastewater per day. The term "domestic wastewater treatment works" also includes appurtenances to such system or facility such as outfall sewers and pumping stations and to equipment related to such appurtenances. The term "domestic wastewater treatment works" does not include industrial wastewater treatment plants or complexes whose primary function is the treatment of industrial wastes, notwithstanding the fact that human wastes generated incidentally to the industrial process are treated therein. 25-8-103 (5), C.R.S.

37. "Dosing" means a high rate periodic discharge into a soil treatment area.

38. "Dosing, demand" means configuration in which a specific volume of effluent is delivered to a component based upon patterns of wastewater generation from the source.

39. "Dosing, pressure" means a uniform application of wastewater throughout the intended portion of the soil treatment area through small diameter pipes and orifices, under pressure. For this definition, the term pressure indicates that the system is capable of creating upward movement of effluent out of the distribution system piping.

40. "Dosing, timed" means a configuration in which a specific volume of effluent is delivered to a component based upon a prescribed interval, regardless of facility water use.

41. "Dosing siphon" means a device used for demand dosing effluent; which stores a predetermined volume of water and discharges it at a rapid rate, from a tank at a given elevation to a component at a lower elevation, accomplished by means of atmospheric pressure and the suction created by the weight of the liquid in the conveying pipe.

42. "Dosing tank" means a tank, compartment or basin that provides for storage of effluent from a septic tank or other treatment unit intended to be delivered to a soil treatment area at a high rate periodic discharge.

43. "Drainfield" See Soil treatment area.

44. "Drop box" means a device used for serial or sequential distribution of effluent by gravity flow to a lateral of a soil treatment area.

45. "Dry gulch" See Gulch, dry.

46. "Drywell" means an unlined or partially lined underground pit (regardless of geometry) into which drainage from roofs, basement floors, water softeners or other non-wastewater sources is discharged and from which the liquid seeps into the surrounding soil.

47. "Effective Size" means the size of granular media such that 10 percent by weight of the media is finer than the size specified.

48. "Effluent" means the liquid flowing out of a component or device of an On-site Wastewater Treatment System.

49. "Effluent filter" See Effluent screen.

50. "Effluent pipe" means non-perforated pipe that conveys effluent from one On-site Wastewater Treatment System component to the next.

51. "Effluent screen" means a removable, cleanable (or disposable) device installed on the outlet piping of a septic tank for the purpose of retaining solids larger than a specific size and/or modulating effluent flow rate. An effluent screen may be a component of a pump installation. An effluent screen may also be installed following the septic tank but before higher level treatment components or a soil treatment area.

52. "Environmental health specialist" means a person trained in physical, biological, or sanitary science to carry out educational and inspectional duties in the field of environmental health.

53. "Evapotranspiration/absorption system" means an unlined On-site Wastewater Treatment component that uses evaporation, transpiration, and absorption for dispersal of effluent.

54. "Evapotranspiration system" means an On-site Wastewater Treatment component with a continuous, impermeable liner that uses evapotranspiration and transpiration for dispersal of effluent.

55. "Experimental system" means a design or type of system based upon improvements or development in the technology of sewage treatment that has not been fully tested.

56. "Failure" means a condition existing within any component of an OWTS which prevents the system from functioning as intended, and which results in the discharge of untreated or partially treated wastewater onto the ground surface, into surface water or ground water, or which results in the back-up of sewage into the building sewer. Other conditions within an OWTS component that are deemed by the Department to be a threat to public health and/or safety may also be deemed a failure.

57. "Field performance testing" means data gathering on a system in actual use that is being proposed for Division acceptance.

58. "Floodplain (100-year)" means an area adjacent to a stream which is subject to flooding as the result of the occurrence of a one hundred (100) year flood, and is so adverse to past, current or foreseeable construction or land use as to constitute a significant hazard to public or environmental health and safety or to property or is designated by the Federal Emergency Management Agency (FEMA) or National Flood Insurance Program (NFIP). In the absence of FEMA/NFIP maps, a professional engineer must certify the flood plain elevations.

59. "Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot or as designated by the Federal Emergency Management Agency or National Flood Insurance Program. In the absence of FEMA/NFIP maps, a professional engineer must certify the floodway elevation and location.

60. "Flow, daily" means the measured volume of wastewater generated from a facility in a 24-hour period expressed as gallons per day.

61. "Flow, design" means the estimated volume of wastewater per unit of time for which a component or system is designed. Design flow may be given in the estimated volume per unit such as person per unit time that must be multiplied by the maximum number of units that a facility can accommodate over that time.

62. "Flow equalization" means a system configuration that includes sufficient effluent storage capacity to allow for regulated flow on a daily or multi-day basis to a subsequent component despite variable flow from the source.

63. "Flow equalizer" means an adjustment device to evenly distribute flow between outlets in a distribution box or other device that may be out of level.

64. "Grease interceptor tank" means a watertight device located outside a facility designed to intercept, congeal, and retain or remove fats, oils, and grease from sources such as commercial food-service that will generate high levels of fats, oils and greases.

65. "Ground water" means that part of the subsurface water that is at or below the saturated zone.

66. "Ground water surface" means the uppermost limit of an unconfined aquifer at atmospheric pressure.

67. "Guidelines" means State Board of Health Guidelines on Individual Sewage Disposal Systems, 5 CCR 1003-6 – predecessor of Regulation 43, On-site Wastewater Treatment System Regulation, 5 CCR 1002-43.

68. "Gulch, dry" means a deep, narrow ravine marking the course of an intermittent or ephemeral stream.

69. "Health officer" means the chief administrative and executive officer of the Department, or the appointed health officer of the Board of Health. Health officer includes the director of the Department.

70. "Higher level treatment" means designated treatment levels other than treatment level 1. (See Table 6-3)

71. “Holding tank” See Vault.

72. "Individual Sewage Disposal System" means a term used for On-site Wastewater Treatment System in Colorado regulations from 1973 until 2013.

73. "Infiltrative surface" means designated interface where effluent moves from distribution media or a distribution product into treatment media or original soil. In standard trench or bed systems this will be the interface of the distribution media or product and in-situ soil. Two separate infiltrative surfaces will exist in a mound system and an unlined sand filter, one at the interface of the distribution media and fill sand, the other at the interface of the fill sand and in-situ soil.

74. "Inspection port" means an access point in a system component that enables inspection, operation and/or maintenance.

75. "Invert" means elevation of the bottom of the inside pipe wall or fitting.

76. "Lateral" means a pipe, chamber or other conveyance used to carry and distribute effluent.

77. "Leach field" See Soil treatment area.

78. "Limiting layer" means a horizon or condition in the soil profile or underlying strata that limits the treatment capability of the soil or severely restricts the movement of fluids. This may include soils with low or high permeability, impervious or fractured bedrock, or a seasonal or current ground water surface.

79. "Liner" means an impermeable synthetic or natural material used to prevent or restrict infiltration and/or exfiltration. For the purposes of this regulation, the minimum thickness of a liner must be 30 ml.

80. “Linear loading rate” means the amount of effluent applied per linear foot along the contour (gpd/linear ft.).

81. "Local Board of Health" means any local, county, or district Board of Health.

82. "Local health department" See Department.

83. "Long-term acceptance rate" (LTAR) means design parameter expressing the rate that effluent enters the infiltrative surface of the soil treatment area at equilibrium, measured in volume per area per time, e.g. gallons per square foot per day (gal/ ft^2 /day).

84. "Malfunction" means the condition in which a component is not performing as designed or installed and is in need of repair in order to function as originally intended.

85. "Manufactured media" See Media, other manufactured.

86. "Media" means solid material that can be described by shape, dimensions, surface area, void space, and application.

87. “Media, enhanced manufactured” means an accepted proprietary manufactured distribution product, wrapped in a specified fabric, and placed on a specified sand base or media that does not mask the infiltrative surface of the in-situ soil.

88. "Media, other manufactured" means an accepted proprietary manufactured distribution product made of synthetic media for distribution of effluent that is placed directly on the in-situ soil.

89. "Media, treatment" means non-or slowly-degradable media used for physical, chemical, and/or biological treatment in an On-site Wastewater Treatment System component.

90. "Mound" means a soil treatment area whereby the infiltrative surface must be placed at or above original grade to meet vertical separation requirements to a limiting layer.

91. "Nitrogen reduction" means a minimum 50 percent reduction of influent nitrogen strength which is the minimum objective of NSF/ANSI Standard 245 - Wastewater Treatment Systems - Nitrogen Reduction.

92. "On-Site Wastewater Treatment System" or "OWTS" and, where the context so indicates, the term "system" means an absorption system of any size or flow or a system or facility for treating, neutralizing, stabilizing, or dispersing sewage generated in the vicinity, which system is not a part of or connected to a sewage treatment works.

93. "OWTS Act" means the On-site Wastewater Treatment System Act, 25-10-101, et seq. C.R.S.

94. "Percolation test" means a subsurface soil test at the depth of a proposed absorption system or similar component of an OWTS to determine the water absorption capability of the soil, the results of which are normally expressed as the rate at which one inch of water is absorbed. The rate is expressed in minutes per inch.

95. "Performance standard" means minimum performance criteria for water quality and operation and maintenance established by the regulatory authority to ensure compliance with the public health and environmental goals of the state or public health agency.

96. "Permeability" means the property of a material which permits movement of water through the material.

97. "Permit" means a permit for the construction or alteration, installation, and use or for the repair of an On-site Wastewater Treatment System.

98. "Person" means an individual, partnership, firm, corporation, association, or other legal entity and also the state, any political subdivision thereof, or other governmental entity.

99. "Pressure distribution" See Dosing, pressure.

100. "Privy" means an above grade structure allowing for the disposal of excreta not transported by a sewer and which provides privacy and shelter and prevents access to the excreta by flies, rodents, or other vectors.

    a. Pit privy – privy over an unlined excavation.

    b. Vault privy – privy over a vault.

101. "Professional engineer" means an engineer licensed in accordance with section 12-25-1, C.R.S.

102. "Professional geologist" means a person who is a graduate of an institution of higher education which is accredited by a regional or national accrediting agency, with a minimum of thirty semester (forty-five quarter) hours of undergraduate or graduate work in a field of geology and whose post-baccalaureate training has been in the field of geology with a specific record of an additional five years of geological experience to include no more than two years of graduate work. 23-41-208, C.R.S. and 34-1-201, C.R.S.

103. "Proprietary product" means a manufactured component or other product that is produced by a private person. It may be protected by patent, trademark or copyright.

104. "Public domain technology" means a system that is assembled on location from readily available components and is based on well-established design criteria and is not protected by patent, trademark or copyright.

105. “Record drawing” means construction drawings provided to illustrate the progress or completion of the installation of an OWTS, or components of the OWTS; typically based on field inspections by the designer or Department.

106. "Redoximorphic" means a soil property that results from the reduction and oxidation of iron and manganese compounds in the soil after saturation with water and subsequent desaturation.

107. "Remediation system" means a treatment system, chemical/biological additive or physical process that is proposed to restore the soil treatment area of an OWTS to intended performance.

108. “Repair” means restoration of functionality and/or treatment by reconstruction, relocation, or replacement of an on-site wastewater treatment system or any component thereof in order to allow the system to function as intended.

109. “Replacement system” See Repair.

110. "Riser" means a watertight vertical cylinder and lid allowing access to an OWTS component for inspection, cleaning, maintenance, or sampling.

111. "Rock-plant filter" means a designed system which utilizes treatment media and various wetland plants to provide treatment of wastewater through biological, physical, and chemical processes. Also called a constructed wetland.

112. "Sand filter" means an engineer designed OWTS that utilizes a 24” or greater layer of specified sand as filter and treatment media and incorporates pressure distribution.

113. "Sand filter, lined" means an engineer designed OWTS that has an impervious liner and under-drain below the specified sand media. Lined sand filters may be intermittent / single pass where the effluent is distributed over the sand bed a single time before distribution to a soil treatment area, or re-circulating where part of the effluent is returned to an earlier component for additional treatment before distribution to a soil treatment area.

114. "Sand filter, unlined" means an engineer designed OWTS that includes a layer of specified sand used as a treatment media without a liner between the sand and the existing soil on which it is placed.

115. "Seepage pit" means an excavation deeper than it is wide that receives septic tank effluent and from which the effluent seeps from a structural internal void into the surrounding soil through the bottom and openings in the side of the pit.

116. "Septage" means a liquid or semisolid that includes normal household wastes, human excreta, and animal or vegetable matter in suspension or solution generated from a residential septic tank system. Septage may include such material issued from a commercial establishment if the commercial establishment can demonstrate to the Division that the material meets the definition for septage set forth in this subsection. Septage does not include chemical toilet residuals.

117. "Septic tank" means a watertight, accessible, covered receptacle designed and constructed to receive sewage from a building sewer, settle solids from the liquid, digest organic matter, store digested solids through a period of retention, and allow the clarified liquids to discharge to other treatment units for final disposal.

118. "Sequential distribution" means a distribution method in which effluent is loaded into one trench and fills it to a predetermined level before passing through a relief pipe or device to the succeeding trench. The effluent does not pass through the distribution media before it enters succeeding trenches.

119. "Serial distribution" means a distribution method in which effluent is loaded into one trench and fills it to a predetermined level before passing through a relief pipe or device to the succeeding trench. The effluent passes through the distribution media before entering succeeding trenches which may be connected to provide a single uninterrupted flow path.

120. "Sewage" means a combination of liquid wastes that may include chemicals, house wastes, human excreta, animal or vegetable matter in suspension or solution, and other solids in suspension or solution, and that is discharged from a dwelling, building, or other establishment. See also Wastewater, domestic.

121. "Sewage treatment works" has the same meaning as "domestic wastewater treatment works" under section 25-8-103, C.R.S.

122. "Site evaluation" means a comprehensive analysis of soil and site conditions for an OWTS.

123. "Site evaluator" means a practitioner who conducts preconstruction site evaluations, including visiting a site and performing soil analysis, a site survey, or other activities necessary to determine the suitability of a site for an OWTS.

124. "Slit trench latrine" means a temporary shallow trench for use as disposal of non-water-carried human waste.

125. "Soil" means 1. unconsolidated mineral and/or organic material on the immediate surface of the earth that serves as a medium for the growth of plants and can potentially treat wastewater effluent; 2. unconsolidated mineral or organic matter on the surface of the earth that has been subjected to and shows effects of: a) pedogenic and environmental factors of climate (including water and temperature effects) and b) macro and microorganisms, conditioned by relief, acting on parent material over a period of time.

126. "Soil evaluation" means a percolation test, soil profile, or other subsurface soil analysis at the depth of a proposed soil treatment area or similar component or system to determine the water absorption capability of the soil, the results of which are normally expressed as the rate at which one inch of water is absorbed or as an application rate of gallons per square foot per day.

127. "Soil horizon" means layers in the soil column differentiated by changes in texture, color, redoximorphic features, bedrock, structure, consistence, and any other characteristic that affects water movement or treatment of effluent.

128. "Soil morphology" means 1. physical constitution of a soil profile as exhibited by the kinds, thickness, and arrangement of the horizons in the profile; and by the texture, structure, consistence, and porosity of each horizon; and 2. visible characteristics of the soil or any of its parts.

129. "Soil profile test pit excavation" means a trench or other excavation used for access to evaluate the soil horizons for properties influencing effluent movement, bedrock, evidence of seasonal high ground water, and other information to be used in locating and designing an On-site Wastewater Treatment System.

130. "Soil structure" means the naturally occurring combination or arrangement of primary soil particles into secondary units or peds; secondary units are characterized on the basis of type, size class, and grade (degree of distinctness).

131. "Soil texture" means proportion by weight of sand, silt, and clay in a soil.

132. "Soil treatment area" means the physical location where final treatment and dispersal of effluent occurs. Soil treatment area includes drainfields, mounds and drip fields.

133. "Soil treatment area, alternating" means final treatment and distribution component that is composed of two soil treatment areas that are independently dosed.

134. "Soil treatment area, sequencing" means a soil treatment area having more than two sections that are dosed on a frequent rotating basis.

135. "State Waters" has the meaning set forth under section 25-8-103. C.R.S.

136. "Strength, wastewater" means the concentration of constituents of wastewater or effluent; usually expressed in mg/L.

137. "Suitable soil" means a soil which will effectively treat and filter effluent by removal of organisms and suspended solids, which meets long-term acceptance rate requirements as defined in Table 10-1, and has the required vertical thickness below the infiltrative surface and above a limiting layer.

138. "Systems cleaner" means a person engaged in and who holds himself or herself out as a specialist in the cleaning and pumping of On-site Wastewater Treatment Systems and removal of the residues deposited in the operation thereof.

139. "Systems contractor" means a person engaged in and who holds himself or herself out as a specialist in the installation, renovation, and repair of On-site Wastewater Treatment Systems.

140. "Total suspended solids" means measure of all suspended solids in a liquid; typically expressed in mg/L.

141. "Transfer of Title" means change of ownership of a property.

142. "Treatment level" means defined concentrations of pollutants to be achieved by a component or series of components of an OWTS.143.

143. "Treatment media" See Media, treatment.

144. "Treatment unit" means a component or series of components where solids or pollutants are removed from wastewater or effluent from a preceding component.

145. "Trench" means 1. below-grade soil treatment area consisting of a shallow excavation with a width of 3 feet or less containing distribution media and one lateral; and 2. excavation for placement of piping or installation of electrical wire or conduit.

146. "Uniformity coefficient" means a value which is the ratio of D60 to D10 where D60 is the soil diameter of which 60 percent of the soil weight is finer and D10 is the corresponding value at 10 percent finer. (A soil having a uniformity coefficient smaller than 4 would be considered "uniform" for purposes of this regulation.)

147. "Vault" means a watertight, covered receptacle, which is designed to receive and store excreta or wastes either from a building sewer or from a privy and is accessible for the periodic removal of its contents. If the vault is intended to serve a structure or structures that are projected to generate a domestic wastewater flow of two thousand gallons per day or more at full occupancy, the vault is a domestic wastewater treatment works. Vaults are On-site Wastewater Treatment Systems.

148. "Visual and tactile evaluation of soil" means determining the properties of soil by standardized tests of appearance and manipulation in the hand.

149. "Volume, effective" means the amount of effluent contained in a tank under normal operating conditions; for a septic tank, effective volume is determined relative to the invert of the outlet. For a dosing tank, the effective volume under normal conditions is determined relative to the invert of the inlet and the control off level.

150. "Wastewater, domestic" means combination of liquid wastes (sewage) which may include chemicals, household wastes, human excreta, animal or vegetable matter in suspension or solution, or other solids in suspension or solution which are discharged from a dwelling, building or other structure.

151. "Wastewater, high strength" means 1. wastewater from a structure having BOD_5 greater than 300 mg/L; and/or TSS greater than 200 mg/L; and/or fats, oils, and grease greater than 50 mg/L; or, 2. effluent from a septic tank or other pretreatment component (as defined by NSF/ANSI Standard 40 testing protocol) that has BOD_5 greater than 180 mg/L; and/or TSS greater than 80 mg/L; and/or fats, oils, and grease greater than 25 mg/L and is applied to an infiltrative surface.

152. "Wastewater pond" means a designed pond which receives exclusively domestic wastewater from a septic tank and which provides an additional degree of treatment.

153. "Water Quality Control Commission" See Commission.

154. "Water Quality Control Division" See Division.

155. "Wetland, constructed" See Rock-plant filter.

156. "Wetlands" means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs and similar areas and may be mapped on the United States Fish and Wildlife Service's National Wetlands Inventory.

Table 3-1 Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
C.R.S.	Colorado Revised Statutes
CBOD	Carbonaceous Biochemical Oxygen Demand
CPOW	Colorado Professionals in Onsite Wastewater
CSA	Canadian Standards Association
ETL	Electrical Testing Laboratories
GPD	Gallons per day
GPPD	Gallons per person per day
IAPMO	International Association of Plumbing and Mechanical Officials
ISDS	Individual Sewage Disposal System
LTAR	Long-term Acceptance Rate
MG/L	Milligrams per Liter
MPI	Minutes Per Inch

NAWT	National Association of Wastewater Technicians
NDDS	Non-pressurized Drip Dispersal System
NPCA	National Precast Concrete Association
NSF	National Sanitation Foundation
NRTL	Nationally Recognized Testing Laboratory
OWTS	On-site Wastewater Treatment System(s)
STA	Soil Treatment Area
TL	Treatment Level
TN	Total Nitrogen
TSS	Total Suspended Solids
UL	Underwriters' Laboratories

43.4 Applicability and Administration

A. Regulation Coverage

1. An OWTS with design capacity less than or equal to 2,000 gpd must comply with this regulation and the OWTS Act. Within the jurisdiction of the Department, the regulations promulgated by the local Board of Health govern all aspects of OWTS permits, performance, location, construction, alteration, installation, and use.

2. An OWTS with design capacity greater than 2,000 gpd must comply with this regulation, site location and design approval in section 25-8-702, C.R.S., and the discharge permit requirements in the Water Quality Control Act, 25-8-501, et seq. C.R.S.

   a. Applicable Commission regulations include, but are not limited to, the following:

      (1) Regulation 22 - Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works (5 CCR 1002-22).

      (2) Regulation 41 - The Basic Standards for Ground Water (5 CCR 1002-41).

      (3) Regulation 42 - Site-Specific Water Quality Classifications and Standards for Ground Water (5 CCR 1002-42).

      (4) Regulation 61 - Colorado Discharge Permit System Regulations (5 CCR 1002-61).

      (5) Regulation 62 - Regulations for Effluent Limitations (5 CCR 1002-62).

b. For systems greater than 2,000 gpd, the Division is also authorized to determine those parts of this regulation identified as the prerogative of the local public health agencies.

c. The requirements for maintenance and standards of performance for systems greater than 2,000 gpd shall be determined by the site application approval and discharge permit.

d. In the interest of facilitating communication of concerns regarding a design being reviewed by the Division, the Department can provide comments to the Division for consideration during the Division's review of the proposed design and discharge permit application. Under such a coordinated process, the Division retains final authority for approval or denial of each domestic wastewater treatment works that is regulated under the site location approval and Colorado Discharge Permit System regulations. Prior to approval or denial of each OWTS domestic wastewater treatment works, the Division must acknowledge and consider local OWTS regulations when they are more stringent and restrictive than this regulation.

B. Permit Application Requirements and Procedures

1. Prior to commencing construction, any person who wishes to install, alter, or repair an OWTS in Larimer County, Colorado, shall obtain a permit from the Department.

2. An applicant must submit a complete application that is consistent with section 43.4.B.3. to the Department prior to installing, altering or repairing a system.

3. Minimum Permit Application Requirements:

a. Owner name and contact information;

b. Property address;

c. Property legal description;

d. Type of permit;

e. Report from Site and Soil Evaluation (section 43.5);

f. System design with a legible, accurate site plan which shows pertinent physical features on subject property, and on adjacent properties, as noted in Table 7-1; and

g. Other information, data, plans, specifications and tests as required by Department.

(1) When specific evidence suggests undesirable soil conditions exist, additional hydrological, geological, engineering or other information provided by a professional engineer or geologist may be required to be submitted by the applicant. This requirement will not prejudice the right of the Department to develop its own information from its own source at its own expense.

4. Permit Fees

a. A permit fee as established by the Board of Health shall be required of applicants for all OWTS, payable at the Larimer County Department of Health and Environment. The permit fees may be no greater than required to offset the actual indirect and direct costs of the Department per 25-10-107, C.R.S.

b. Permit application fees must not exceed the maximum fees established in section 25-10-107, C.R.S. Permit application fees must be submitted by an applicant with the permit application, and are due and payable upon receipt of the permit application.

5. Other Fees

a. The Board of Health may set fees for inspections, percolation tests, soil evaluation, and other services performed by the Department. The fees must be no greater than required to offset the actual indirect and direct costs of the services, and must not exceed the maximum amounts specified in section 25-10-107, C.R.S.

b. Surcharge - The Department must collect a fee of twenty-three dollars for each permit issued for a new, repaired, or upgraded OWTS. Of that fee, the Department must retain three dollars to cover the Department's administrative costs and twenty dollars must be transmitted to the Colorado Department of Public Health and Environment for use in funding the state's OWTS program.

6. Permit Term

a. An OWTS permit expires one year after the date of issuance if construction of the system has not commenced. If both a building permit and an OWTS permit are issued for the same property and construction of the OWTS has not commenced prior to the expiration date of the building permit, the OWTS permit will also expire. The OWTS permit may be renewed and extended at the same time as the building permit, provided the requirements in 43.4.B.6.c. below are met.

b. If an OWTS permit is issued for property on which no building permit is required, the permit shall expire 180 days after its issuance if construction of the system has not commenced.

c. An expired permit may only be extended or renewed if:

(1) There has been no change in the plans and specifications of the proposed system as set out in the original application; and

(2) The surrounding land, its use or zoning, have not changed so as to cause the original application not to be acceptable under these Regulations; and

(3) The property has not received verifiable complaints or code compliance violations that may preclude the Department from determining that a permit extension is warranted; and

(4) The application for extension or renewal is submitted to the Department not less than 30 days before the expiration of the original permit and meets all of the requirements of the original permit, including fees in instances where

changes in design or location require additional site inspections and data evaluation.

d. Any change in plans or specifications of the OWTS after the permit has been issued invalidates the permit unless the permittee receives written approval from the Department for such changes.

7. Repair Permit

a. The owner or occupant of a property on which an OWTS is not in compliance must obtain a repair permit from the Department. The applicant must apply for a repair permit within two business days after receiving notice from the Department that the system is not functioning in compliance with the OWTS Act or applicable regulations, or otherwise constitutes a nuisance or a hazard to public health or water quality.

b. The repair permit must provide for a reasonable period of time within which the owner or occupant must make repairs. At the end of that period, the Department must inspect the system to ensure it is functioning properly. Concurrently with the issuance of a repair permit, the Department may issue an emergency use permit authorizing continued use of a malfunctioning system on an emergency basis for a period not to exceed the period stated in the repair permit. Such an emergency use permit may be extended, for good cause shown, in the event repairs may not be completed in the period stated in the repair permit through no fault of the owner or occupant and only if the owner or occupant will continue to make repairs to the system.

c. A Major Repair Permit is required for any repair that includes replacement, expansion, relocation, or upgrade to a soil treatment area.

d. A Minor Repair Permit is required for replacement of a septic tank, addition of a septic tank to an existing system, or installation of a new lift station to an existing system.

8. Permit approvals to remodel or expand the use of an existing OWTS. Prior to this Department's approval of a building permit to remodel, add to, or modify the use of a residential or commercial structure served by an OWTS, a remodel permit to increase the size or replace the existing OWTS must be issued, except as in a. & b. below;

a. For residential systems, the proposed building project or remodel will not increase the number of bedrooms as defined by this Regulation, or it is determined that the existing system is adequately designed and constructed for the higher design flow rate.

b. For commercial systems, the proposed project or change in use will not increase the average daily flow or wastewater strength above and beyond the original design of the system.

9. Denial of a permit application by the Department will be made in writing and describe conditions which led to the denial. Any permit application denied by the Department may be appealed and reviewed by the Board of Health upon written request of the applicant within 60 days of the denial.

10. The issuance of a permit and specifications of terms and conditions therein will not constitute assumption of liability, nor create a presumption that the Department or its employees may be liable for the failure or malfunctioning of any system. Permit issuance will not constitute a certification that the system, the equipment used in the system, or any component used for

system operation will ensure continuous compliance with the provision of the OWTS Act, the regulations adopted thereunder, or any terms and conditions of a permit.

11. No OWTS permit shall be issued to any person when the subject property is located within a municipality or special district providing sewer service, or when the property line is within 400 feet of a sewer line providing public sewer service, except where such service to the property is not feasible in the determination of the municipality or sewer district, or the OWTS permit is otherwise authorized by the municipality or sewer district.

C. Determination

1. The Department must determine whether the information provided in the permit application, site and soil evaluations, assumptions and calculations, and design of the proposed OWTS are in compliance with the requirements of the OWTS Act and regulations adopted pursuant thereto. If the submittal is determined to be in compliance, authorization to begin installation may be given.

D. Access to Site

1. For the purpose of inspecting and enforcing applicable regulations and the terms and conditions of any permit issued and investigating and responding to complaints, the Department is authorized to enter upon private property at reasonable times and upon reasonable notice for the purpose of determining whether or not an operating OWTS is functioning in compliance with the OWTS Act and applicable regulations adopted pursuant thereto and the terms and conditions of any permit issued and to inspect and conduct tests in evaluating any permit application. The owner or occupant of every property having an OWTS must permit the Department access to the property to make inspections, conduct required tests, take samples, and monitor compliance.

E. Inspection Stages

1. When construction of an OWTS, or an OWTS component has been completed, and prior to backfilling or placing the system into use, the owner, the owner's agent, or the system contractor must notify the Department, and the engineer, if engineer designed. A representative of the Department shall make a final inspection within 24 hours or at a later agreed time after receipt of notice, Saturdays, Sundays, and holidays excepted.

2. A system designed to utilize pressure distribution must be tested in operation to evaluate function of floats, control panel, alarm/signaling device, and to ensure adequate residual pressure at the end of distribution lines. The pump or dosing tank must be filled with water in order to test the components above, and pumped or drained after testing if necessary to prevent freezing.

F. Final approval of the permit by the Department must include, but is not limited to:

1. Receipt of letter from the engineer certifying construction of the OWTS as per the approved design, if the OWTS was engineer designed per section 43.10.B;

2. A record drawing which includes a scale drawing showing all components of the OWTS including their location from known and findable points, dimensions, depths, sizes, manufacturers' names and models as available, and other information relative to locating and maintaining the OWTS components;

3. Final inspection prior to backfilling the OWTS by the Department confirming that it was installed according to the permit requirements and regulations or variances to the regulations; and

4. Identification of system contractor.

G. Division Authority to Administer and Enforce

1. Wherever the term Board of Health or Department is used in this regulation, said terms also include the Division under its designated authority for the purposes of administering and enforcing the provisions of this regulation where necessary to protect the public health and environment.

H. Primary Enforcement Responsibility

1. The primary responsibility for enforcement of the provisions of the OWTS Act and the regulations adopted under said article will lie with the local Board of Health.

2. In the event that the Board of Health fails to administer and enforce the provisions of said section and the regulations adopted under the OWTS Act, the Division may assume such functions of the Department or Board of Health as necessary to protect the public health and environment. 25-10-110, C.R.S.

I. Product Development Permit

1. For products that have not received Division acceptance under section 43.13.D, the manufacturer may apply to the Department for a product development permit. Requirements for proprietary treatment product acceptance are located in section 43.13.D of this regulation.

2. For products or types of systems which have not been otherwise accepted by the Division pursuant to section 43.13.D, the Board of Health may approve an application for product development permit only if the system has been designed by a professional engineer, and only if the application provides proof of the ability to install a replacement OWTS in compliance with all local requirements in a timely manner in the event of a failure or malfunction of the system installed.

3. Before a product development permit is issued, the Division must determine that the product to be tested qualifies for testing under the product development evaluation based on information submitted to the Division.

a. Applicant must provide evidence of nationally accepted third-party testing of the product to be evaluated, or;

b. Provide test data from multiple single-family homes under normal working conditions that meet the following criteria:

(1) Test data must be provided from a minimum of four sites.

(2) Each system must be tested over a period of at least one year.

(3) Each system must be sampled at least three times during the year with at least one sample obtained during cold weather conditions.

(4) Laboratory results for all parameters for which acceptance is being requested must be submitted.

4. The Board of Health must not arbitrarily deny any person the right to consideration of an application for such a system and must apply reasonable performance standards in determining whether to approve such an application; 25-10-108 (2), C.R.S.

5. A completed application for a product development permit must be submitted to the Department at least 30 days in advance of installation of the product.

6. An application for a product development permit must include the following:

   a. Proof of the ability to install a replacement OWTS in compliance with all requirements in a timely manner in the event of a failure or malfunction of the system under testing;

   b. A description of the product under development including performance goals;

   c. Documentation signed by the owner of the proposed product development site allowing access to the Department and Division for inspection of the site; and

   d. Design documents as required in section 43.5.G of this regulation.

7. Other than the performance standards identified in section 43.4.I(3) above, the Department may stipulate additional requirements for the product development permit necessary to ensure that the system performs as intended.

8. A product development permit is a site-specific permit. Product development testing at multiple sites requires a product development permit for each site.

9. During the term of the product development permit, all data collected is to be submitted to the Division and the Department.

10. The Department may revoke or amend a product development permit, if the continued operation or presence of the product under development:

    a. Presents a risk to the public health or environment;

    b. Causes adverse effects on the proper function of the OWTS on the site;

    c. Leaks or discharges effluent on the surface of the ground; or

    d. If the developer of the product fails to comply with any requirements stipulated on the permit by the Department or the Division.

11. If the product development permit is revoked, the product developer must install the replacement system within the time frame established by the Department.

12. Once the system is installed and approved, the Department must supply the Division with a copy of the completed OWTS permit.

J. Prohibition of OWTS in Unsuitable Areas

1. The Board of Health may prohibit issuance of OWTS permits or limit the type of system installed in accordance with applicable land use laws and procedures for defined areas in which the Board of Health determines that construction and use of additional OWTS may constitute a hazard to public health or water quality.

K. Licensing of Systems Contractors and Systems Cleaners

1. A fee not to exceed actual costs may be charged by the Department for the initial license of a systems contractor; a fee not to exceed actual costs may be charged by the Department for a renewal of the license. Initial licensing and renewals thereof must be for a period of not less than one year. Renewals may be scheduled to coincide with the calendar year.

2. The Board of Health may revoke the license of a systems contractor for violation of the applicable provisions of the OWTS Act and the implementing regulations or for other good cause shown, after a hearing conducted upon reasonable notice to the systems contractor and at which the systems contractor may be present, with counsel, and be heard.

3. A fee not to exceed actual costs may be charged by the Department for the initial license of a systems cleaner; a fee not to exceed actual costs may be charged for the renewal of the license. Initial licensing and renewals thereof must be for a period of not less than one year. Renewals may be scheduled to coincide with the calendar year.

4. The Board of Health may suspend or revoke the license of a systems cleaner for violation of the applicable provisions of the OWTS Act and the regulations adopted under said section or for other good cause shown after a hearing conducted upon reasonable notice to the systems cleaner and at which the systems cleaner may be present, with counsel, and be heard. 25-10-109, C.R.S.

L. Variance Procedure

1. General

a. An applicant for a permit to construct a new OWTS or to repair or upgrade an existing OWTS may request a variance from any portion of this Regulation, except as prohibited in Section 43.4.L.5

b. The Director and Assistant Director of the Larimer County Environmental Health Division are delegated the authority to grant a variance from those portions of the Larimer County OWTS Regulations that are more stringent than Regulation 43 when compelling justification is present and the variance does not endanger the public health. Any Division rulings on these variances may be appealed to the Larimer County Board of Health, using the procedure described in 43.4.L.7 below. The Division may also choose to refer requests for a variance to the Larimer County OWTS Regulations directly to the Board of Health.

c. The Board of Health may set fees for processing an OWTS permit with a variance in accordance with section 25-10-107, C.R.S. This permit fee may be the standard OWTS permit fee or may be a separate fee based upon the cost of processing a permit with a variance.

2. Requirements for Variance Consideration

a. The Board of Health will determine what type of variances will require public hearings. Prior to the rendering a decision on a variance request requiring a public hearing, a public hearing must be held. The hearing must be the subject of a public notice or notice must be sent via certified mail, with a minimum 20-day reply time from the date of mailing, to all adjacent property owners.

b. Variance requests must be accompanied by:

(1) Site-specific request identifying the specific criteria from which a variance is being requested;

(2) Technical justification by a professional engineer or professional geologist, which indicates the specific conditions which exist and/or the measures which will be taken that support a finding that the variance will result in no greater risk than that associated with compliance with the requirements of the regulation. Examples of conditions which exist, or measures which might be taken, include but are not limited to the following: evidence of a natural or manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; placement of a manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; soil replacement with sand filter media to reduce the infiltration rate of the effluent such that the travel time of the effluent from the absorption field to the physical feature is no less than the travel time through the native soils at the prescribed setback and Treatment Level 2;

(3) A discussion of alternatives considered in lieu of the requested variance;

(4) Technical documentation for selected alternative, which may include a testing program, which confirms that the variance does not increase the risk to public health and to the environment; and

(5) A statement of the hardship that creates the necessity for the variance.

c. The applicant has the burden of proof to demonstrate that the variance is justified and will pose no greater risk to public health and the environment than would a system meeting the regulations.

3. The Board of Health has the authority to impose site-specific requirements and conditions on any variance granted.

4. Outcome of the Variance Proceeding

a. The applicant must be notified, in writing, of the Board of Health's decision regarding the request for a variance. The notice of a denial of a variance must include those reasons which form the basis for the denial. The notice of an approval of a variance must include any conditions of the approval. The variance, and any conditions thereof, must be recorded on the deed to the property and any expenses associated with that recording must be the responsibility of the party obtaining the variance.

5. Prohibitions on the Granting of Variance Requests

a. No variance shall be issued where the property can accommodate a conforming OWTS.

b. No variance shall be issued to mitigate an error in construction involving any element of property improvements.

c. No variance shall be allowed solely for economic gain.

d. No variance shall be issued, if it will result in a setback reduction to an offsite physical feature that does not conform to the minimum setbacks defined in Table 7-1 of this regulation without the Board of Health considering any concerns of the owner of

property containing said feature. Property lines are considered offsite features. The property owner containing said feature must be notified of the time and date of the hearing.

e. No variance shall be issued, if it reduces the separation to ground water or bedrock based on the level of treatment in Table 7-2.

f. No variance from the horizontal setback from a well shall be issued unless it also meets the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors.

g. No variance shall be issued for the installation of a higher level treatment system based on sizing or separation reductions without the LPHA having a maintenance and oversight program as defined in section 43.14.D.

6. Variances for Repair of Failing Systems

a. When a proposed variance for a system repair or upgrade would result in encroachment on minimum distances to physical features on neighboring properties required by the Division, the public hearing procedures in 43.4.L.2.c, Requirements for Variance Consideration above must be followed.

b. For the repair of or upgrade to an existing system where the existing system does not meet the required separation distances and where conditions other than lot size precludes adherence to the required distances, a variance to the separation distances may be requested. The repairs or upgrade must be no closer to features requiring setbacks than the existing facilities. Variances requesting setbacks no closer than existing setbacks do not have to provide technical justification from a professional engineer or professional geologist.

7. Findings on Appeal

a. A request for review must be made within 60 days after denial of an application by the Department.

b. The applicant must bear the burden of supplying the Board of Health with sufficient evidence to document that the denied system will be constructed and used in such a manner that will result in no greater risk than that associated with compliance with the requirements of the regulation, comply with the declaration and intent of this regulation, and comply with all applicable state and local regulations and required terms and conditions in any permit.

c. Such review must be conducted pursuant to the requirements of section 24-4-105, C.R.S.

M. General Prohibitions; Section 25-10-112, C.R.S.

1. No city, county, or city and county shall issue to any person:

a. A permit to construct or remodel a building or structure that is not serviced by a sewage treatment works until the Department has issued a permit for an OWTS.

b. An occupancy permit for the use of a building that is not serviced by a sewage treatment works until the Department makes a final inspection of the OWTS, provided for in section 25-10-106 (1) (h), C.R.S. and the Department approves the installation.

2. The construction of new, or the repair of existing cesspools, pit privies, wastewater ponds, or slit trenches is prohibited except as in 43.12.B.2.h. Where an existing cesspool is failing, a conforming OWTS must be installed. Where space is not available for a conforming OWTS, the criteria for repairs established within section 43.10.I must be followed.

3. A person must not connect more than one dwelling, commercial, business, institutional or industrial unit to the same OWTS unless such multiple connection was specified in the application submitted and in the permit issued for the system.

4. No person shall construct or maintain any dwelling or other occupied structure which is not equipped with adequate facilities for the sanitary disposal of sewage.

5. All persons shall dispose of septage removed from systems in the process of maintenance or cleaning at an approved site and in an approved manner.

N. Cease and Desist Orders

1. The Department may issue an order to cease and desist from the use of any OWTS or sewage treatment works which is found by the health officer not to be functioning in compliance with the OWTS Act or with applicable regulations or is found to constitute a hazard to public health, or has not otherwise received timely repairs under the provisions of section 25-10-106 (1) (j), C.R.S. Such an order may be issued only after a hearing which shall be conducted by the health officer not less than 48 hours after written notice thereof is given to the owner or occupant of the property on which the system is located. The order shall require that the owner or occupant bring the system into compliance or eliminate the health hazard within thirty days, or thereafter cease and desist from the use of the system. A cease and desist order issued by the health officer shall be reviewable in the district court for the county wherein the system is located and upon a petition filed not later than ten days after the order is issued.

O. Penalties; Section 25-10-113, C.R.S.

1. Any person who commits any of the following acts or violates any of the provisions of this section commits a Class 1 petty offense as defined in section 18-1.3-503, C.R.S.:

a. Constructs, alters, installs, or permits the use of any OWTS without first having applied for and received a permit as provided for in section 25-10-106, C.R.S.;

b. Constructs, alters, or installs an OWTS in a manner which involves a knowing and material variation from the terms or specifications contained in the application, permit or variance;

c. Violates the terms of a cease and desist order that has become final under the terms of section 25-10-106 (1) (k), C.R.S.;

d. Conducts a business as a systems contractor without having obtained the license provided for in section 25-10-109 (1), C.R.S., in areas which the Board of Health has adopted licensing regulations pursuant to that section;

e. Conducts a business as a systems cleaner without having obtained the license provided for in section 25-10-109 (2), C.R.S., in areas which the Board of Health has adopted licensing regulations pursuant to that section;

f. Falsifies or maintains improper records concerning system cleaning activities not performed or performed improperly; or

g. Willfully fails to submit proof of proper maintenance and cleaning of a system as required by regulations adopted by the Board of Health.

2. Upon a finding by the Board of Health that a person is in violation of this regulation, the Board of Health may assess a penalty of up to fifty dollars for each day of violation. In determining the amount of the penalty to be assessed, the Board of Health shall consider the seriousness of the danger to the health of the public caused by the violation, the duration of the violation, and whether the person has previously been determined to have committed a similar violation.

3. A person subject to a penalty assessed pursuant to section 43.4.Q.2 may appeal the penalty to the Board of Health by requesting a hearing before the appropriate body. The request must be filed within thirty days after the penalty assessment is issued. The Board of Health shall conduct a hearing upon the request in accordance with section 24-4-105, C.R.S.

43.5 Site and Soil Evaluation

A. A site and soil evaluation must be conducted for each property on which an OWTS is proposed to determine the suitability of a location to support an OWTS, and to provide the designer a sound basis to select the most appropriate OWTS design for the location and application.

1. Each site evaluation must consist of:

a. Preliminary investigation;

b. Reconnaissance;

c. Detailed soil investigation; and

d. Report and site plan.

B. Preliminary investigation: Research of information relative to the site and anticipated conditions must be conducted. Information gathered as part of the preliminary investigation must include, but is not limited to:

1. Property Information:

a. Address;

b. Legal description;

c. Existing structures; and

d. Location of existing or proposed wells on the property.

2. Department records.

3. Published site information:

a. Topography; and

b. Soil data.

4. Location of physical features, on and off the property that will require setbacks as identified in Table 7-1.

5. Preliminary soil treatment area size estimate based on information on existing or planned facility and local regulations.

6. Other information required by the Department.

7. Additional information that may be useful to the specific evaluation as available:

a. Survey;

b. Easements;

c. Floodplain maps;

d. Geology and basin maps and descriptions;

e. Aerial photographs;

f. Climate information; and

g. Delineated wetlands maps.

C. Reconnaissance: A visit to the property to evaluate the topography and other surface conditions that will impact the location and design of the OWTS must be conducted. Information gathered as part of the site reconnaissance may include, but is not limited to:

1. Landscape position;

2. Topography;

3. Vegetation;

4. Natural and cultural features; and

5. Current and historic land use.

D. Detailed Soil Investigation

1. Soil investigations to determine the long-term acceptance rate of a soil treatment area must be conducted per the following criteria:

a. Visual and tactile evaluation of two or more soil profile test pit excavations must be conducted to determine soil type as well as to determine whether a limiting layer is encountered.

b. In addition to the two soil profile test pit excavations, percolation testing may be conducted to obtain additional information regarding the long-term acceptance rate of the soil.

c. If the site evaluation includes both a visual tactile evaluation of soil profile test pit excavations and percolation tests, and the results from these two evaluations do not coincide with the same LTAR as noted in Table 10-1, the designer must use the more restrictive LTAR in determining the size of the soil treatment area.

2. Procedure for performing visual and tactile evaluations of soil in order to determine a long-term acceptance rate:

a. Evaluation of two or more soil profile test pit excavations must be performed by a professional engineer or by a competent technician under the supervision of a professional engineer to determine soil types limiting layers, and best depth for the infiltrative surface. The total number of soil profile test pit excavations beyond the required two shall be based on the judgment of the evaluator.

b. At least one of the soil profile test pit excavations must be performed in the portion of the soil treatment area anticipated to have the most limiting conditions.

c. The minimum depth of the soil profile test pit excavation must be to any limiting layer, or four feet below the infiltrative surface of the in-situ soil, whichever is encountered first.

d. Any limiting soil characteristic such as consistence also needs to be evaluated. The evaluation of consistence may also include an evaluation of excavation difficulty, rupture resistance, and/or penetration resistance.

e. The soil observations must be conducted at or immediately adjacent to the location of the proposed soil treatment area, but if possible, not under the final location of a trench or bed.

f. Each soil profile test pit excavation observed at the proposed soil treatment area must be evaluated under adequate light conditions with the soil in an unfrozen state.

g. The soil observation method must allow observation of the different soil horizons that constitute the soil profile.

h. Soil profile test pit observations must be conducted prior to percolation tests to determine whether the soils are suitable to warrant percolation tests and, if suitable, at what depth percolation tests must be conducted.

i. The soil type at the proposed infiltrative surface of the soil treatment area or a more restrictive soil type within the treatment depth (2-4 feet below infiltrative surface) must be used to determine the long-term acceptance rate from Table 10-1 or Table 10-1A. The treatment depth is two to four feet depending on the required thickness for the treatment level below the infiltrative surface from Item 4, Table 7-2.

j. Soils data, previously collected by others at the site can be used for the purposes of an OWTS design at the discretion of the Department. If the location of the system will be changed from the original soils report, at a minimum, an evaluation of a soil profile test pit excavation must be completed to confirm soil conditions.

3. Soil descriptions for determination of a limiting layer must include:

   a. The depth of each soil horizon measured from the ground surface and a description of the soil texture, and structure of each soil horizon;

   b. Depth to the bedrock;

   c. Depth to the periodically saturated soil as determined by:

      (1) Redoximorphic features and other indicators of seasonal or historic water levels, or

      (2) Depth of standing water in the soil observation excavation, measured from the ground surface, if observed, unless redoximorphic features indicate a higher level.

4. Procedure for performing percolation tests:

   a. Percolation testing shall be performed by a professional engineer or by a competent technician under the supervision of a professional engineer.

   b. Number of test holes; Location

      (1) Soil percolation tests shall be performed in at least three test holes in the area in which the soil treatment area is to be located, spaced evenly over the proposed area.

      (2) If the likely depth of a proposed infiltrative surface is uncertain, percolation tests must be performed at more than one depth to determine the depth of the infiltrative surface.

   c. Dimensions

      (1) The percolation test hole must have a diameter of eight to 12 inches and be terminated a minimum of six inches and a maximum of 18 inches below the proposed infiltrative surface.

   d. Change in Soil

      (1) If a change of soil type, color or structure is present within those soils comprising the depth of soil below the infiltrative surface as required in Table 7-2 for vertical separation, a minimum of two soil percolation holes must be terminated in the changed soil, and percolation tests must be conducted in both holes.

   e. Percolation Tests

      (1) The percolation tests must be conducted using the hole preparation, soil saturation and rate measurement procedures described below.

      (2) Preparation of Percolation Test Holes

         (i) Excavate the hole to the depth and diameter required.

(ii) Carefully scrape the bottom and sides of the hole with a knife blade or sharp instrument to remove any smeared soil surfaces and provide a natural soil interface into which water may percolate.

(iii) Remove all loose soil from the hole.

(iv) Add two inches of very coarse sand or fine gravel to protect the bottom of the hole from scouring and sediment.

(3) Presoak

(i) The hole must be presoaked adequately to accomplish both saturation, which is filling the void spaces between the soil particles, and swelling, which is the intrusion of water into the individual soil particles.

(ii) To presoak the hole, carefully fill the hole with clean water to a minimum depth of 12 inches over the gravel placed in the bottom of the hole. In most soils, it is necessary to refill the hole by supplying a surplus reservoir of clean water, possibly by means of an automatic siphon, to maintain water in the hole for at least four hours and preferably over night. Determine the percolation rate 24 hours after water is first added to the hole. This procedure is to ensure that the soil is given ample time to swell and to approach the condition it will be in during the wettest season of the year. In sandy soils containing five percent or less particles passing the #200 sieve, by weight, the swelling procedure is not essential and the test may be conducted after the water from one filling of the hole has completely seeped out of the hole.

(4) Percolation Rate Measurement

(i) With the exception of sandy soils containing five percent or less particles passing the #200 sieve, by weight, percolation rate measurements must be made on the day following the presoak procedure.

(ii) If water remains in the percolation test hole after the swelling period, adjust the depth to approximately six inches above the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level over a 30 minute interval. The drops are used to calculate the percolation rate.

(iii) If no water remains in the hole after the swelling period, carefully add clean water to bring the depth of water in the hole to approximately six inches above the top of the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level at 30 minute intervals for four hours, refilling to six inches over the top of the gravel as necessary. The drop in water level that occurs during the final 30-minute period is used to calculate the percolation rate. If the water level drops during prior periods provide sufficient information, the procedure may be modified to suit local circumstances. The requirement to conduct a four hour test under this section is waived if three successive water-level drops do not vary by more than 1/16 inch;

however, in no case shall a test under this section be less than two hours in duration.

(5) Sandy Soils

(i) In sandy soils or other soils in which the first six inches of water seeps out of the hole in less than 30 minutes, after the 24 hour swelling period, the time interval between measurements must be ten minutes and the test conducted for one hour. The drop that occurs during the final ten minutes must be used to calculate the percolation rate.

(ii) If the soil is so sandy or coarse-textured that it will not retain any water, then the infiltration rate must be recorded as less than one minute per inch.

(6) Special Soil Types

(i) The Department may identify soil types in the county for which different procedures such as extra presoaking or an extended testing time to obtain a valid percolation rate will be required.

(7) Percolation Rate Determination and Reporting

(i) The field percolation rate will be the average rate of the percolation rates determined for all percolation test holes observed in the proposed soil treatment area in minutes per inch. The average percolation rate determined by the tests must be used in determining the long-term acceptance rate for the proposed system from Table 10-1.

(ii) The technician performing the percolation tests shall furnish an accurate scale drawing, showing the location of the soil profile test pit excavations and/or percolation holes tied to lot corners or other permanent objects. The drawing must meet the criteria in section 43.5.F.1.g. The information in the subsections following section 43.5.F.1.g.1 through 43.5.F.1.g.5 may be included but is not required for this drawing. All holes must be clearly labeled to relate to the information provided for the profile test pits and percolation tests.

(8) Alternate Percolation Testing

(i) Alternate percolation test procedures may be approved, provided the test results of alternate procedures are substantially equivalent to those determined using the test procedures described in this section.

(ii) Prior approval from the Department of alternate percolation test procedures is required.

E. Marking of Soil Profile Test Pit Excavations or Percolation Holes

1. The engineer or technician conducting the soil profile test pit excavations or percolation tests must, upon completion of the tests, flag or otherwise mark each excavation or hole to allow easy

location by others. Soil profile test pit excavations and percolation holes must remain open until after evaluation by the Department.

2. If test pit excavations must be left open for inspection at a later date by the engineer, technician, or Department, they must be suitably barricaded to prevent unauthorized access and to address safety concerns.

F. Report and Site Plan

1. A written report must describe the results of the preliminary investigation, reconnaissance, and detailed evaluations. The report may be in text and/or tabular form and must include a drawing locating features relative to the proposed OWTS location and test locations. The report may be included as part of the OWTS design document. The report must include, but is not limited to:

   a. Company name, address, telephone number, e-mail address, and name of individual, credentials and qualifications of the individual conducting the site evaluation;

   b. Preliminary and detailed evaluations, providing information from the surface site characteristics assessment and soils investigation;

   c. Dates of preliminary and detailed evaluations;

   d. A graphic soil log, to scale, indicating depth of the soil test pit excavation, soil description and classification, depth to any limiting layer encountered, type of equipment used to excavate the soil profile test pit and date of soils investigation.

   e. Setback distances to features listed in Table 7-1;

   f. Setback distances to features listed in Table 7-2, existing on the site or within applicable setback limits, whichever is greater;

   g. A drawing created to a scale that provides the complete property boundary lines. The minimum drawing size is 8.5-inches by 11-inches. If the property is too large to adequately indicate and label the profile test pits and percolation test holes, a detail of the portion of the site containing the soil profile test pits and percolation test holes must be submitted. If the property is too large to adequately show site evaluation information, a detail drawing that includes the information required from the site and soil evaluation that will impact the location of the OWTS must be submitted. Drawings must indicate dimensions, have a north arrow and graphic scale and include:

      (1) Fixed, non-degradable temporary or permanent benchmark, horizontal and vertical reference points of the proposed soil treatment area; soil observations; percolation testing results and pertinent distances from the proposed OWTS to all required setbacks, lot improvements, easements; ordinary high water mark of a pond, creek, stream, lake, wetland or other surface waters, and detention or retention ponds; and property lines;

      (2) Contours or slope direction and percent slope;

      (3) The location of any visible or known unsuitable, disturbed or compacted soils;

      (4) The estimated depth of periodically saturated soils and bedrock, or flood elevation, if applicable; and

(5) The proposed elevation of the infiltrative surface of the soil treatment area, from an established datum (either ground surface or a benchmark);

h. Anticipated construction-related issues, if applicable;

i. An assessment of how known or reasonably foreseeable land use changes are expected to affect the system performance, including, but not limited to, changes in drainage patterns, increased impervious surfaces and proximity of new water supply wells, if applicable; and

j. A narrative explaining difficulties encountered during the site evaluation, including but not limited to identifying and interpreting soil and landform features and how the difficulties were resolved, if applicable.

G. Design Document

1. A design document must be provided for all systems. If required by section 43.10.B, the design document must be prepared by an engineer and may be attached to the report and site plan or be combined as a single document.

2. The design document must include a brief description of the facility and its proposed use, basis and calculations of design flow, and influent strength.

3. The design document must contain all plan details necessary for permitting, installation and maintenance, including:

a. Assumptions and calculations for each component, including total dynamic head (TDH) and gallons per minute (GPM) for all dosing systems;

b. A fixed, non-degradable temporary or permanent benchmark, (North America Vertical Datum or assumed elevation is acceptable);

c. A scale drawing showing location of each OWTS component and distances to water supplies, surface water, physical and health impact features on both the subject and adjacent properties requiring setbacks;

d. Layout of soil treatment area, dimensions of trenches or beds, distribution method and equipment, distribution boxes, drop boxes, valves, or other components used;

e. Elevation or depth of infiltrative surface of the soil treatment area, the septic tank invert, and all other components of the OWTS;

f. Special structural design considerations, as applicable to ensure the long-term integrity of each component;

g. References to design manuals or other technical materials used;

h. Installation procedures, as applicable;

i. Operation and maintenance manuals or instructions; and

j. Other information that may be useful such as photos and cross-section drawings.

H. Site protection: Prior to and during construction, the proposed soil treatment area and replacement area, if any, must be protected from disturbance, compaction, or other damage by means of staking, fencing, posting, or other effective methods.

I. Qualifications for a Competent Technician

1. Percolation Tests

a. Competencies needed:

(1) Set up equipment;

(2) Perform and run percolation tests according to the procedure in this regulation; and

(3) Record results and calculate percolation rates.

b. The Department may approve training for percolation testing.

2. Visual and Tactile Evaluation of Soil

a. Competencies needed:

(1) Identify soil types by hand texturing and observation;

(2) Identify presence or absence of soil structure;

(3) Identify type and grade of soil structure;

(4) Recognize evidence of highest seasonal water surface;

(5) Identify layers and interfaces that will interfere with effluent movement;

(6) Determine the most promising depth for infiltrative surface of OWTS and for percolation tests, if used; and

(7) Understand basic principles of OWTS siting and design.

b. Possible demonstrations of competence in visual and tactile evaluation of soil:

(1) Degree in soil science, agronomy, geology, other majors if a course(s) in soil morphology was included; or

(2) Attendance at training or workshop for soil evaluation for OWTS including both class and field work.

(i) If the training or workshop includes an exam to verify acceptable completion of the course, a passing grade on the exam must be attained.

c. The Division must approve training for visual and tactile evaluation of soil.

43.6 Wastewater Flow and Strength

A. Wastewater Flows

1. The Department may require the installation of a meter to measure flow into the facility or the OWTS.

2. Single-Family Residential Homes:

   a. Design flow per person must be 75 gallons per day (gpd).

   b. The Department may increase the wastewater design flow per person to 100 gpd on a case by case basis, where justified.

   c. The minimum design flow for a new home must be for a two-bedroom house unless otherwise noted in this regulation. The minimum design flow for the repair or replacement of an OWTS of an existing one-bedroom home or for new accessory dwelling units may be for one-bedroom if the dwelling will remain as one-bedroom due to lot size or zoning restrictions.

   d. For homes up to and including three bedrooms, the assumed number of persons per bedroom is two for design purposes.

   e. For homes with more than three bedrooms, the assumed number of persons is six persons (first three bedrooms x two persons per bedroom) plus one additional person for each bedroom more than three bedrooms.

   f. For residential dwellings for which a building permit is obtained to change the use to a short term rental, the minimum required design flow will be based on the maximum number of occupants at 75 gallons per person instead of the number of bedrooms.

   g. Table 6-1 summarizes the design flows for single-family residential homes up to six bedrooms. The Department has authority to adjust these values as described in sections 43.6.A.2.b., 43.6.A.2.f.

3. Auxiliary Buildings

   a. If a single-family home has an auxiliary building, such as a non-commercial shop with plumbing fixtures, the flow may be conveyed to the OWTS of the home, or to a separate OWTS constructed to handle the flow from the auxiliary facility.

   b. If the flow from the auxiliary building is only generated by residents of the home, it will be assumed that the OWTS for the home will be adequately sized to include the auxiliary building if the flows are combined.

   c. If the auxiliary building will have users in addition to residents and the flow from the auxiliary building will flow to the OWTS of the home, the design flow of the home must include the increased use.

   d. If the auxiliary building has a separate OWTS, the facility must be sized on the basis of Table 6-2 and a septic tank detention time of 48 hours.

4. Multi-Family and Commercial On-site Wastewater Treatment Systems

   a. Design flow values and strengths for multi-family and commercial systems must be determined from:

      (1) Table 6-2; or

      (2) An analysis of flows and strengths from at least three comparable facilities or from the facility, if it is an existing facility, must be submitted to the Department for approval. The analysis must include:

         (i) Metered water flows for inside use only for at least a year, or if use is seasonal, for a full season. If metered flows are less than full capacity, they must be paired with actual use in units of persons present or meals served or other units as appropriate so that an actual daily rate per unit can be determined. The daily rate per unit times the number of units at full occupancy will be the design flow.

         (ii) Total Suspended Solids and BOD_5 or $CBOD_5$ tests at times of full use. At least three samples taken at least one week apart are required. Sampling that provides equivalent and representative data through "composite sampling" may be allowed

         (iii) Explanation and justification for the comparability of the tested facilities with the proposed facility.

5. Flow Equalization

   a. Flow equalization may be used if a facility has flows that vary from day to day by more than four times the average flow.

   b. The highest peak assumed must be at least equal to the full capacity of the facility.

   c. The stored flow must be distributed to the soil treatment area before the next greater-than-average peak.

   d. Flow equalization may be used only if:

      (1) The facility is non-residential;

      (2) The facility is only used for one purpose;

      (3) Flows will follow a predictable pattern; and

      (4) There is a long-term expectation that size and pattern of the flows will remain the same.

   e. Timed dosed pressure distribution or timed dosed NDDS must be used. The soil treatment area reduction for pressure distribution (Table 10-2) must not be used in addition to the flow equalization reduction.

   f. Contingency plans must be made for expanding the capacity of the OWTS in the event of changed use at the facility.

B. Wastewater Strength

1. Table 6-3 includes levels of treatment that can be achieved by various OWTS components, excluding the soil treatment area. Systems qualifying for these treatment levels except TL1 produced by a septic tank alone, must be approved under section 43.13. of this regulation. If soil treatment area or vertical separation distance reductions are permitted, the Department must have a maintenance oversight program under section 43.14.D. in place.

2. High strength waste must be reduced to at least Treatment Level TL1 quality or lower before applying to a soil treatment area. Waste strength levels defined in Tables 6-3 and 6-4 must be used to determine compliance.

43.7 Minimum Distances Between Components of an On-site Wastewater Treatment System and Physical Features

A. Horizontal distances from the various components of a system to pertinent terrain features, including streams, lakes, water courses, springs, wetlands, wells, subsurface drains, cisterns, water lines, suction lines, dry gulches, cut banks, dwellings, other occupied buildings and property lines, must be in accordance with Table 7-1. The setback requirements are applicable for minimum system performance and treatment levels with specific modifications allowed for higher treatment levels as provided in Table 7-2. All distance setback modifications must be analyzed and approved by the Board of Health or Department and be in complete compliance with the variance procedures of this regulation and those of the Board of Health. Acceptable methods of analyzing horizontal separation distances with higher treatment levels include but are not limited to:

1. Analyzing the intended uses of impacted surface and/or ground waters;

2. Contacting adjacent property owners for potential conflicts with property line encroachments; and

3. Analyzing potential impacts that system locations may have on building foundations and other potentially affected features.

B. Reductions in separation distances with higher level treatment must include provisions for operation and maintenance for the life of the system, as described in section 14.D.

C. Dry Gulches, Cut Banks and Fill Areas

1. Separation distances to dry gulches, cut banks and fill areas in Table 7-1 must apply unless the designer or design engineer determines by observation of the exposed slope of the dry gulch or cut bank or by soil profile test pit excavations that a limiting layer is present that will direct or allow the effluent from the soil treatment area to move laterally and surface. In this instance, a greater distance may be required.

2. A lesser distance may be used if it can be demonstrated by a professional engineer or professional geologist that the use of a barrier, such as a minimum 30 mil PVC liner placed between the soil treatment area and the slope of the dry gulch, cut bank or fill area will prevent effluent surfacing laterally.

3. The separation distance between a component and the crest of a dry gulch or cut bank will be evaluated for potential erosion or slope instability if the component and the slope are too close

together. If there is potential for erosion or instability, the separation distance must be increased until the risk is minimized.

D. Components of an OWTS listed in Table 7-1 shall be installed or located in accordance with the minimum distance requirements provided in the table or such increased distances provided by Board of Health regulations.

E. Table 7-2 provides the required site evaluation, design, and treatment level considerations necessary to evaluate the site and to design and locate the soil treatment area component of an OWTS.

1. Items 1, 2 and 3 in Table 7-2 address the allowable horizontal setback distance between the soil treatment area and the following physical features:

   a. Setback distance from soil treatment area to on-site well;

   b. Setback distance from soil treatment area to water features; and

   c. Setback distance from soil treatment area to a dry gulch or cut bank.

2. Item 4 in Table 7-2 addresses the required vertical separation distance between the infiltrative surface of the soil treatment area and the limiting layer or the required depth of soil comprising the soil treatment area.

3. The designer may select the level of treatment from Table 7-2 to be applied to the soil treatment area that is necessary in order to accommodate the site conditions.

4. Sizing adjustments for use of the higher level treatment categories listed in Tables 7-2 and 10-1 will only apply provided the system is inspected and maintained as specified in the requirements of section 43.14.D, Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher Level Treatment.

F. When a system component must be placed on an adjacent property held under the same ownership as the owner of the dwelling, an easement allowing for future use and maintenance of the system must be prepared and recorded with the property through the Larimer County Clerk and Recorder prior to final approval of the system.

43.8 Design Criteria – General

A. The OWTS for single-family homes shall be designed to accommodate the proposed flows from the structure as defined in 43.6.A.2. Flow estimates for multi-family or commercial OWTS must comply with 43.6.A.4. Expected waste strength as noted in Table 6-3 and Table 6-4 must also be addressed, where applicable. Installation of low flow fixtures or the separation of toilet waste or other sources of wastewater does not allow for the reduction in the size of an OWTS.

B OWTS shall be designed and constructed to achieve the treatment level specified by the design.

C. OWTS must be designed and constructed such that each component shall function, when installed and operated, in a manner not adversely affected by normal operating conditions including erosion, corrosion, vibration, shock, climatic conditions, and usual household chemicals. Each component must be free of non-functional protrusions or sharp edges, or other hazards, which could cause injury to persons, animals, or properties. Design must be such as to exclude flies and rodents and other vectors and to prevent the creation of nuisances and public health hazards and must provide for efficient operation and maintenance.

D. Accessibility for Inspection, Maintenance, and Servicing

1. Septic tanks must have watertight risers over each access manhole and all risers must extend to or above final grade.

2. For new construction, the top of any septic tank, dosing tank or vault must be no deeper than four feet below finished grade.

3. Each treatment component of an OWTS other than the septic tank and soil treatment area must be equipped with access manholes with risers that extend to or above final grade, located to permit periodic physical inspection, collection and testing of samples and maintenance of all components and compartments.

4. Riser Lids

   a. Each riser lid must be watertight, brought to or above the surface, and must have a secure closing mechanism, such as a lock, bolts or screws, or sufficient weight (59 pounds or more) to prevent unauthorized access.

   b. The Department may require a secondary plug, cap, cover or screen be provided below the riser cover to prevent tank entry if the cover is unknowingly damaged or removed.

5. Components that require access at or above grade for maintenance include but are not limited to; submerged bearings, moving parts, pumps, siphons, valves, tubes, intakes, distribution boxes, drop boxes, cleanouts, effluent screens, filters, inlet and outlet baffles, aerators, treatment equipment and other devices.

6. Components must be designed and constructed so that, when installed, they may be easily maintained, sampled, and serviced according to the manufacturer's recommendations. Easy physical access to treatment components by maintenance personnel and equipment must be provided.

E. Plumbing Codes: Plumbing fixtures, building sewers, vents, sewer lines and other appurtenances must be designed, operated and maintained so as to comply with the minimum requirements of the most recently revised locally enforceable plumbing code. In absence of a local plumbing code, designs must adhere to the Colorado Plumbing Code (3 CCR 720-1). A local plumbing permit may be required.

F. Electrical Equipment, If Used

1. All electrical work, equipment, and material must comply with the requirements of the currently applicable National Electrical Code as designated by the State Electrical Board Rules and Regulations (3 CCR 710-1). A local electrical permit may be required.

2. Electrical components must be protected from moisture and corrosive gases.

3. An electrical disconnect must be provided within the line of sight of the chamber or component housing the pump.

G. Indicators of Failure or Malfunctioning for Systems Utilizing Mechanical Apparatus: A signal device must be installed which will provide a recognizable indication or warning to the user that the system or component is not operating as intended. This indication or warning must be a visual signal and an audible signal, and be located in a centralized area within visual and audible range of the system user. A signal or message may also be sent remotely to a maintenance provider.

H. Sampling Access

1. If sampling for testing or as a requirement for a permit will be required of effluent from a component other than the soil treatment area, an accessible sampling point must be provided.

2. If sampling of the treated wastewater from the soil treatment area will be required for testing or as a requirement for a permit, a monitoring well or wells must be constructed. Monitoring wells must be located down gradient from the soil treatment area, accessible, and provided with a properly securable cover at or above the ground surface. Monitoring wells up gradient of the system may also be required. Lysimeters or other collection devices under the soil treatment area may be used instead of a monitoring well if approved by the Department or other issuer of a permit.

I. Component Operating Instructions

1. The manufacturer of proprietary treatment units utilizing mechanical components must provide clear, concise written instructions covering the components which, when followed, must assure proper installation and safe and satisfactory operation and maintenance.

2. If the OWTS uses public domain technology, the design engineer must provide clear, concise written instructions covering the components which, when followed, must assure proper installation and safe and satisfactory operation and maintenance.

J. Surface Activity: Activity or use on the surface of the ground over any part of the OWTS must be restricted. The soil treatment area must not be subject to damage or soil compaction from livestock, vehicular traffic, recreational use, or other site development activity. Construction equipment not necessary to install the OWTS must be kept off of the soil treatment area to prevent undesirable compaction of the soils. If compaction occurs, the disturbed or compacted soil must be re-evaluated and/or new soil evaluations performed. The system must be redesigned if the soil permeability has changed.

K. Floodplains

1. A new, expanded or repair/replacement OWTS installed in a 100-year floodplain must meet or exceed the requirements of the Federal Emergency Management Agency and the local emergency agency. Repairs of an existing system must meet the requirements as feasible. The system as approved by the Department must be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the system into the floodwaters. The OWTS must be located to avoid impairment to floodwaters or contamination from them during flooding.

2. A new or expanded OWTS must not be installed in a floodway designated in a 100-year floodplain where a conforming OWTS outside the floodway can be installed. For any new OWTS or system repair that may affect the floodway delineation, appropriate procedures must be followed including revision of the floodway designation, if necessary.

3. In order to comply with items 1 and 2 above, new and replacement OWTS installed in a 100 year floodplain shall obtain a Floodplain Development Permit from the Larimer County Floodplain Administrator in accordance with the requirements outlined in the Larimer County Land Use Code Floodplain Overlay Zone District, Section 4.2.2H. That regulation, as amended in November, 2013, requires that OWTS be designed and located to avoid impairment to them or contamination from them during flooding. Replacement OWTS in a designated floodway may also require a variance from the Larimer County Flood Review Board if the replacement system is proposed to be installed above grade and have the potential to cause a rise in the base flood elevation.

L. Business Commercial, Industrial, Institutional or Multi-Family Dwelling Wastewater Systems

1. An OWTS that will serve a business, commercial, industrial or institutional property, or a multifamily dwelling must:

a. Be designed by a professional engineer;

b. Receive only such biodegradable wastes for treatment and distribution as are compatible with those biological treatment processes as occur within the septic tank, any additional treatment unit and the soil treatment area; and

c. Receive authorization by rule or a class V underground injection permit from the United States Environmental Protection Agency (EPA) before an application for an OWTS permit is approved if the system may receive non-residential wastewater or is otherwise covered by the EPA underground injection control program. Subsequent to acceptance by the EPA, the Department may choose to also issue a permit for this type of use.

43.9 Design Criteria – Components

A. Tanks and Vaults

1. Watertightness

a. Septic tanks, vaults, dosing tanks, other treatment components, risers and lids must not allow infiltration of ground water or surface water and must not allow the release of wastewater or liquids through other than designed openings.

b. When the final compartment of a tank is being proposed for use as a pump or siphon chamber, the wall between this chamber and the previous chamber must be watertight except for the intended hydraulic opening.

c. Acceptable watertightness testing methods performed at a manufacturer's site or in the field include water filling the tank or vacuum testing.

2. Tank Anchoring: In locations where ground water or floodwaters may cause instability problems to the septic tank, vault, or other treatment unit in the OWTS due to flotation, the tank, vault or unit must be anchored in a manner sufficient to provide stability when the tank is empty. Risers must be included in the buoyancy calculations.

a. If a manufacturer provides recommendations for anchoring designs, they may be used if they meet the conditions present at the site.

b. If a manufacturer does not provide recommendations for provisions to compensate for buoyancy, or if the professional engineer chooses to provide his/her own designs, the anchoring system design must be prepared by the professional engineer.

3. Identification and Data Marking: All tanks and treatment units must be permanently and legibly marked in a location for the purpose of inspection that is readily visible when inspected before backfilling. The marking inscription must include the following:

a. Name of manufacturer;

b. Model or serial number, if available;

c. Effective volume and unit of measure;

d. Maximum depth of earth cover and external loads the tanks is designed to resist; and

e. Inlet and outlet identifications, if relevant.

B. Septic Tanks

1. The manufacturer must provide sufficient information to demonstrate that the tank will meet the design specification.

2. Sizing Requirements:

a. Sizing for residential capacity for new installations must be based upon the number of bedrooms according to Table 9-1 and 43.6.A.2:

b. For multi-family and non-residential applications, a septic tank must be sized to permit detention of incoming wastewater design flows for a minimum of 48 hours.

c. For systems that remove toilet waste for separate treatment, tank capacity may be less than 1,000 gallons, if it provides a minimum of 48 hours detention time.

d. Minimum tank size for new installations other than for a single-family residence is 400 gallons.

3. Inspection and Testing of Septic Tank Watertightness

a. Testing of septic tanks must be performed and evaluated as specified in section 9 of ASTM C1227-13 (Standard Specification for Precast Septic Tanks) for concrete tanks or in Standard IAPMO/ANSI Z1000-2013 (American Standards for Prefabricated Septic Tanks) for other prefabricated septic tanks.

b. Each unit must be inspected in the field for conditions that may compromise its watertightness.

c. The inspection in the field must be conducted by the Department and be performed after the tank installation but before backfilling.

d. If the inspection in the field indicates that the tank may be damaged or is not watertight, the inspector may require that the tank be tested for watertightness by the tank manufacturer or the system contractor.

4. Septic Tank Design and Dimension Criteria

a. A septic tank must have two or more compartments or more than one tank may be used in series. The first compartment of a two-compartment tank or the first tank in a series must hold no less than one-half of the required effective volume.

b. Inlet invert must be at least two inches higher than the outlet invert.

c. Inlet tee or baffle must extend above the surface of the liquid at least five inches and must extend a minimum of eight inches below the liquid surface. However the inlet tee

or baffle must not extend to a depth of more than 40 percent of the liquid depth measured from the liquid surface.

d. Outlet tee or baffle must extend at least 5 inches above and 14 inches below the outlet invert, however it must not extend to more than 40 percent of the liquid depth measured from the liquid surface. The outlet tee or baffle that accommodates an effluent screen must be located so that the effluent screen has sufficient clearance to be removed through the access opening with a riser in place.

e. The distance from the outlet invert to the underside of the tank top must be at least ten inches.

f. Liquid depth must be a minimum of 30 inches and the maximum depth must not exceed the tank length.

g. The transfer of liquid from the first compartment to the second or successive compartment must be made at a liquid depth of between 35 and 40 percent of the liquid depth measured from the liquid surface.

h. At least one access opening no less than 20 inches across must be provided in each compartment of a septic tank.

i. A septic tank must have a minimum of 25 square feet of liquid surface area and have at least a six-foot separation between inlets and outlets. Septic tanks in series, combined, must have a minimum of 25 square feet of liquid surface area and the sum of the distances between inlets and outlets of all tanks must be at least six feet. The requirements for liquid surface area and separation between inlet and outlet may be waived for tanks with less than 750 gallon effective volume.

5. Concrete Septic Tank Structural Design

a. Concrete septic tanks must comply with the structural design criteria of ASTM C1227-13 (Standard Specification for Precast Septic Tanks).

b. The design for each tank model and size by each manufacturer must be certified by a professional engineer as complying with these design and structural requirements and the watertightness standard of this regulation.

c. Certification by a professional engineer must be submitted to the Division for acceptance.

d. Tank slab lids, mid-seam tanks, and the connections between the tank and risers must be designed to provide for a watertight seal.

6. Fiberglass, Fiberglass-Reinforced Polyester, and Plastic Tanks

a. All fiberglass, fiberglass-reinforced polyester, and plastic tanks must meet the minimum design and structural criteria of IAPMO/ANSI Z1000-2013 (American Standards for Prefabricated Septic Tanks) and be certified by a professional engineer as meeting these standards. The professional engineer certifying the criteria must be registered or licensed in the United States, but need not be registered in Colorado.

b. All tanks must be sold and delivered by the manufacturer or manufacturer's designated representative, preferably completely assembled. On-site tank assembly will be allowed on an as-needed basis.

c. Tanks must be structurally sound and support external forces as specified in the standard referenced above when empty and internal forces when full. Tanks must not deform or creep resulting in deflection of more than five percent in shape as a result of loads imposed.

d. All tanks must be constructed of sound, durable materials and not be subject to excessive corrosion, decay, frost damage, or cracking.

e. All seams or connections including to risers must be sealed to be watertight.

7. Metal tanks are prohibited.

C. Abandonment of Tank

1. A tank may be completely removed and the parts disposed of safely.

2. If the tank will remain in place:

a. The tank must be pumped to remove as much waste as possible;

b. The bottom of the tank must be broken so the tank neither floats nor fills with water;

c. The top must be collapsed and the sides may be broken into the void;

d. The remaining void must be filled with gravel, sand or compacted soil; and

e. The filled excavation will be graded to surroundings, allowing for settling.

3. The Department may require abandonment of a tank that is deemed to be a hazard.

D. Pipe Standards and Bedding Requirements

1. Pipe Standards

a. All wastewater pipes used in portions of an OWTS that are pressurized must be constructed of compatible pipe, primer, bonding agent, and fittings. Gasketed pipe is not approved for use in pressurized portions of a system.

b. Flexible couplings to connect pipes may only be used in portions of an OWTS that are intended for gravity flow of the wastewater. If flexible couplings are used to connect the exterior building sewer with the portion of the line exiting the foundation, they must be provided with shielding or a shear ring for additional stability and protection from settling.

c. The building sewer to, and the effluent line from the septic tank shall be laid with a minimum fall of 1/8 inch per foot (1/4 inch fall per foot is recommended) and shall be no less than four inches (4") in diameter. The building sewer and effluent line shall be buried a minimum of one foot (1') below grade.

d. Where unperforated plastic pipe and fittings are used for gravity flow, the minimum wall thickness of the pipe must conform to ASTM Standard D 3034 or equivalent or greater strength. Schedule 40 pipe is preferred.

e. Perforated distribution pipe surrounded by rock within a soil treatment area must have a minimum wall thickness and perforations conforming to ASTM Standard D 2729 or equivalent or greater strength. Corrugated polyethylene pipe with smooth interior that meets ASTM F405 or AASHTO M252 specifications or equivalent may be used.

f. Schedule 40 or pipe of equivalent or greater strength must be used for the placement of piping under driveways or roadways and in instances where sewer line setback distances are granted a variance for any reason.

g. Tile pipe, open-joint pipe, and cast iron pipe must not be used in an OWTS.

h. Pressure pipe must be rated for the intended use to accommodate pump discharge pressure.

2. All system piping, except for distribution laterals within the soil treatment area, must be bedded using sand, pea gravel or squeegee, or loose on-site material free of rock, clods, frozen soil, and other debris before final inspection by the Department. Bedding material must be mechanically compacted to support piping.

3. When using pipe lengths that have spigot and bell ends on the building sewer, the pipes must be arranged such that the flow travels from the bell or socket end to the spigot end, with the bell ends facing upstream on each section of piping to prevent creating a lip which can catch material. The effluent pipe between the septic tank and soil treatment area is exempt from this requirement

E. Cleanouts Required Between the Building and the Septic Tank

1. Cleanouts must have a secure cap and a riser extending to or easily accessible from grade. The installation of a straight tee or sanitary tee is acceptable. Double sweep cleanouts are recommended.

2. Cleanouts must be provided within five (5) feet of the outside of the building. If a cleanout cannot be located with five (5) feet of the building due to an exterior extension off of the dwelling or structure (deck, porch, patio, etc.), a double sweep cleanout must be installed beyond the extension with the uphill cleanout facing downstream towards the tank and the downhill cleanout facing upstream towards the dwelling.

3. Where a sewer has a change of horizontal direction greater than 45 degrees, a cleanout must be installed at the change of direction unless a cleanout exists within 40 feet upstream of this fitting. Where more than one change of direction greater than 45 degrees occurs, one cleanout may serve for all changes within 40 feet downstream of developed length of pipe.

4. Cleanouts must be provided at intervals within the building sewer from the structure to the tank of not more than 100 feet. The effluent pipe between the septic tank and soil treatment area is exempt from this requirement.

F. Distribution Box

1. A distribution box, if used, must be of sufficient size to distribute effluent equally to the laterals of a trench or absorption bed system. The box must be constructed with the inlet invert at least one inch above the level of the outlet inverts.

2. Flow equalizers or similar devices must be used to adjust the flow between laterals. Access to the box must be provided with a manhole riser with access lid at or above grade if the top of the box does not reach final grade.

3. Distribution box extension risers must not be used to provide the required access unless less than 24" in riser height is needed, or the risers are a minimum of 24" in diameter.

G. Drop Box

1. In sequential or serial distribution, a watertight box may be used to transfer the effluent to the following trench when the effluent in a trench has received the designed level for overflow to the next trench. A drop box shall have a riser or lid at or above final grade.

2. Outlet pipes in sequential distribution must be designed and installed so that they may be capped off for resting periods.

H. Stepdown/Relief Pipe: In sequential or serial distribution, an unperforated pipe may be used to transfer the effluent to the following trench when the effluent in a trench has received the designed level for overflow from that trench.

I. Wastewater Pumping and Dosing Siphon Systems

1. Dosing Tank Sizing

a. Tanks or tank compartments used for dosing a pressure distribution system with a pump must have a minimum volume equal to the following:

(1) One design dose volume, plus;

(2) Drain-back volume (if applicable), plus;

(3) One third of the daily design flow, plus;

(4) Volume of the tank located below the pump inlet.

b. Tanks used for dosing must be protected from freezing by being buried deep enough to place the pump below frost depth and have all discharge piping drain between doses or be buried below frost depth. The top of the dosing tank must be no deeper than four feet below finished grade.

2. Pumps

a. Non-clog pump opening must have at least two-inch diameter solids handling capacity where raw wastewater is pumped. A pump opening must not have more than 3/4-inch diameter solids handling capacity if previously settled effluent is pumped.

b. Pumps must be certified to the applicable UL or CSA electrical safety standard, bear the seal of approval of CSA, UL or an equivalent testing program and be constructed of corrosion resistant materials.

c. Grinder pumps must also be certified to NSF/ANSI Standard 46 and bear the seal of approval of the NSF or equivalent testing and certification program.

3. Floats and Switches

a. Automatic liquid level controls must be provided to start and shut off pumps at a frequency or level specified in the design.

b. Floats must be mounted on a stem separate from the pump discharge piping to allow for removal, adjustment, and replacement of the float from grade without removing the pump. Floats attached to the pump body are not permitted for use in pressure distribution systems.

c. Float switches must be certified to the applicable UL or CSA electrical safety standard, bear the seal of approval of CSA, UL or an equivalent certification program and be constructed of corrosion resistant materials.

d. Dosing siphons for pressure dosing and higher level treatment systems must provide for a means of determining the number of dosing events.

4. Location of Pump or Siphon

a. A pump or a siphon may be installed in a separate tank following the septic tank. The tank must be of sufficient volume to allow pump or siphon cycling commensurate with the design capacity.

b. The second compartment of a two-compartment septic tank may only be used as the pump tank when the tank is specifically designed for this purpose and it can be demonstrated to the satisfaction of the Department that the minimum 48-hour detention time will not be decreased. The pump must be screened or provided with an approved filtering device to assure that only liquid effluent will be discharged. The transfer of liquid from the first to the second compartment must be at an elevation that is between the inlet and outlet invert elevations, and through a standard tee designed and located as per the requirements of section 43.9.B.4.d. Siphons must not be installed in the second compartment of a two compartment tank.

c. The use of a three-compartment septic tank, sized to provide the required effective volume in the first two compartments with the pump or siphon in the third compartment is acceptable for tanks specifically designed for this purpose. The transfer of liquid from the second to the third compartment must be at an elevation that is between the inlet and outlet invert elevation, and through a standard tee designed and located as per the requirements of section 43.9.B.4.d.

5. Pump or Siphon Discharge Piping

a. The discharge pipe from the pumping or siphon chamber must be protected from freezing by burying the pipe below frost level or sloping the pipe to allow it to be self-draining. Drainage must be provided through the bottom of the pump or through a weep hole located in the discharge pipe prior to exiting the tank.

b. The pump discharge piping must have a quick disconnect or union located within 18” of the access riser lid to allow for easy pump access and removal.

c. The pipe must be sized to maintain a velocity of two or more feet per second.

d. Pressure pipes must be designed to prevent air or vacuum locking and allow self-draining of the pipes.

6. Access

a. The pump or dosing system tank, chamber, or compartment must have a minimum 24-inch diameter access riser, made of corrosion-resistant material, extending to or above ground level. A smaller diameter riser may only be installed if it is accepted by the Division as an integral component of a specific product during the product review process.

b. The access riser must have a watertight connection to the pump or dosing chamber/compartment to prevent infiltration or exfiltration. All other intrusions to the riser for electrical or other component access must also be watertight.

7. Junction Box

a. Electrical junction boxes must be located outside the pump system or septic tank access risers and be accessible from the ground surface. Wire penetrations from the interior of the riser to conduit or a junction box on the outside of the riser must be sealed.

b. Wire splices are prohibited inside the tank, dosing chamber or riser. Wire splicing must be completed with corrosion-resistant, watertight connectors.

8. Controls

a. Control panels or other electrical boxes used to control the functions of an OWTS must comply with the following, as appropriate:

(1) The pump system must have an audible and visual alarm notification in the event an excessively high water condition occurs.

(2) The pump must be connected to a circuit breaker separate from the alarm breaker and from any other control system circuits.

(3) An electrical disconnect must be provided within the line of sight of the pump chamber.

(4) The pump system must be provided with a means that will allow the pump to be manually operated; such as an H.O.A. switch (Hand/Off/Auto).

(5) The pump system for pressure dosing and higher level treatment systems must have a mechanism for determining both the amount of time the pump runs and the number of cycles the pump operates.

(6) Must bear the seal indicating acceptable product testing from a U.S. Department of Labor, Occupational Safety and Health Administration Nationally

Recognized Testing Laboratory (NRTL)
(https://www.osha.gov/dts/otpca/nrtl/nrtllist.html), such as UL or ETL.

J. Effluent Screens

1. If a pump or dosing siphon is used to remove septic tank effluent from the final compartment of the septic tank or from a separate dosing tank, the effluent must be filtered prior to dispersal into the soil treatment area through use of an outlet tee effluent screen, pump vault equipped with a filter cartridge, or a filter on the discharge pipe.

2. The effluent screen must be cleaned at manufacturer-recommended intervals, or more often, if use patterns indicate.

3. An alarm may be installed on an effluent screen indicating need for maintenance.

4. Where an ejector pump, grinder pump or non-clog pump is proposed for use prior to the septic tank, an effluent screen must be installed on the outlet of the septic tank.

5. The handle of the effluent screen must extend to within 12 inches of the access riser lid.

K. Grease Interceptor Tanks

1. All commercial food service facilities and other facilities generating fats, oils and greases in their waste must install a grease interceptor tank. The tank must be located outside of the structure and be a concrete, plastic, or fiberglass tank that meets the requirements of 43.9.A & B with baffles or tees per requirements of 4 & 5 below.

2. Grease interceptor tanks shall treat only those portions of the total wastewater flow in which grease and oils are generated.

3. The grease interceptor must have a minimum of two compartments and must be sized proportionate to the amount of fats, oils and grease it receives, the peak flow rate through the tank, and the expected cleaning frequency.

4. The inlet and outlet tees or baffles must extend into the bottom 1/3 of the liquid volume, but must be at least 12 inches off the inside floor of the interceptor.

5. The inlet and outlet tees or baffles must extend at least 5 inches above the liquid level and must provide for a free vent area across the liquid surface.

43.10 Design Criteria – Soil Treatment Area

A. The size and design of the soil treatment area must be based on the results of the site and soil evaluation, design criteria, and construction standards for the proposed site and OWTS selected.

B. At proposed soil treatment area locations where any of the following conditions are present, the system must be designed by a professional engineer and approved by the Department:

1. For soil types 3A, 4, 4A, 5, R-0, R-1 and R-2, and Treatment Levels TL2, TL2N, TL3, and TL3N as specified in Tables 10-1 and 10-1A of this regulation;

2. The maximum seasonal level of the ground water surface is less than four (4) feet below the bottom of the proposed infiltrative surface;

3. A limiting layer exists less than four (4) feet below the bottom of the proposed infiltrative surface;

4. The ground slope is in excess of thirty percent;

5. Pressure distribution is used;

6. In environmentally sensitive areas as described in 43.11.A.3.

C. Calculation of Infiltrative Surface of Soil Treatment Area

1. The infiltrative surface of a trench or bed receiving any treatment level of effluent is only the bottom area. No sidewall credit is allowed except in deep gravel trenches and seepage pits that are permissible in repairs.

2. Long-term acceptance rates (LTARs) are shown in Tables 10-1 and 10-1A.

3. Factors for adjusting the size of the soil treatment area are in Tables 10-2 and 10-3.

4. The required area for a soil treatment area is determined by the following formula:

$$\textit{Soil Treatment Area in Square Feet Required} = \frac{\textit{Design Flow (in gallons per day)}}{\textit{LTAR (in gallons per day per square foot)}}$$

a. Adjusted Soil Treatment Area = Required Soil Treatment Area x Size Adjustment Factor(s).

b. Size adjustment factors for methods of application are in Table 10-2.

c. Size adjustment factors for types of distribution media are in Table 10-3.

d. A required soil treatment area receiving TL1 effluent may be multiplied by one size adjustment factor from Table 10-2, Table 10-3, or both.

e. A soil treatment area receiving TL2, TL2N, TL3, or TL3N effluent must be pressure dosed.

(1) For products that combine distribution and higher level treatment within the same component, pressure distribution of the effluent over the soil treatment area must be used.

(2) TL2 – TL3N effluent may be applied by gravity flow in soil types 3, 3A, 4, 4A, or 5 for designs where reductions in the soil treatment area size or vertical/horizontal separation reductions are not being requested.

f. The distribution media in Table 10-3 may be used for distribution of higher level treatment system effluent, but an additional reduction factor from Table 10-3 must not be used. Sizing reductions for higher level treatment systems are achieved through the increased LTAR's provided in Table 10-1.

D. Allowable Soil Treatment Area Sizing Adjustments:

1. The soil treatment area size determined by dividing the design flow rate by the long-term acceptance rate may be adjusted by factors for method of treatment, soil treatment area design, and type of distribution media.

2. For the purpose of the table, a "baseline system," i.e. adjustment factor of 1.00, is considered to be Treatment Level 1 (TL1) applied by gravity to a gravel-filled trench.

3. Sizing adjustments for use of the higher level treatment categories listed in Tables 10-1 will only apply provided the system is inspected and maintained as specified in the requirements of section 43.14.D, Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher Level Treatment.

E. Design of Distribution Systems

1. General

a. The infiltrative surface and distribution laterals must be level.

b. The infiltrative surface must be no deeper than four feet below grade unless TL2 or higher effluent is applied to the distribution media and the system is inspected and maintained as specified in the requirements of section 43.14.D. The depth of the infiltrative surface will be measured on the up-slope side of the trench or bed.

c. Trenches must follow the ground surface contours so variations in infiltrative surface depth are minimized. Beds must be oriented along contours to the degree possible.

d. Pipe for gravity distribution must be no less than three inches in diameter.

e. A final cover of soil suitable for vegetation at least ten inches deep must be placed from the top of the geotextile or similar pervious material in a rock and pipe system, chamber, or manufactured media up to the final surface grade of the soil treatment area.

f. Following construction, the ground surface must be graded to divert stormwater runoff or other outside water from the soil treatment area. The area must be protected against erosion. Subsurface drains upslope of the soil treatment area may be installed to divert subsurface flow around the area.

g. Backfilling and compaction of soil treatment areas must be accomplished in a manner that does not impair the intended function and performance of the storage/distribution media and soil and distribution laterals, allows for the establishment of vegetative cover, minimizes settlement and maintains proper drainage.

h. Dosing may be used for soil treatment area distribution. The dose must be sized to account for the daily flow and the dosing frequency.

2. Distribution Laterals; Must meet the requirements of section 43.9.D as applicable.

a. Distribution between laterals in a soil treatment area must be as level as possible. Uneven settling of portions of the distribution system following construction must be addressed by provisions in the design to adjust flows between laterals.

b. The maximum length of distribution laterals for gravity distribution must not exceed 100 feet. Distribution laterals may be up to 150 feet if pressure dosed or if the application of the effluent is made at the center of the lateral through a distribution box.

c. For absorption beds, the separating distance between parallel gravity distribution laterals must not exceed six feet (center-to-center), and a distribution lateral must be located within three feet of each sidewall and endwall.

d. The end of a distribution pipe must be capped, unless it is in a bed or trenches in a level soil treatment area, where the ends of the pipes may be looped.

e. To promote equal distribution to the soil treatment area, the forcemain or effluent pipe must be connected to as near to the middle of the distribution header as possible. However it must be offset from any distribution lateral to prevent preferential flow.

f. Orifices must be oriented downward unless pressure distribution is used and provision for pipe drainage is included.

3. Pressure Distribution

a. Design of pressure distribution systems must include:

(1) Dose size and frequency for either proposed flows and soil type, or media long-term acceptance rate;

(2) Pipe diameter and strength requirements;

(3) Orifice size and spacing;

(4) A minimum 30 inch residual head at the distal end orifice for holes larger than $^{1}/_{8}$", and a minimum 60 inch residual head for $^{1}/_{8}$" orifices;

(5) Pump/siphon information; total dynamic head; gallons/minute;

(6) Drain-back volume from transport line to manifold/valve; and

(7) Calculations, or a design software reference, that indicates the selected component sizing will provide equal flow within each active zone of the distribution system, and provide no more than a 10% flow differential from the initial orifice to the most distal end orifice within each zone.

b. The separating distance between parallel distribution pipes in a pressure distribution absorption bed must not exceed four feet, and the outer distribution pipe must be located within two feet of each sidewall and endwall. Specific requirements for the design of sand filters are noted in section 43.11.C.2.

c. Flushing assemblies must be installed at the distal end of each lateral and be accessible from finished grade. A sweeping 90 degree or bends limited to 45 degree must be provided.

d. An effluent filter with a screen opening size sufficient to protect the orifice size selected in the design must be installed in the septic tank outlet tee, screened pump vault, or a filter placed on the discharge line from the pump or siphon.

F. Soil Treatment Area Requirements

1. Trenches

a. Trenches must be three (3) feet wide or less.

b. The separating distance between trenches must be a minimum of four (4) feet sidewall-to-sidewall.

c. Distribution laterals used in a trench must be as close to the center of the trench as possible.

2. Beds

a. Maximum width for a bed must be 12 feet, unless the bed receives effluent meeting Treatment Level 2 quality or better.

b. The separating distance between beds must be a minimum of six feet sidewall-to-sidewall.

3. Serial and Sequential Distribution:

a. A serial or sequential distribution system may be used where the ground slope does not allow for suitable installation of a single level soil treatment area unless a distribution box or dosing chamber is used.

b. The horizontal distance from the side of the absorption system to the surface of the ground on a slope must be adequate to prevent lateral flow and surfacing.

c. Adjacent trenches or beds must be connected with a stepdown/relief pipe or a drop box arrangement such that each trench fills with effluent to the top of the gravel or chamber outlet before flowing to succeeding treatment areas.

4. Alternating Systems

a. An alternating system must have two or more zones that must be alternated on an annual or more frequent basis.

b. For repairs, each section must be a minimum of 50 percent of the total required soil treatment area. For new installations, each separate soil treatment area must meet the minimum sizing requirements of this regulation.

c. A diversion valve or other approved diversion mechanism that requires the owner or operator to manually alternate zones of the OWTS may be installed on the septic tank effluent line allowing soil treatment area sections to be alternated.

d. The diversion mechanism must be readily accessible from the finished grade.

5. Sequencing Zone Systems

a. Sequencing zone systems have two or more soil treatment area sections that are dosed on a frequent rotating basis.

b. Where soil conditions are similar between the sections, each section area must be the same size. If soil conditions are such that long-term acceptance rates are different, each section may be sized for the same dose, but different long-term acceptance rates.

c. An automatic distribution valve must be used. Flow rate calculations must be included in the design to ensure the pump can provide the minimum required rate required to activate the valve per manufacturer's specifications.

d. Dosing of each system must be evaluated by the design engineer based on projected daily flow rates, number of zones, and soil types.

6. Inspection Ports

a. A 4-inch inspection port accessible from ground surface must be installed at the terminal end of each lateral in a trench system and at each corner of a bed system. The bottom of the inspection port tube must extend to the infiltrative surface and not be connected to the end of a distribution pipe.

b. Inspection ports in chambers may be installed according to manufacturer's instructions if the infiltrative surface is visible and effluent levels can be observed from the inspection port.

c. Additional inspection ports connected to distribution pipes may be installed.

d. The top of inspection ports may be terminated below the final grade if each is housed in a component such as a valve box for a lawn irrigation system and has a removable cover at the ground surface.

G. Storage/Distribution Media

1. Rock and Pipe

a. The perforated pipe must be surrounded by clean, graded gravel, rock, or other material of equal efficiency which may range in size from $^1/_2$ inch to 2 $^1/_2$ inches. AASHTO M 43 size No. 3 coarse aggregate meets this specification. Gravel should have no more than one percent by weight passing a No. 200 sieve. Crushed limestone, sandstone, asphalt, or other materials that easily break down over time are not approved.

b. At least six inches of gravel, rock or other material must be placed below the pipe. The gravel, rock or other material must fill around the pipe and be at least two inches above the top of the distribution pipe.

c. The top of the placed gravel or such material used must be covered with non-woven permeable geotextile meeting a thickness rating of 2.0-5.0 ounces per square yard or equivalent pervious material. An impervious covering must not be used.

2. Chambers

a. Chambers must be installed with the base of the unit on in-situ soil or, if placed on acceptable media, the manufacturer's installation instructions must be followed so as to prevent chambers from settling into the media.

b. Installation must be according to manufacturer's instructions.

c. Effluent may be distributed by gravity, pump or siphon.

d. For width and square footage requirements, refer to section 43.13.E.1.d.

3. Media, Enhanced, or Other Manufactured

a. Manufactured media must be installed with the base on the in-situ soil or placed on acceptable media meeting the manufacturer's specifications for proprietary distribution products or combined treatment/distribution products.

b. Installation must be according to manufacturer's instructions.

c. Pressure distribution is required for TL2-TL3N effluent, unless otherwise noted in this regulation.

4. Driplines

a. The infiltrative surface area must be calculated using the long-term acceptance rate for the site or a more conservative value if recommended by the manufacturer.

b. Driplines must be installed on manufacturer's spacing recommendations.

c. Drainback must be provided for all drip lines, pipes and pumps.

d. Provisions must be made to minimize freezing in the distribution pipes, driplines, relief valves, and control systems.

e. Provisions must be made for filtering, back-flushing, or other cleaning.

5. Tire Chips

a. The pipe may be surrounded with clean, uniformly-sized tire chips.

b. Tire chips must be nominally two inches in size and may range from ½ inch to a maximum of four inches in any one direction.

c. Wire strands must not protrude from the tire chips more than 0.75 inches.

d. Tire chips must be free from balls of wire and fine particles less than two mm across.

e. The top of the tire chips used must be covered with non-woven permeable geotextile meeting a thickness rating of 2.0-5.0 ounces per square yard or equivalent pervious material. An impervious covering must not be used.

H. Soil Replacement Systems

The construction of a soil replacement system is permitted to bring the soil treatment area into compliance with the requirements of this regulation.

1. When a soil type “R” is removed, the following requirements must be met:

    a. All added soil must comply with the following specifications:

        (1) Added soil must meet the specifications of either “preferred” or “secondary” sand filter media, as specified in section 43.11.C.2.

        (2) The long-term acceptance rates as specified in Table 10-1A must be used. No additional sizing adjustments are allowed.

        (3) The depth of the added media must comply with the requirements of Table 10-1A.

            (i) In order to utilize the reduced vertical separation requirements for TL2 or higher quality effluent, the Department must have a program for inspection and oversight as specified in section 43.14.D.4.

        (4) A gradation of the sand media used must be provided. The gradation report must be dated no more than one month prior to the installation date. However, a gradation of the actual material placed in the excavation is recommended.

        (5) All added soil must be completely settled prior to installation of components as specified and approved by the design engineer.

        (6) Pressure distribution must be used.

2. The removal and reinstallation of in-situ soil may only be allowed where the soils are determined to be a soil type “R-1” (Option 2). The design must comply with the requirements for this soil type noted in Table 10-1A (Soil Type R-1, Option 2).

3. When a sand media is added to soil treatment area or to an excavation where a soil type 1-5 (Table 10-1) is the underlying soil, the following requirements must be met:

    a. Added soil must meet the specifications of either “preferred” or “secondary” sand filter media, as specified in section 43.11.C.2.d.

    b. When less than 24” of sand media is added the TL1 long-term acceptance rate for the receiving soil must be used and all of the requirements of section 43.10 must be met. If greater than 24” of sand must be added, or the infiltrative surface is placed above existing grade, the design must follow the criteria for a sand filter or mound system as required in section 43.11.

    c. A gradation of the sand media used must be provided. The gradation report must be dated no more than one month prior to the installation date. However, a gradation of the actual material placed in the excavation is recommended.

    d. All added soil must be completely settled prior to installation of components.

I. Repairs

1. When space is not available or if there are site limitations that preclude other soil treatment area options for OWTS repairs, wide beds, deep gravel trenches, deep beds and seepage pits may be considered for repairs only. Other options are vaults or higher level treatment systems.

2. Repairs to failing systems must conform to setbacks identified in Table 7-1 when possible. When this is not possible using all available methods described above, the jurisdiction with authority may permit reductions to setbacks. At no point will a setback reduction be approved by the jurisdiction less than what the existing separation is to existing OWTS. In maximizing this setback distance, all methods available in section 43.10.I.1 must be utilized including but not limited to the use of Higher Level Treatment, wide beds, seepage pits, etc., where allowed. Any setback reduction beyond what the existing failing system presents must be approved by the Board of Health as outlined in section 43.4.L.

3. Wide Beds: For repairs, beds may be wider than 12 feet without being required to receive effluent meeting Treatment Level 2 quality or better.

4. Deep Beds: For repairs, the infiltrative surface of a bed may be no deeper than five feet. Size adjustments as provided for in Tables 10-2 and 10-3 must not be applied. System sizing will be based strictly on the soil type and corresponding LTAR.

5. Deep Gravel Trenches

   a. The length of an absorption trench may be calculated by allowance for the sidewall area of additional depth of gravel in excess of six inches below the bottom of the distribution pipe according to the following formula:

$$\text{Adjusted Length} = L \times \frac{(W+2)}{(W+1+2D)}$$

   Where:

   L = length of trench prior to adjustment for deep gravel

   W = width of trench in feet

   D = additional depth in feet of gravel in excess of the minimum required six inches of gravel below the distribution pipe

   b. Maximum allowable additional depth is five feet.

   c. Percolation tests or soil profile test pit excavations must be performed at the proposed infiltrative surface depth.

   d. Size adjustments as provided for in Tables 10-2 and 10-3 must not be applied to deep gravel trenches.

6. Seepage Pits

   a. For repairs, a seepage pit without higher level treatment may be used if the site can meet all required horizontal and vertical setbacks of Tables 7-1 and 7-2. Construction of seepage pits for new systems is prohibited.

b. If setbacks in Tables 7-1 and 7-2 cannot be met, higher level treatment of at least TL2 must be attained prior to discharge to a seepage pit.

c. A seepage pit must consist of a buried structure of precast perforated concrete, or cinder or concrete block laid dry with open joints.

(1) Pits must be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity.

(2) The excavation must be larger than the structure by at least 12 inches on each side and may not exceed 5 feet beyond the structure wall.

(3) The over-excavated volume must be filled with clean, graded gravel or rock, which may range in size from ½ inch to 2 ½ inches. AASHTO M 43 size No 3 coarse aggregate meets this specification.

(4) The capacity of the pit must be computed on the basis of long-term acceptance rates determined for each stratum penetrated. The weighted average of the results must be used to obtain a design figure.

(5) Soil strata in which the percolation is slower than 30 minutes per inch must not be used for absorption or seepage. These strata must not be included in the weighted average to determine the long-term acceptance rate.

(6) The infiltrative surface of the pit is the vertical wall area (based on dug perimeter) of the pervious strata below the inlet plus the bottom of the excavated area.

(7) The bottom of the pit excavation must be greater than four feet above a limiting layer.

d. Pits must be separated by a distance equal to three times the greatest lateral dimension of the largest pit. For pits over 20 feet in depth, the minimum space between pits must be 20 feet.

7. Vaults

a. Criteria for vaults are in section 43.12.B of this regulation.

8. Higher Level Treatment Options

a. Reduction in required soil treatment area for repairs is possible with higher level treatment only where the Department meets the requirements of section 43.14.

b. Design criteria for higher level treatment systems are in section 43.11.

9. Wastewater Ponds

a. Construction of new wastewater ponds is prohibited.

10. Remediation Systems

a. The intent of a remediation technology or process is to sufficiently increase the infiltration rate through the infiltrative surface at the bottom of an existing trench or bed and restore permeability to the soil below. Treatment levels as defined in Table 6-3 are not granted to remediation technologies.

b. The Department may permit the use of remediation technologies or processes to address an existing failure or malfunction within a soil treatment area.

c. The use of a remediation technology or process constitutes an alteration to the OWTS, and therefore the owner must obtain a minor repair permit for this work from the Department.

d. Upon approval of the Department, a system owner may choose to try a remediation technology or process to see if an existing problem with the soil treatment area will be resolved. The system owner bears the risk and cost of this attempt and is aware that an additional repair may be required.

e. Remediation technologies and processes must not adversely affect groundwater, surface water, any existing components, the long-term effectiveness of the soil treatment area, or the environment.

f. If the remediation technology or process does not correct the problem with the system, a conforming OWTS must be installed per the requirements in this regulation within a time frame determined by the Department.

g. The Department may require monitoring and/or maintenance of the remediation technology or process as a stipulation of permit issuance.

43.11 Design Criteria – Higher Level Treatment Systems

A. General

1. Higher level treatment systems must be designed by a professional engineer.

2. Higher level treatment systems may be public domain technology systems or proprietary systems.

   a. Public domain technology systems must be designed, installed and maintained according to established criteria and additional criteria established by the Department. When design criteria are not specifically provided in this regulation, the criteria used in the design must be from a reference commonly used as an industry standard and the criteria must be cited in the design.

   b. Proprietary systems must be designed, installed, and maintained according to manufacturer's instructions and additional criteria identified in the Technology Review and Acceptance process, section 43.13.

3. The Department will require Higher Level Treatment meeting the total nitrogen reduction requirements of treatment level TL2N per Table 6-3 in environmentally sensitive areas as defined below. Treatment level TL3N may be required if the setbacks of Table 7-2 cannot be met using TL2N.

   a. Properties on which blasting has been specified by the design engineer as a means of removing unweathered competent bedrock for a proposed soil treatment area and

replacing it with suitable filtration media with the intent that treated wastewater will then disperse through the fractured bedrock;

b. Properties on which the 100-foot set back from the soil treatment area and a water feature (lake, stream, or ditch) cannot be met, provided the setbacks in Table 7-2 for the selected treatment level can be maintained, and the required variance procedure outlined in Section 43.4.L of these Regulations has been approved;

c. Properties on which the 100-foot set back from the soil absorption portion of an OWTS and a well has received a variance to a lesser distance, per Section 43.4.L of these Regulations;

4. Soil treatment areas for higher level treatment systems must be pressure dosed.

5. The distribution media in Table 10-3 may be used for distribution of higher level treatment system effluent, but an additional reduction factor from Table 10-3 must not be used. Sizing reductions for higher level treatment systems are achieved through increased LTAR's provided in Table 10-1.

6. Systems must be capable of accommodating all anticipated flows and organic loads.

7. Ventilation and air systems: Mechanical components must be installed in a properly vented location and all vents, air intakes, and air hoses must be protected from snow, ice, or water vapor accumulations.

8. Covers, barriers, or other protection: All systems must be installed to include protection of openings against entry of insects, rodents, other vectors and unauthorized people.

B. The treatment levels identified in Table 6-3 are specified in this section for public domain technology, and proprietary treatment systems will be assigned a treatment level by the technology review and acceptance process in section 43.13. Adequate maintenance for each must be required and documented as in section 43.14.D.

C. Sand Filters

1. A lined or unlined intermittent sand filter, or recirculating sand filter, may be used as a higher level treatment system prior to dispersing the effluent into a soil treatment area.

2. Intermittent (Single Pass) Sand Filters; General Requirements

a. The treatment level for intermittent sand filters is considered TL3.

b. General Design Parameters: Not all combinations of the variables noted below will result in a proper distribution system design. The design engineer must justify through calculations or design software that the selected values will concur with industry standards.

(1) Distribution pipe size: 3/4 inch – 1.5 inches (PVC Class 200, min.)

(i) 2 inch distribution pipe may only be used where other design modifications cannot overcome a greater than 10% variation in the pressure head between the initial and distal orifices.

(2) Distribution pipe spacing: 18 inches – 48 inches

(3) Orifice size: 1/8 inches – 3/8 inches

(4) Orifice spacing: 18 inches – 48 inches

(5) A minimum 30 inch residual head at the distal end orifice for holes larger than 1/8", and a minimum 60 inch residual head for 1/8" orifices

c. Dosing:

(1) Pressure distribution is required. The design of the distribution system must also comply with the requirements of 43.10.E.3.a.

(2) Number of cycles/day: Will vary with design (Short, frequent doses are preferred.)

(3) Proposed dose volume: Will vary with design (0.25 – 1.0) gallons/orifice/dose, or 3-5 times distribution pipe volume

(4) Timed dosing is recommended where design considerations allow.

d. Sand Filter Treatment Media

(1) The depth of the sand media below the distribution system must be at least 24 inches unless otherwise noted in Table 10-1A for type "R" soils.

(2) "Preferred" sand media requirements:

(i) Effective size: 0.25-0.60 mm

(ii) Uniformity coefficient: ≤ 4.0

(iii) Percent fines passing #200 sieve: ≤ 3.0

(3) "Secondary" sand media requirements:

(i) Effective size: 0.15-0.60 mm

(ii) Uniformity coefficient: ≤7.0

(iii) Percent fines passing #200 sieve: ≤ 3.0

(4) A gradation of the sand media used must be provided. The gradation report must be dated no more than one month prior to the installation date. However, a gradation of the actual material placed in the excavation is recommended.

e. Gravel Requirements

(1) Clean, graded gravel, or rock, must range in size from 1/2 inch to 2 1/2 inches. AASHTO M 43 size No.3 coarse aggregate meets this specification.

(2) The gravel must surround the distribution pipes used to disperse the effluent and must be at least 6 inches below and 2 inches above the pipes.

(3) Division accepted manufactured media may be used as an alternative to specified gravel.

f. Filter Fabric Requirements

(1) The top layer of gravel must be covered with a non-woven permeable geotextile fabric meeting a maximum thickness rating of 2.0 ounces per square yard or equivalent pervious material.

g. Final Cover Material

(1) 8 inches – 10 inches of Type 1 or 2 soil with an additional 2 inches top soil

h. Size adjustment factors provided in Tables 10-2 and 10-3 are not applicable for sand filters.

i. Sand filters must not be used to treat wastewater that does not conform to TL1 treatment level or better.

3. Unlined (Open Bottom) Sand Filters

a. All requirements of 43.11.C.2.a-i will apply to unlined sand filters.

b. Application rates:

(1) Maximum hydraulic loading rate for TL1 effluent applied to “Preferred Sand Media” in an unlined sand filter is 1.0 gal./sq.ft./day, or the long-term acceptance rate of the receiving soil for TL3 (Table 10-1) whichever results in the larger area.

(2) Maximum hydraulic loading rate for TL1 effluent applied to “Secondary Sand Media” in an unlined sand filter is 0.8 gal./sq.ft./day, or the long-term acceptance rate of the receiving soil for TL3 (Table 10-1) whichever results in the larger area.

(3) Use of the long-term acceptance rate of the receiving soil for TL3 as in (1) and (2) above does not require the system comply with the operation and maintenance requirements of section 43.14, however no reductions to vertical separation distances in Table 7-2 may be taken. Size adjustment factors provided in Tables 10-2 and 10-3 are not applicable for unlined sand filters.

(4) Maximum hydraulic loading rate for TL2, TL2N, TL3, or TL3N effluent applied to “Preferred” or ”Secondary” Sand Media in an unlined sand filter must be the long-term acceptance rate of the receiving soil for TL3, (Table 10-1).

c. The upper infiltrative surface of an unlined sand filter receiving TL1 – TL2 effluent must be at least three feet above a limiting layer.

d. The upper infiltrative surface of an unlined sand filter receiving TL2N-TL3 effluent must be at least two and one-half feet above a limiting layer.

e. The upper infiltrative surface of an unlined sand filter receiving TL3N effluent must be at least two feet above a limiting layer.

4. Lined Sand Filters

   a. All requirements of 43.11.C.2.a-i will apply to unlined sand filters.

   b. Application rates:

      (1) Hydraulic loading rate for TL1 effluent applied to “Preferred Sand Media” in a lined sand filter is 1.0 gal./sq.ft./day.

      (2) Hydraulic loading rate for TL1 effluent applied to “Secondary Sand Media” in a lined sand filter is 0.8 gal./sq.ft./day.

   c. The minimum depth of the sand media in a lined sand filter must be two feet.

   d. An intermediate layer of pea gravel, two inches in thickness, must be placed between the sand filter media and the course under-drain media to prevent the migration of sand into the lower layer of under-drain gravel. ASTM C 33, No. 8, coarse aggregate meets this specification.

   e. A minimum four-inch diameter slotted SCH40 PVC under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a 5 inches thick bed of washed, graded gravel, or rock ranging in size from 1/2 inch to 2 1/2 inches. AASHTO M 43, No.3 coarse aggregate meets this specification.

   f. Lined sand filters must have an impervious liner on the sides and bottom of the filter. The liner must consist of a minimum 30 mil thick PVC material or equivalent.

   g. Effluent collected by the under-drain must be dispersed to a soil treatment area. The soil treatment area may be sized with a maximum long-term acceptance rate of the receiving soil for TL3 effluent.

5. Recirculating Sand Filter, Minimum Requirements:

   a. Treatment level:

      (1) Treatment level provided within recirculating sand filters is TL3.

   b. General Design Parameters: Not all combinations of the variables noted below will result in a proper distribution system design. The design engineer must justify through calculations or design software that the selected values will concur with industry standards.

      (1) Distribution pipe size: 3/4 inch – 1.5 inches (PVC Class 200, min.)

      (2) Distribution pipe spacing: 18 inches – 36 inches (24 inches typ.)

      (3) Orifice size: $^{1}/_{8}$ inch – ¼ inch

      (4) Orifice spacing: 18 inches – 36 inches (24 inches typ.)

      (5) A minimum 30 inch residual head at the distal end orifice for holes larger than $^{1}/_{8}$”, and a minimum 60 inch residual head for $^{1}/_{8}$” orifices

c. Dosing:

(1) Timed dosed, pressure distribution is required. The design of the distribution system must comply with the requirements of section 43.10.E.3.a.

(2) Recirculation ratio: 3:1 – 5:1

(3) Gallons/orifice/dose: 1 – 3 (2.0 typ.)

(4) Hydraulic loading: 3 - 5 gal./sq.ft./day (4 – 5 typ.)

(5) Dosing time "ON"; <2.5 min. (<2.0 typ.)

(6) Number of cycles/day: 48 – 120

d. Top gravel requirements:

(1) Washed, graded gravel, or rock, must range in size from 1/2 inch to 2 1/2 inches. AASHTO M 43, No.3 coarse aggregate meets this specification.

(2) The gravel must surround the distribution pipes used to disperse the effluent and must be at least 6 inches below and 2 inches above the pipes.

(3) State accepted manufactured media may be used as an alternative to specified gravel.

(4) Soil cover is prohibited. The upper gravel layer must be open to the atmosphere.

e. Filter media requirements:

(1) Effective size: 1.5 – 2.5 mm

(2) Uniformity coefficient: ≤ 3

(3) Fines passing #200 sieve: ≤ 1.0

(4) Media depth (min.): ≥24 inches

f. Intermediate gravel layer:

(1) An intermediate layer of pea gravel, two inches in thickness, must be placed between the coarse underdrain media and the sand filter media to prevent the migration of sand into the lower layer of under-drain gravel (ASTM C 33, No. 8, coarse aggregate meets this specification).

g. Under-drain requirements:

(1) A minimum four-inch diameter slotted SCH40 PVC under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a 5 inches thick bed of washed, graded gravel, or rock ranging in size from 1/2 inch to 2 1/2 inches. AASHTO M 43, No.3 coarse aggregate meets this specification.

h. PVC liner requirements:

(1) Lined sand filters must have an impervious liner on the sides and bottom of the filter. The liner must consist of a 30 mil thickness PVC material or equivalent.

i. Effluent collected from the recirculating sand filter must be discharged to a soil treatment area. The soil treatment area may be sized with a maximum long-term acceptance rate of the receiving soil for TL3N effluent.

D. Mound Systems

1. When the infiltrative surface of the media receiving wastewater effluent must be placed at or above the natural ground surface at any point to meet the vertical separation requirements of Table 7-2, it shall be considered a mound system.

2. Mound systems that provide a minimum of 24 inches of sand treatment media may use the application rates for the in-situ receiving soil for TL3 effluent (Table 10-1). Use of the long-term acceptance rate of the receiving soil for TL3 does not require the system comply with the operation and maintenance requirements of section 43.14, however no reductions to vertical separation distances for use of higher level treatment in Table 7-2 may be used.

3. Size adjustment factors within Table 10-3 must not be applied to mound designs where TL3 application rates are used. However they may be applied if TL1 application rates are used.

4. Mound systems must conform to the design requirements of sections 43.11.C.3.a-e for unlined (open bottom) sand filters, with the following exceptions.

a. A mound system may include less than 24 inches of imported sand media on a site where a lesser depth of sand media is sufficient to meet vertical separation requirements of Table 7-2. Application rates for the in-situ receiving soil for TL1 effluent must be used when less than 24 inches of sand media is used, unless higher level treatment is provided prior to dispersal into the mound system.

b. For the design of a mound system where less than 24 inches of sand media is proposed, and application rates for TL1 are used, the size adjustment factors within Table 10-3 may be used.

5. The basal area must be determined using the LTAR from Table 10-1 for the in-situ receiving soil under the mound.

6. Linear loading rates must be determined. The evaluation of many factors is required for an accurate determination of the linear loading rate. While application rates for the in-situ receiving soil under the mound is a main component, placement on the slope, and percent of slope must also be addressed when defining the linear loading rate. If the movement of the effluent is primarily vertical, then the linear loading rate is not as critical. However, if the movement of the effluent will be primarily horizontal, as would be expected in soil types 3A through 5 (Table 10-1), then the linear loading rate is extremely important and long narrow mounds are strongly recommended.

a. When TL1 effluent is applied to the distribution media of a mound system installed above in-situ soil types 1 through 3 (Table 10-1) and R-0 through R-2 (Table 10-1A), the

suggested linear loading rate is between 6 gpd/lin.ft. and 12 gpd/lin.ft. The maximum width of the distribution media in a mound system installed above these soil types is 12 feet when TL1 effluent is applied to the distribution media of a mound system.

b. When TL2 through 3N effluent is applied to the distribution media of a mound system installed above in-situ soil types 1 through 3 (Table 10-1) and R-0 through R-2 (Table 10-1A), the linear loading rate may exceed 12 gpd/lin.ft.; subsequently the mound may be wider than 12 feet.

c. When TL1 through TL3N effluent is applied to mound systems installed above in-situ soil types 3A through 5 (Table 10-1), the suggested linear loading rate is between 3 gpd/lin.ft. and 5 gpd/lin.ft. The maximum width of the distribution media in a mound system placed above these soil types is 12 feet.

7. The final cover over a mound system must extend at least twelve inches horizontally beyond the perimeter of the distribution media prior to sloping down to existing grade. The final slope of the mound must be no greater than three feet horizontal to one foot vertical.

8. On sites with slopes in excess of 25 percent a retaining structure and liner may be used on the downhill side. The liner must be placed three feet from the edge of the chambers or gravel and a minimum of 12 inches into existing native grade. Trenches or narrow beds installed parallel with the native contour of the slope must be used to limit the height of the infiltrative surface above grade.

9. The surface of the mounded area must be planted with a suitable vegetative cover.

10. The Colorado Department of Public Health and Environment, Water Quality division has created a technical guidance document for Mounded Wastewater Treatment Systems that should be referenced when designing this type of system. Another suggested reference for the design and installation of mound systems is, “The Wisconsin Mound Soil Absorption System: Siting, Design, and Construction Manual, January 2000”.

E. Rock Plant Filter (Constructed Wetland) Treatment Before a Soil Treatment Area

1. A rock plant filter system must be designed by a professional engineer.

2. The design must be site specific and include specifications for: loading, capacity, dimensions, liner material, filter media, effluent depth and depth control mechanism, density and species of plant material, and other site specific information.

3. The treated effluent from a rock plant filter must be distributed to a soil treatment area.

4. Although producing higher level treatment, rock plant filters must not be assigned a treatment level higher than TL1 because of system and seasonal variability.

43.12 Design Criteria – Non-Pressurized Drip Dispersal System (NDDS), Evapotranspiration, and Limited Use Systems

A. Evapotranspiration and Evapotranspiration/Absorption Systems:

1. Non-Pressurized Drip Dispersal System (NDDS):

a. An NDDS is considered a type of evapotranspiration/absorption system. However as specific design criteria is provided for an NDDS, they are exempt from the additional requirements of section 43.12.A.2, 3 and 4.

b. The design of a NDDS must follow the procedures stated in the document titled: *The Colorado Professionals in Onsite Wastewater Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (NDDS),* Revision September, *2016* is the procedural guideline in the design of a NDDS and must be followed when an NDDS is proposed. The document is available from Colorado Professionals in Onsite Wastewater (www.cpow.net).

c. The width of an NDDS system may be wider than 12 feet.

2. The following section provides general criteria which must be followed when an evapotranspiration or evapotranspiration/absorption bed is proposed.

a. The design may only be permitted in arid climates where the annual evaporation rate exceeds the annual precipitation rate by more than 20 percent, and where site characteristics dictate that conventional methods of effluent dispersal are not appropriate.

b. The design may only be permitted in soil types 4, 4A and 5.

c The system must be designed by a professional engineer.

d. If data for the Pan Evaporation Rate is provided, it must be multiplied by 0.70, or less, to obtain the equivalent Lake Evaporation Rate.

e. The width of the bed may be wider than 12 feet.

f. The required capillary or wicking sand must meet the gradation requirements in Table 12-1 and be approved by the design engineer. This sand is to be covered by a crowned, thin layer of loamy-sand mix and appropriate vegetation that will assist in drawing the water to the surface.

g. Adjustment factors as provided in Tables 10-2 and 10-3 must not be used.

3. For systems designed strictly as an evapotranspiration bed, the following criteria must be met:

a. Design data to be furnished must include, but shall not be limited to; system dimensions, distribution system design, specifications of distribution media and wicking sand, liner material if used, bedding, properties of the soil under the system, vegetation cover, and a water balance calculation including annual precipitation and storage requirements for periods of the year when evapotranspiration does not occur.

b. The following formula must be used for determining the minimum area necessary for total evapotranspiration of septic tank effluent:

$$\text{Area (in square feet)}^{*} = \frac{\text{Design Flow (in gallons per day)} \times 586}{\text{Lake Evaporation Rate at the Site (in inches per year)}}$$

* Additional area may be required based on the annual water balance calculations.

c. Designs will include a rock and pipe, or other Division approved proprietary distribution product, with the centerline of the distribution system 6 to 8 feet on center. A thin non-woven fabric may be placed above the distribution system. Capillary wicking of the effluent is accomplished by a uniform depth layer of the specified sand media (capillary wicks), no more than 24 inches deep, placed between and above the distribution media. The base of the evapotranspiration bed may be no more than 30 inches below finished grade.

d. Capillary wicks which penetrate between the distribution system to the bottom of the bed must be at least 15 percent of the bed surface area. The wicks must be uniformly spaced throughout the system.

e. Except for dwellings, if the system is designed for summer use only, as determined by the Department, the surface area may be multiplied by 0.6 to obtain the required area.

4. For systems designed as an evapotranspiration/absorption bed, the following criteria must be met:

a. Data to be furnished must include, but is not limited to: system dimensions, distribution system design, specifications of wicking sand, properties of the soil under the evapotranspiration/absorption bed, provision for vegetation cover, and a water balance calculation including annual precipitation and storage requirements for periods of the year when evapotranspiration does not occur.

b. Design will include a rock and pipe, or other Division approved proprietary distribution product, with the centerline of the distribution system 6 to 8 feet on center. A thin non-woven fabric may be placed above the distribution media. Capillary wicking of the effluent is accomplished by a uniform depth layer of the specified sand media (capillary wicks) no more than 24 inches deep placed between and above the distribution media. The infiltrative surface may be no more than 30 inches below finished grade.

c. Capillary wicks which penetrate between the distribution system to the bottom of the bed, must be at least 15 percent of the bed surface area. The wicks must be uniformly spaced throughout the bed.

d. Amount of storage and evapotranspiration capacities may be reduced by the volume of effluent absorbed by the underlying soil based on the long-term acceptance rate for that soil type and the formulas provided in section 43.12.A.4.e below.

e. The following formula must be used for determining the minimum area necessary for evapotranspiration/absorption of septic tank effluent:

(1) $$\text{Area (sq. ft.)}^* = \frac{\text{Flow (gpd)}}{\text{(LTAR + ETR)}}$$

(i) LTAR refers to the long-term acceptance rate of the underlying soil as provided in Table 10-1 for TL1 effluent.

(ii) ETR refers to the evapotranspiration rate derived from the following formula:

$$\text{ETR (gal./day sq. ft.)} = \frac{\text{Lake Evaporation Rate at the Site (in inches per year)}}{586}$$

* Additional area may be required based on the annual water balance calculations.

B. Limited Use Wastewater Systems

1. Use of these systems is intended to provide an option for wastewater disposal when a standard OWTS with a soil treatment area is impractical due to site conditions, limited access, and where soil treatment areas are prohibited. Due to the high cost of maintenance associated with limited use systems, financial reasons or seasonal use alone cannot be considered as a justification for a limited use wastewater system.

2. Vaults and Vaulted Privies

a. Vaults for use in new construction of single family dwellings or commercial facilities are prohibited when the property can accommodate an OWTS with a soil treatment area, except as provided in (1) – (3) below:

(1) The Department may approve the use of a vault or vaulted privy for new construction of a dwelling built as a Cabin, as defined in Larimer County Land Use Code and per Larimer County Building Department policy, when water under pressure is not provided, or the source of water is hauled or hand carried to the site.

(2) A vault may be permitted if the property is located in an area where the installation of an OWTS with soil treatment area is not permitted.

(3) Vault or vaulted privy permits may be granted for specialized commercial uses, or when a connection to public sewer is pending and written documentation approving the connection from the wastewater supplier or district having authority is provided.

b. A vault must have a minimum 1250 gallon effective volume or be capable of holding a minimum of the two-day 48-hour design wastewater flow, whichever is larger.

c. Vaults may be permitted for repairs when a failing OWTS cannot be replaced.

d. Building permits to expand the use of a property currently served by a vault will be approved only if the vault is capable of holding a minimum of the 48-hour design wastewater flow.

e. A visual or an audible signal device or both, indicating filling to a maximum of 75 percent capacity, must be installed to indicate when pumping is necessary.

f. Vaults may be permitted for systems where some of the wastewater flows are separated, such as toilet wastes only, into a vault. The portion not retained in the vault must be treated in an adequately-sized OWTS with a soil treatment area sized per the requirements of this regulation.

3. Vaulted and Pit Privies

a. Vaulted privies for use in new construction of single family dwellings or commercial facilities are prohibited when the property can accommodate an OWTS with a soil treatment area.

b. Concrete vaults must meet the strength and watertightness requirements for septic tanks. Prefabricated fiberglass, fiberglass-reinforced polyester, and plastic tanks may be used as vaults, if the tank manufacturer provides testing criteria certifying them for this use.

c. Effective volume of the vault portion of a vaulted privy must be no less than 400 gallons and it must be constructed of pre-cast concrete or approved plastic. The vaults for privies must meet the structural and water tightness requirements of septic tanks. Site built concrete or concrete masonry unit tanks are not approved.

d. A vault privy structure must be built to include: fly- and rodent-tight construction, a superstructure affording complete privacy, an earth mound around the top of the vault and below floor level that slopes downward away from the superstructure base, a floor, and a riser of concrete or other impervious material with hinged seats and covers of easily cleanable, impervious material. All venting must be fly-proofed with No. 16 or tighter mesh screening.

e. On properties where there is no other option for an OWTS with a soil treatment area, or other limited use system as provided in section 43.12.B, and no vehicle access exists to the property for maintenance of a tank or vault, a pit privy may be considered by this Department and must meet the following requirements:

(1) The bottom of the pit must be located above at least four feet of suitable soil and four feet above a limiting layer;

(2) The pit must have at least 400 gallons of effective volume; and

(3) The superstructure must provide complete privacy and have fly- and rodent-tight construction, an earth mound around the top of the pit and below floor level that slopes downward away from the superstructure base, a floor, and a riser of concrete or other impervious material with hinged seats and covers of easily cleanable, impervious material. All venting must be fly-proofed with No. 16 or tighter mesh screening.

f. Installation of new or continued use of existing pit privies where an OWTS with a soil treatment area or another limited use wastewater system can be installed is prohibited.

4. Incinerating and Composting Toilets

a. The use of an incinerating or composting toilet will not reduce the required size of the OWTS as noted in section 43.8.A. This type of installation may also be subject to the jurisdiction of a local agency regulating plumbing or the Colorado Plumbing Board, whichever has jurisdiction over plumbing in the location.

b. An incinerating or composting toilet may be used for toilet waste where an OWTS or limited use system is installed for treating wastewater remaining after removal of toilet waste. Subject to other applicable regulations or codes, the composting or incinerating toilet may be located within a dwelling, or separate building provided the unit complies with the applicable requirements of this regulation, and provided the installation will not

result in conditions considered to be a health hazard as determined by the local public health agency. Compartment and appurtenances related to the unit must include fly-tight and vector-proof construction and exterior ventilation.

c. Incinerating toilets must be designed and installed in accordance with all applicable federal, state, and local air-pollution requirements and manufacturer's instructions.

d. Composting Toilets must meet the requirements of NSF/ANSI Standard 41 and bear the seal of approval of the NSF or an equivalent testing and certification program and meet the following requirements;

(1) An approved composting toilet must treat deposits of feces, urine, and readily decomposable household garbage that are not diluted with water or other fluids and are retained in a compartment in which aerobic composting will occur.

(2) The effective volume of the receptacle must be sufficient to accommodate the number of persons served in the design of the unit installed. The effective volume of the unit must include sufficient area for the use of composting materials which must not be toxic to the process or hazardous to persons and which must be used in sufficient quantity to assure proper decomposition.

(3) Residue from the composting toilet must be removed when it is filled to 75 percent of capacity. Residue from the unit must be properly disposed of by methods recommended by the manufacturer and acceptable to the local public health agency. Disposal methods must prevent contamination of water and not cause a public health nuisance. Disposal using solid waste practices is recommended.

(4) If a system will be installed where low temperature may be a factor, design and installation must address the effects of the low temperature. Composting toilets are not permitted for full time use in unheated dwellings or structures unless a standard flush toilet is also available.

(5) Composting toilets must be operated according to manufacturer's specifications.

(6) Overflow, drainage lines, or liquid separation tanks from composting toilets must be plumbed to an approved OWTS.

(7) Composting toilets are not approved for use at temporary or special events.

e. Incinerating toilets must meet the requirements of the NSF Protocol P157 and bear the seal of approval of the NSF or an equivalent testing and certification program, and must be operated according to manufacturer's specifications.

5. Portable Chemical Toilets

a. Use of a portable chemical toilet for permanently occupied buildings is prohibited except during construction or under emergency circumstances as determined by the Department.

b. Portable chemical toilets or other temporary facilities are not approved as a means of disposing of wastewater from sites that operate as event centers or as community halls per Larimer County Land Use Code.

c. Portable toilets may be used for temporary and special events per the Larimer County Land Use Code. Use of an OWTS or limited use wastewater system for a special or temporary event must be in compliance with this Regulation and be appropriately sized per section 43.6.

6. Slit Trenches

a. Construction of new or continued use of existing slit trenches is prohibited.

C. Treatment Systems Other Than Those Discharging Through a Soil Treatment Area or Sand Filter System

1. For systems discharging to State Waters, see section 2.C.

2. Systems that discharge other than through a soil treatment area or a sand filter system must:

a. Be designed by a professional engineer;

b. Be reviewed by the Board of Health; and

c. Not pose a potential health hazard or private or public nuisance or undue risk of contamination.

d. Not allow drainage of effluent off of the property of origin.

e. For residential systems, not utilize spray or drip irrigation directly to the ground surface.

3. The following minimum performance criteria must be required for all permitted systems pursuant to this section:

a. If effluent discharge is made into areas in which the possibility exists for occasional direct human contact with the effluent discharge, the effluent at the point of discharge must meet the minimum treatment criteria of TL3 effluent and specifically adhere to each of the following standards:

(1) The geometric mean of the *E. coli* density must not exceed 15 per 100 milliliters when averaged over any five consecutive samples, and no single sample result for *E. coli* can exceed 126 per 100 milliliters.

(2) The arithmetic mean of the standard five-day carbonaceous biochemical oxygen demand ($CBOD_5$) must not exceed ten milligrams per liter when averaged over any three consecutive samples.

(3) The arithmetic mean of the total suspended solids must not exceed ten milligrams per liter when averaged over any three consecutive samples.

b. If the effluent discharge is made into an area so restricted as to protect against the likelihood of direct human contact with the discharged effluent, the effluent at the point of discharge must meet the treatment criteria of TL2 effluent and specifically adhere to each of the following standards:

(1) The geometric mean of the *E. coli* density must not exceed 126 per 100 milliliters when averaged over any five consecutive samples, and no single sample can exceed 325 *E. coli* per 100 milliliters.

(2) The arithmetic mean of the standard five-day carbonaceous biochemical oxygen demand ($CBOD_5$) must not exceed 25 milligrams per liter when averaged over any three consecutive samples.

(3) The arithmetic mean of the total suspended solids must not exceed 30 milligrams per liter when averaged over any three consecutive samples.

4. To determine compliance with the standards contained in this section, the required sampling frequency for *E. coli*, $CBOD_5$, and total suspended solid levels must be performed at least once per month when the system is in operation and the results submitted to the Department for compliance with the permit requirements.

5. Methods of Analysis - Sampling Points:

a. All effluent samples must be analyzed according to the methods prescribed in the American Public Health Association, American Water Works Association, and Water Environment Federation: Standards Methods for the Examination of Water and Wastewater, 21st edition.

b. The sampling point must be a location that is representative of final discharge from the system.

43.13 Technology Review and Acceptance

A. OWTS technologies must either be public domain, including but not limited to rock and pipe distribution systems, sand filters with pressure distribution and mound systems, with criteria for design, installation, maintenance and use as described in this regulation, or proprietary products that have received Division review and acceptance before the Department may permit them for use.

B. The Division must review and provide either comment or acceptance to the manufacturer for proprietary products in these technology categories:

1. Proprietary treatment products (e.g. treatment systems);

2. Propriety distribution products (e.g. manufactured distribution products or subsurface dripline);

3. Septic tanks;

4. Others as needed.

C. Product Acceptance Requirements – General:

1. To qualify for product acceptance, manufacturers desiring to sell or distribute proprietary products in Colorado must submit a completed application to the Division in the format provided by the Division and a report describing in detail the test procedures and data confirming the performance and properties of the product claimed by the manufacturer. Products within a single series or model line sharing distinct similarities in design, materials, capacities, configuration, and claiming the same level of treatment may be accepted under a single application. Products outside

of the series or model line must be accepted under separate applications. The following information must be included in the application:

a. Manufacturer's name, mailing address, street address, and phone number;

b. Contact individual's name, mailing address, street address, phone number and email address. The contact individual must be vested with the authority to represent the manufacturer in the acceptance process;

c. Category of product (e.g., proprietary treatment product, proprietary distribution product, septic tank);

d. Name, including specific brand and model, of the proprietary product;

e. A description of the functions of the proprietary product, along with any known limitations on the use of the product;

f. Product description and technical information, including dimensioned drawings; materials and characteristics; component design specifications; and volumes, design capacity, and flow assumptions and calculations, as relevant;

g. Siting and installation requirements;

h. Product performance information in appropriate product section;

i. Detailed description, procedure and schedule of routine service and maintenance events;

j. Copies of manufacturer's literature to include sales and promotion, design, installation, operation and maintenance, and owner instructions; and

k. Identification of information subject to protection from disclosure and trade secrets, if any.

2. Upon receipt of an application, the Division must verify that the application is complete and meets the requirements for which the product is being evaluated. If the application is found to be complete, and the requirements of this section needed to accept the product are met, the Division will place the product on a list of accepted proprietary products for the type of product. Installation and use of accepted products must comply with the requirements noted on the acceptance document provided by the Division.

3. Manufacturers must have readily accessible and up to date information for designers, regulators, product owners, and other interested parties about their product including:

a. Product manuals;

b. Design instructions;

c. Installation instructions;

d. Operation and maintenance instructions; and

e. A list of representatives and manufacturer-certified service providers in Colorado, if any. If none exist, information on how service on the product will be provided in Colorado.

4. If, at any time after a proprietary product has been accepted for use, the Division receives information that the product so accepted does not meet the required standards, or in any way constitutes a public health or environmental hazard, the Division may, at its discretion, revoke the product acceptance. The Division shall notify the manufacturer and local public health agencies within 30 days of any revocation.

D. Proprietary Treatment Product Acceptance Requirements

1. If a proprietary treatment product is submitted to meet a specific treatment level, a report with test procedures and data must be submitted to the Division to demonstrate that it can meet the treatment level for which the approval is being requested on a consistent basis in actual installations. The Division must approve the test methods and programs. Test results from product certification testing must also be submitted.

2. If a product is accepted for a specific treatment level, the product may also be used for applications requiring lower treatment levels. Reductions based on higher level treatment may not be applied unless the Department has a maintenance oversight program in place as described in section 43.14.D.

3. Field Performance Testing

a. Testing must be performed by a neutral third party.

b. Testing for residential applications must be performed on a minimum of 12 single-family homes under normal operating conditions unless otherwise noted below:

(1) If the proprietary treatment product is requesting TL2 acceptance and that product has received NSF/ANSI 40 certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 40 certification must be submitted if the reduced number of test sites is requested.

(2) If the proprietary treatment product is requesting TL2N acceptance and that product has received NSF/ANSI 245 certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 245 certification must be submitted if the reduced number of test sites is requested.

c. Each system must be tested over a period of at least one year.

d. Each system must be sampled at least four times during the year with the sampling evenly distributed throughout the year.

e. Laboratory results for all parameters for which acceptance is being requested must be submitted.

f. Testing may be performed in Colorado under a Product Development Permit.

g. Testing may be performed in locations other than Colorado. As part of the testing, the manufacturer must define, to the acceptance of the Division, what adjustments or modifications to the product will be required to compensate for the following conditions:

(1) Increased elevation results in lower atmospheric pressure and lower oxygen content. Adjustments or modifications to the treatment process may be

required to compensate for these conditions and those adjustments or modifications must be specified.

(2) Winter season conditions in Colorado include cold temperatures that may affect product performance. Adjustments or modifications to the treatment process may be required to compensate for these conditions and those adjustments or modifications must be specified. This item must be addressed if nitrogen reductions are claimed.

h. The report conclusions must indicate the proprietary treatment unit can consistently be expected to meet the treatment level for which acceptance is being requested.

i. The report must include estimated operating costs for the first five years of the treatment system's life. This must include both estimated annual electricity or other energy costs, and routine inspection and maintenance costs, including replacement of parts.

(1) Energy and other costs are to be based on typical Denver, Colorado, costs at the time of the acceptance request.

(2) Replacement part costs must include shipping and handling.

(3) If media or other major part replacement is expected during the normal life of the system, the cost of replacement and the typical replacement interval must be included even if replacement is not expected within five years.

j. If a proprietary product had been previously accepted for use in Colorado under NSF/ANSI 40 or equivalent testing and at least one product unit had been installed in Colorado prior to June 30, 2013, the acceptance for use in Colorado may continue as Treatment Level 2. A request for this continued acceptance must be submitted to the Division on the forms provided by the Division. Documentation of a product installation must be provided.

E. Proprietary Distribution Product Acceptance Requirements

1. Proprietary manufactured distribution products must:

a. Be constructed or manufactured from materials that are non-decaying and non-deteriorating and do not leach chemicals when exposed to septic tank effluent and the subsurface soil environment;

b. For gravity distribution systems, the product must provide a liquid storage volume at least equal to the storage volume within the assumed 30 percent void space in a rock and pipe distribution system assuming six inches of rock below the pipe and two inches above the pipe;

c. Maintain the integrity of the trench or bed. The material used, by its nature and its manufacturer-prescribed installation procedures, must withstand the physical forces of the soil sidewalls, soil backfill and the weight of equipment used in the backfilling; and

d. If the width of a proprietary manufactured distribution product is within 90 percent of the width of the excavation, it may be approved as being equivalent to the full width of the excavation, if information is provided that demonstrates distribution over the full

width. Thus, the product must cover at least 90 percent of the excavated area in either a trench or bed configuration in order to receive sizing adjustments provided in Table 10-3.

2. Chambers:

   a. Include a sidewall that is structurally sound and capable of allowing aeration of the infiltrative surface and exfiltration of effluent while minimizing the intrusion of soil.

3. Enhanced manufactured media:

   a. The product must be wrapped in a fabric that promotes movement of the effluent through the fabric and prevents intrusion of soil. Manufacturer must demonstrate that the product has been adequately tested and functions as intended.

   b. For enhanced manufactured media that requires a specified layer of sand or other media to be placed below the actual product, the vertical separation requirements of this regulation will be determined from the base of the sand or other media, as the sand or media is an integral part of the component.

   c. For products that allow for sand extensions beyond the actual manufactured component, the distance of sand allowed from the edge of the excavation to the manufactured component may be up to six inches in a trench system and 24 inches in a bed system.

   d. If sand media is proposed by the manufacturer as an integral part of the distribution product, it must meet the size and uniformity specifications as noted by the manufacturer.

4. Other manufactured media:

   a. In order to receive sizing adjustments provided in Table 10-3, the product must cover at least 90 percent of the excavated area in either a trench or bed configuration without the use of gravel, stone or other aggregate containing fines, which may compromise soil permeability.

5. Proprietary subsurface dripline products must:

   a. Be warranted by the manufacturer for use with OWTS effluent;

   b. Specify required treatment level of influent to the driplines;

   c. Be designed for resistance to root intrusion; and

   d. Incorporate emitters that may be controlled either by use of pressure-compensation emitters or with a pressure regulator.

F. Septic Tank Acceptance Requirements

1. Septic tank design must conform to the requirements of section 43.9.B. of this regulation.

2. Each manufacturer must annually test five percent of its tanks for watertightness at the manufacturing facility, unless the tanks are certified for use as a septic tank by the International Association of Plumbing and Mechanical Officials (IAPMO) or Canadian Standards Association

(CSA), or the manufacturer participates in the Plant Certification Program of the National Precast Concrete Association (NPCA).

3. Watertightness results must be sent to the Division on an annual basis unless otherwise addressed in section 43.13.F.2 above. The manufacturer must provide information that specifies measures taken to repair a tank that fails the watertightness test. The manufacturer must also define the measures taken to prevent similar problems in future tanks.

4. IAPMO, CSA, and NPCA certifications must be submitted to the Division for acceptance. Current certifications must be submitted to the Division on an annual basis.

G. Other Product Acceptance Requirements

1. The Division may adopt review and acceptance requirements for additional products as needed.

43.14 Operation and Maintenance

A. Responsibility: The owner must be responsible for maintenance of an OWTS unless the responsibility has been contractually assigned to a tenant or a third party or a public, quasi-public, or political subdivision.

B. Service Label: For higher level treatment systems or other components under a service contract, a clearly visible, permanently attached label or plate giving instructions for obtaining service must be placed at a conspicuous location.

C. The Board of Health may adopt regulations for:

1. Scheduling of maintenance and cleaning;

2. Practices adequate to ensure performance of an OWTS; and/or

3. Submission of proof of maintenance and cleaning to the Department by the owner of the system.

D. Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher Level Treatment;

1. Reductions in requirements for soil treatment areas, vertical separation distances to limiting layers or reductions in horizontal separation distances by using higher level treatment systems are based on the criteria that these systems are functioning as designed. If these criteria are not met, failure or malfunction is likely, which could result in damage to public health and water quality.

2. Prior to issuing a permit for systems with a reduced soil treatment area, vertical separation distances to limiting layers, or reductions in horizontal separation distances as a result of higher level treatment, the applicant must complete a Higher Level Treatment System Maintenance Agreement, acknowledging the requirements associated with installation of the system per section 43.14.D.3.

   In addition, the Department will keep the following records for each Higher Level Treatment System permitted;

   a. Records that indicate:

(1) Owner and contact information;

(2) Address and legal description of property;

(3) Location of OWTS specifying location of septic tank, higher level treatment system, soil treatment area and other components;

(4) Description of OWTS installed;

(5) Level of treatment to be provided;

(6) Copy of current contract with a service provider;

(7) Inspection and maintenance performed:

(i) Dates system was inspected and/or maintained;

(ii) Name and contact information of inspector and/or maintenance provider;

(iii) Condition of system at inspection; and

(iv) Maintenance tasks performed;

(8) Permits, if required by the Department for the work performed; and

(9) Condition of system at completion of any maintenance activity.

b. Frequency of inspection and maintenance must be the most frequent of:

(1) Manufacturer recommendations for proprietary systems or design criteria requirements for public domain technology;

(2) Department or Division requirements;

(3) For higher level treatment systems, two inspections at six-month intervals for the first year of operation, followed by annual inspections for the life of the system.

3. Owner responsibilities:

a. Ensure OWTS is operating, maintained and performing according to the required standards for the designated treatment level;

b. Maintain an active service contract with a maintenance provider at all times; and

c. Each time his/her current contract with a maintenance provider is renewed or replaced, send a copy to the Department within 30 days of signing.

4. Maintenance provider responsibilities:

a. Must notify the Department when a service contract has been terminated.

b. Must obtain appropriate training/certification for specific proprietary treatment products as provided by the manufacturer necessary to provide the required operation and maintenance for said products.

E. Monitoring and Sampling

1. For an OWTS for which monitoring of effluent is required, the Department or delegated third party must collect and test effluent samples to ensure compliance with the provisions of this regulation.

2. Sampling may be required by the Department in conjunction with an enforcement action.

3. Any owner or occupant of property on which an OWTS is located may request the Department to collect and test an effluent sample from the system. The Department may perform such collection and testing services. The owner or occupant must pay for these services.

a. If the Department or a delegated third party collects and tests effluent samples, a fee not to exceed that which is allowed by the OWTS Act may be charged for each sample collected and tested. Payment of such charge must be stated in the permit as a condition for its continued use.

b. Conditions when a Department can require routine monitoring:

(1) Indications of inadequate performance;

(2) Location in sensitive areas;

(3) Experimental systems; and/or

(4) Systems under product development permits.

c. Sampling and analysis must be performed according to American Public Health Association, American Water Works Association, and Water Environment Federation: Standards Methods for the Examination of Water and Wastewater, 21st edition.

43.15 Severability

The provisions of this regulation are severable, and if any provisions or the application of the provisions to any circumstances are held invalid, the application of such provision to other circumstances, and the remainder of this regulation will not be affected thereby.

43.16 Materials Incorporated by Reference

Throughout these regulations, standards and requirements by outside organizations have been adopted and incorporated by reference. The materials incorporated by reference cited herein include only those versions that were in effect as of April 10, 2017, and not later amendments to the incorporated material.

Materials incorporated by reference are available for public inspection during normal business hours from the Water Quality Control Division, 4300 Cherry Creek Drive South, Denver, Colorado 80246. Copies may be purchased from the source organizations listed below.

AASHTO, American Association of State Highway and Transportation Officials

444 North Capitol Street, NW, Suite 249
Washington, DC 20001
Phone: 202-624-5800
Email: info@aashto.org
www.transportation.org

ANSI, American National Standards Institute
25 West 43rd Street, 4th floor
New York, NY 10036
Phone: 212.642.4900
www.ansi.org

ASTM, American Society for Testing and Materials
ASTM International
100 Barr Harbor Drive
PO Box C700
West Conshohocken, PA 19428-2959
Phone: 610.832.9500
Email: service@astm.org www.astm.org
CSA, Canadian Standards Association
CSA Group Testing and Certification Inc.
178 Rexdale Boulevard
Toronto, Ontario M9W 1R3
Canada
Phone: 800-463-6727
Email: sales@csagroup.org
www.csagroup.org

ETL, Electrical Testing Laboratories
The ETL Listed Mark is from Intertek Testing Services NA, Inc. (ITSNA)
545 East Algonquin Road, Suite F
Arlington Heights, Illinois 60005
Phone: 800 967 5352
www.intertek.com

IAPMO, International Association of Plumbing and Mechanical Officials
International Association of Plumbing and Mechanical Officials EGS (IAPMO)
4755 East Philadelphia Street
Ontario, CA 91761
Phone: 909-472-4100
Email: iapmo@iapmo.org
www.iapmo.org

NPCA, National Precast Concrete Association
1320 City Center Drive, Suite 200
Carmel, IN 46032
Phone: 800-366-7731
www.precast.org

NSF, National Sanitation Foundation
NSF International (NSF)
789 North Dixboro Road
Ann Arbor, Michigan 48105

Phone: 734-769-8010
Email: info@nsf.org
www.nsf.org

UL Underwriters Laboratories
Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, Illinois 60062
Phone: 847.272.8800
Email: CustomerExperienceCenter@ul.com
www.ul.com

Standard Methods for the Examination of Water and Wastewater, 21st edition.
A joint publication of the American Public Health Association, American Water Works Association, and Water Environment Federation
Phone: 877-574-1233
Email: standardmethods@wef.org
www.standardmethods.org/Buy/

43.17 – 43.21 Reserved

Table 6-1 Single-Family Residential Design Flows

# Bedrooms	Occupancy (# of Persons)	Wastewater Flow Per Person (gallons/day)	Design Flow (gallons/day)
2	4	75	
3	6	75	
4	7	75	
5	8	75	
6	9	75	

TABLE 6-2 For Design Purposes, the Estimated Daily Wastewater Flow and BOD_5 Load Per Person Unless Otherwise Noted in Section 43.6.A.4

RESIDENTIAL WASTEWATER	GPPD	BOD_5 IN POUNDS PER DAY
Single-family dwellings	75	.20
Auxiliary buildings, by fixture type		
Kitchen sink with garbage grinder		.052
	19.5	.037
	24.8	.029
Tiny Homes[3], per unit		.40
COMMERCIAL WASTEWATER	GPD	BOD_5 IN POUNDS PER DAY
Hotels and motels per room	75	

Boarding and rooming houses per room (users absent during working hours)	50	.15
Mobile home per occupant	75	.20
Mobile home park per space	300	.80
Facilities with short-term or transient visitors. Airports or bus stations per passenger; fairgrounds per person attending; ball parks, race tracks, stadiums, theaters or auditoriums per seat	5	.02
Airport per employee	10	.06
Barber and beauty shops per chair	100	.70[1]
Bowling alleys per lane - toilet wastes only	5	.03[1]
Country club per member	30	.02
County club per employee	20	.06
Dentist offices per non-wet chair	50	.14[1]
Doctor offices per doctor	250	.80[1]
Event Centers/Wedding Venues, per seat; without any food service	3.5	.01
Event Centers/Wedding Venues, per seat; warming kitchen only, catered/off-site food preparation	10	.01
Kennels per dog	30	.20
Laundries, self-service per commercial washer	400	.75
Office buildings per employee per eight-hour shift	15	.06
Service stations per toilet fixture	250	.50[1]
Stores and shopping centers per square foot of retail space	.1	.01[1]
Work or construction camps semi-permanent with flush toilets	50	.17

FOOD SERVICE ESTABLISHMENTS	GPD	BOD_5	IN POUNDS PER DAY

INSTITUTIONAL WASTEWATER WITHOUT KITCHENS UNLESS OTHERWISE NOTED	GPD	BOD_5	IN POUNDS PER DAY

RECREATIONAL AND SEASONAL WASTEWATER USE	GPD	BOD_5	IN POUNDS PER DAY
Camps, day, no meals served	15	.12	

Camps, primitive (limited plumbing)	25	.12
Camps, residential	50	.12
Luxury resort	125	.17
Resort night and day/Guest Ranches	50	.12
Campground per campsite[2]	50	.12
Public park flush toilet per fixture per hour when park is open	36	.04 lbs./ fixture
Public park urinal per fixture per hour when park is open	10	.01 lbs./fixture
Public park shower per fixture per hour when park is open	100	.10 lbs./ fixture
Public park faucet per fixture per hour when park is open	15	.04 lbs./ fixture
Swimming pools and bathhouses	10	.06
Travel trailer parks with individual water and sewage hookup per unit [2]	100	.24
Travel trailer park without individual water and sewage hookup per unit [2]	50	.12

1 BOD levels need further verification depending on the specific use of the facility.
2 Laundry facilities are to be calculated on a per commercial washer basis in accordance with other elements of this table.
3 For the purposes of this Table, a "Tiny home" is a structure that has only one bedroom and has <400 sq.ft. of livable space, including lofts.
4 For churches with food service, the 4 gal/meal must be added to the 3.5 gal/seat to determine projected design flows.

Table 6-3 Treatment Levels

Treatment Level	BOD_5 (mg/L)	$CBOD_5$[1] (mg/L)	TSS (mg/L)	Total Nitrogen (mg/L)
TL1[2]	180	-	80	60-80
TL2	-	25	30	N/A[3]
TL2N	-	25	30	>50% reduction[4]
TL3	-	10	10	N/A[3]
TL3N	-	10	10	20 mg/L

Shading indicates higher treatment levels.
1 Requirements for $CBOD_5$ are only related to effluent samples from a higher level treatment system.
2 Domestic septic tank effluent prior to soil treatment or higher level treatment has a wide range of concentrations. These values are typical, but values used for design must account for site-specific information.

3 Total Nitrogen does not apply to Treatment Levels TL2 and TL3. Processes intended to reduce total nitrogen are addressed in Treatment Levels TL2N and TL3N. Any total nitrogen reductions that may be observed for TL2 and TL3 are as a result of the treatment process for BOD_5 and TSS reductions.

4 NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction requires reduction of 50 percent rather than an absolute value.

Table 6-4 High Strength Wastewater*

	BOD_5 (mg/L)	TSS (mg/L)	Fats, Oils, Grease (FOG) (mg/L)
Septic Tank Influent	>300	>200	>50
Septic Tank Effluent	>180	>80	>25

* High strength effluent prior to a septic tank has a wide range of concentrations. These values are typical, but values used for design purposes must account for site-specific information

Table 7-1 Minimum Horizontal Distances in Feet Between Components of an On-Site Wastewater Treatment System Installed After November 15, 1973 and Water, Physical and Health Impact Features

	Spring, Well[1], Suction Line, Potable Water Supply Cistern[4]	Potable Water Supply Line, Geothermal Coils	Structure w/Basement, Crawl Space, or Footing Drains	Structure Without Basement, Crawl Space, or Footing Drains	Property Lines, Piped or Lined Irrigation Ditch, or Upslope Curtain Drain	Subsurface Drain, Intermittent Irrigation Lateral, Drywell, Stormwater Structure or Conveyance	Surface Water, Lake, River, Irrigation Ditch, Stream, Wetland	Dry Gulch, Cut Bank, Fill Area (From Crest)	Septic Tank, Higher Level Treatment Unit, Dosing Tank, Vault, Vaulted Privy
Septic Tank, Higher Level Treatment Unit, Dosing Tank, Vault, or Vault Privy	50[2]	10[2]	5	5	10	10	50	10	--
Building Sewer or Effluent Lines	50[2]	5[6]	0	0	10[2]	10[2]	50[2]	10[2]	--
STA Trench, STA Bed, Unlined Sand Filter, Subsurface Dispersal System, Seepage Pit, Pit Privy	100[3]	25[2]	20	10	10	25	100[3]	25	5
Lined Sand Filter	60	10[2]	15	10	10	10	50	10	5
Lined Evapotranspiration Field or Outside of Berm of Lined Wastewater Pond	60	10[2]	15	15	10	10	50	10	5
Unlined or Partially Lined Evapotranspiration System, Outside of Berm of Unlined Wastewater Pond, or System Not Relying on STA for Treatment Other than Aerosol	100	25[2]	15	15	10	25	100	15	10
System Not Relying on STA for Dispersal	100[3]	10[2]	125[5]	125[5]	10	--	50[3]	10	10

NOTE: The minimum distances shown above must be maintained between the OWTS components and the features described. Where soil, geological or other conditions warrant, greater distances may be required by the local Board of Health or by the Water Quality Control Commission pursuant to section 25-8-206, C.R.S. and applicable regulations. For repair or upgrading of existing OWTS where the size of lot precludes adherence to these distances, a repaired OWTS must not be closer to setback features than the existing OWTS, as reviewed and approved by the Department. Components that are not watertight should not extend into areas of the root system of nearby trees.

1 Includes potable wells, irrigation wells and monitoring wells set within a potable aquifer and infiltration galleries permitted as wells by the Division of Water Resources.

2 Crossings or encroachments may be permitted at the points as noted above provided that the water or wastewater conveyance pipe is encased for the minimum setback distance on each side of the crossing. A length of pipe with a minimum Schedule 40 rating of sufficient diameter to easily slide over and completely encase the conveyance must be used. Rigid end caps of at least Schedule 40 rating must be glued or secured in a watertight fashion to the ends of the encasement pipe. A hole of sufficient size to accommodate the pipe must be drilled in the lowest section of the rigid cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area in which the pipe passes through the end caps must be sealed with an approved underground sealant compatible with the piping used. Other methods of encasement that provide equal protection are allowed. These methods must be reviewed and approved by the Department.

3 Add eight feet additional distance for each 100 gallons per day of design flows between 1,000 and 2,000 gallons per day, unless it can be demonstrated by a professional engineer or geologist by a hydrologic analysis or the use of a barrier, consisting of a minimum 30 mil PVC liner or equivalent, that contamination will be minimized. If effluent meets Treatment Level 3N and the Department has a maintenance oversight program in accordance with section 14.D. of this regulation, the distance addition is not required. Flows greater than 2,000 gallons per day must be hydrologically analyzed for flow, velocity, hydraulic head, and other pertinent characteristics as means of estimating distances required to minimize contamination as part of the Division site application and permitting process.

4 All horizontal setbacks to a potable water supply cistern must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2 of the Water Well Construction Rules, 2 CCR 402-2. Setback requirements which may necessitate a variance are found within section.10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted through a variance is to 25 feet. Above ground water storage tanks not connected to a well or other potable water supply must maintain a 25 foot setback to all components of an OWTS.

5 If the structure is not used as a habitable unit, the isolation may be reduced by the local Board of Health to no less than 50 feet.

6. Building sewer installations shall meet the design requirements of the Colorado Plumbing Code.

Table 7-2On-site Wastewater Treatment System Design Consideration and Treatment Requirements – Separation Distances from Soil Treatment Area

ITEM	OWTS DESIGN CONSIDERATION	Treatment Levels 1 and 2	Treatment Level 2N*	Treatment Level 3*	Treatment Level 3N*
	Horizontal Separation Distances				
1	Distance from soil treatment area to on-site well	Greater than or equal to 100 feet	Greater than or equal to 100 feet	Greater than or equal to 100 feet	Greater than or equal to 100 feet [1]
2	Distance from soil treatment area to pond, creek, lake, or other surface water feature	Greater than or equal to 100 feet	Greater than or equal to 50 feet	Greater than or equal to 50 feet	Greater than or equal to 25 feet
3	Distance from soil treatment area to dry gulch or cut bank	Greater than or equal to 25 feet	Greater than or equal to 10 feet	Greater than or equal to 10 feet	Greater than or equal to 10 feet
	Vertical Separation Distances				
4	Treatment depth in feet from infiltrative surface to a limiting layer	4 feet[2] (3 feet with pressure dosing)	Greater than or equal to 2.5 feet	Greater than or equal to 2.5 feet	Greater than or equal to 2 feet

*Requires pressure distribution

NOTE: Treatment levels are defined in Table 6-3. Reductions in separation distances with higher level treatment may be granted only if the Department regulations have included provisions for operation and maintenance.

1 All setback distance reductions to the 100 foot requirement for wells and soil treatment areas must be in full compliance with the minimum standards and variance requirements of the State of Colorado Division of Water Resources: Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction. For TL 3N effluent, a reduction to 75 feet is allowed if a variance from the Water Well Construction Regulations is obtained.

2 Reductions in the vertical separation requirements for the use of higher level treatment systems with seepage pits are not allowed. The bottom of the excavation of a seepage pit must be a minimum of four feet above a limiting layer.

Table 9-1 Minimum Septic Tank Size Based on Number of Bedrooms

Number of Bedrooms	Tank Capacity (gallons)
2 or 3	1,000
4	1,250
Each Additional	250

Table 10-1 Soil Treatment Area Long-term Acceptance Rates by Soil Texture, Soil Structure, Percolation Rate and Treatment Level

Soil Type, Texture, Structure and Percolation Rate Range					Long-term Acceptance Rate (LTAR); Gallons per day per square foot				
Soil Type	**USDA Soil Texture**	**USDA Soil Structure-Type**	**USDA Soil Structure-Grade**	**Percolation Rate (MPI)**	**Treatment Level 1[1]**	**Treatment Level 2[1]**	**Treatment Level 2N[1]**	**Treatment Level 3[1]**	**Treatment Level 3N[1]***
R	**>35% Rock (>2mm): See Table 10-1A**					**>35% Rock (>2mm): See Table 10-1A**			
1	Sand, Loamy Sand	Single Grain	0 (Structureless)	5-15	0.80	**1.40**	**1.40**	**1.55**	**1.55**
2	Sandy Loam, Loam, Silt Loam	PR (Prismatic) BK (Blocky) GR (Granular)	2 (Moderate) 3 (Strong)	16-25	0.60	**1.0**	**1.0**	**1.1**	**1.1**
2A	Sandy Loam, Loam, Silt Loam	PR, BK, GR Massive	1 (Weak) 0 (Structureless)	26-40	0.50	**0.80**	**0.80**	**0.90**	**0.90**
3	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR	2, 3	41-60	0.35	**0.55**	**0.55**	**0.65**	**0.65**
3A	**Sandy Clay Loam, Clay Loam, Silty Clay Loam**	**PR, BK, GR** **Massive**	**1** **0 (Structureless)**	**61-75**	**0.30**	**0.45**	**0.45**	**0.55**	**0.55**
4	**Sandy Clay, Clay, Silty Clay**	**PR, BK, GR**	**2, 3**	**76-90**	**0.20**	**0.30**	**0.30**	**0.30**	**0.30**
4A	**Sandy Clay, Clay, Silty Clay**	**PR, BK, GR** **Massive**	**1** **0 (Structureless)**	**91-120**	**0.15**	**0.20**	**0.20**	**0.20**	**0.20**
5	**Soil Types 2-4A**	**Platy**	**1, 2, 3**	**121+**	**0.10**	**0.15**	**0.15**	**0.15**	**0.15**

NOTE: Shaded areas require system design by a professional engineer.

1 Treatment levels are defined in Table 6-3.

* Higher long-term acceptance rates for Treatment Level 3N may be allowed for OWTS required to have a discharge permit, if the capability of the design to achieve a higher long-term acceptance rate can be substantiated.

Table 10-1A Design Criteria for Soils with High Rock Content (Type "R" Soils) [1,2,3,4]

Soil Type, Percentage of Rock, LTAR, Distribution				Required Sand or Media Depth Relative to the Quality of Effluent Applied to the Distribution System				
Soil Type	**Percentage and Size of Rock[5]**	**Maximum LTAR (Gal./sq.ft./ day)**	**Type of Distribution Required**	**Treatment Level 1[6]**	**Treatment Level 2**	**Treatment Level 2N**	**Treatment Level 3**	**Treatment Level 3N**
R-0	**Soil Type[7] 1 with more than 35% Rock (>2mm)**	**Unlined Sand Filter: 1.0 for "Preferred Sand Media"; 0.8 for "Secondary Sand Media"**	**Pressure Distribution[8]**	**Minimum 3-foot deep Unlined Sand Filter**	**Minimum 3-foot deep Unlined Sand Filter**	**Minimum 2.5-foot deep Unlined Sand Filter**	**Minimum 2.5-foot deep Unlined Sand Filter**	**Minimum 2-foot deep Unlined Sand Filter**
R-1; Option 1	Soil Type[7] 2 – 5, >35 - 65% Rock (>2mm) ; with ≥50% of the Rock <20 mm (3/4 inch)	Use TL1 LTAR from Table 10-1 for the soil type corresponding to the soil matrix, with a maximum LTAR of 0.8	Pressure Distribution[8]	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter	Sand media not required	Sand media not required
R-1; Option 2	Soil Type[7] 2 and 2A, >35 - 65% Rock (>2mm); with ≥50% of the Rock <20 mm (3/4 inch)	The allowable LTAR's are defined in each individual treatment level column in this Table	Pressure Distribution[8]	Remove, mix, replace 4 feet of existing material; with a maximum LTAR of 0.6	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.7	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.7	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.8	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.8
R-2	**Soil Type[7] 2 – 5, >65 Rock (>2mm), OR ≥50% of Rock >20 mm (3/4 inch)**	**Use TL1 LTAR from Table 10-1 for the soil type corresponding to the soil matrix, with a maximum LTAR of 0.8**	**Timed, Pressure Distribution[8]**	**Minimum 3-foot deep Unlined sand filter**	**Minimum 3-foot deep Unlined Sand Filter**	**Minimum 2.5-foot deep Unlined Sand Filter**	**Minimum 2.5-foot deep Unlined Sand Filter**	**Minimum 2-foot deep Unlined Sand Filter**

1. General guidance for Table 10-1A: The intent of the soil type R-0 is to define a material that consists of a high percentage of rock, or rock fragments, and has a percolation rate of less than 5 mpi. Soil types R-1 and R-2 consist of a high percentage of rock or rock fragments, but have a percolation rate of greater than 5 mpi. Soil types R-0 and R-2 are considered to be a "limiting layer".
2. No sizing adjustments are allowed for systems placed in type "R" soils. The maximum LTAR's are provided in this table.
3. The design of type "R" soil treatment systems must conform to sections 43.11.C.2 and 3.
4. All systems installed in a type "R" soil must be designed by a professional engineer.
5. The percentage of rock may be determined by a gradation conducted per ASTM standard D6913, or an appropriate field evaluation by volume.
6. Type "R" soil treatment systems that are designed per the criteria noted in the Treatment Level 1 column of this table do not require O/M oversight by the LPHA.
7. The "Percentage and Size of Rock" column references the soil types noted in Table 10-1.
8. Design of the pressure distribution system for type "R" soils shall comply with the requirements of sections 43.11.C.2.b, c, e, f, g, h and i.

Table 10-2 Size Adjustment Factors for Methods of Application in Soil Treatment Areas Accepting Treatment Levels 1, 2, 2N, 3 and 3N Effluent

Type of Soil Treatment Area	Method of Effluent Application from Treatment Unit Preceding Soil Treatment Area		
	Gravity	Dosed to Gravity (Siphon or Pump)	Pressure Distribution (Siphon or Pump)
Bed	1.2	1.1	1.0
Trench	1.0	0.9	0.8

Table 10-3 Size Adjustment Factors for Types of Distribution Media in Soil Treatment Areas for Treatment Level 1 Systems

Type of Soil Treatment Area	Type of Distribution Media Used in Soil Treatment Area[1]		
	Category 1	Category 2	Category 3
	Rock or Tire Chips	Other Manufactured Media	Chambers or Enhanced Manufactured Media
Trench or Bed	1.0	0.9	0.7

1. All proprietary distribution products must receive acceptance and the applicable reduction through Division review per the applicable requirements of section 43.13.

Table 12-1 Gradation of Wicking Sand for Evapotranspiration Beds (Fine Sand)

Sieve Size	Percent Passing
4	100
40	50-70
200	<15