COLORADO
Water Quality
Control Commission
Department of Public Health & Environment

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Water Quality Control Commission

REGULATION NO. 43 - ON-SITE WASTEWATER TREATMENT SYSTEM REGULATION

5 CCR 1002-43

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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. In order to preserve the environment and protect the public health and water quality; to eliminate and control 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 and regulations for On-site Wastewater Treatment Systems (OWTS) in the state of Colorado and to provide the authority for the administration and enforcement of such minimum standards and regulations.

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, a closet, and/or is intended for sleeping purposes; or as defined by the local board of health, as stated in the local OWTS regulation.

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

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

12. "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.

13. "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.

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

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

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

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

18. "Competent technician" means a person who has the appropriate expertise and is able to conduct and interpret the results of soil profile test pit excavations, percolation tests, and site evaluations. This individual has also met the required competencies for a “Competent Technician” as defined in section 43.5.I.

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

20. '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.

21. "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.

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

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

24. "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.

25. “Deficiency” See Malfunction.

26. "Department" means the Department of Public Health and Environment created by section 25-1-102, C.R.S.

27. "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.

28. "Design capacity" See Flow, Design.

29. "Design flow" See Flow, Design.

30. "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.

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

32. "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.

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

34. "Domestic wastewater" See Wastewater, domestic.

35. "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.

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

37. "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.

38. "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.

39. "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.

40. "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.

41. "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.

42. "Drainfield" See Soil treatment area.

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

44. "Dry gulch" See Gulch, dry.

45. "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.

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

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

48. "Effluent filter" See Effluent screen.

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

50. "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.

51. "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.

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

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

54. "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.

55. "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 a local public health agency to be a threat to public health and/or safety may also be deemed a failure.

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

57. "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.

58. "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.

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

60. "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.

61. "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.

62. "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.

63. "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.

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

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

66. "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.

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

68. "Health officer" means the chief administrative and executive officer of a local public health agency, or the appointed health officer of the local board of health. Health officer includes a director of a local public health agency.

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

70. “Holding tank” See Vault.

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

72. "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.

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

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

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

76. "Leach field" See Soil treatment area.

77. "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.

78. "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.

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

80. "Local board of health" means any local, county, or district board of health.

81. "Local health department" See local public health agency.

82. "Local public health agency" means any county, district, or municipal public health agency and may include a county, district, or municipal board of health to oversee On-site Wastewater Treatment System permitting and inspection or an on-site wastewater treatment system program. A local public health agency may designate another agency to administer the OWTS program.

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 sandbase 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 is at or above original grade at any point.

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 (2013 version).

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 local public health agency.

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 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. "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 generally include swamps, marshes, bogs and similar areas.

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

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
NRTL	Nationally Recognized Testing Laboratory
NSF	National Sanitation Foundation
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

A. Regulations Adopted By Local Boards of Health

1. Regulation Coverage

a. An OWTS with design capacity less than or equal to 2,000 gpd must comply with regulations adopted by local boards of health pursuant to this regulation and the OWTS Act. Within the jurisdiction of the local public health agency, the regulations promulgated by the local board of health govern all aspects of OWTS permits, performance, location, construction, alteration, installation, and use.

b. 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.

(1) Applicable Commission regulations include, but are not limited to, the following:

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

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

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

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

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

(2) 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.

(3) 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.

(4) In the interest of facilitating communication of LPHA concerns regarding a design being reviewed by the Division, the local public health agency 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.

2. Local Regulations

a. Local boards of health have one year from the effective date of this regulation to update their local regulations which must be as stringent as this regulation.

b. Local boards of health may seek a determination by the Division that their existing local regulations are as stringent as this regulation.

c. After one year from the effective date of this regulation, if a local board of health has not finalized regulations pursuant to section 25-10-104(2), C.R.S. and section 4.A.3 of this regulation, the Division will propose local rules based on this regulation to the Commission for approval for use in that county or district.

3. Procedures to Adopt or Revise Regulations by the Local Board of Health:

   a. A local board of health must submit its proposed regulations to the Division for preliminary review at least 30 days prior to a public hearing before a local board of health.

   b. The local board of health must hold a public hearing on the proposed regulations before adopting final regulations.

   c. The local board of health must give notice of the time and place of the public hearing at least once and at least 20 days in advance in a newspaper of general circulation within its area of jurisdiction.

   d. The local board of health may make changes or revisions to the proposed regulations after the public hearing and prior to final adoption, and no further public hearing is required regarding the changes or revisions.

   e. All local regulations must be transmitted to the Division no later than five days after final adoption and become effective 45 days after final adoption unless the Division notifies the local board of health before the forty-fifth day that the regulations or any portions of the local regulations determined by the Division are not as stringent as the OWTS Act or with this regulation. Any portions of the local regulations determined by the Division not to be in compliance with the OWTS Act and this regulation will not take effect or be published as regulations of the local board of health. For those portions of its regulations that do not comply, the local board of health may submit revisions to the Division. Only after the Division has determined that the local board of health's revised regulations comply with the OWTS Act and this regulation may the local board of health's revised regulations take effect and be published. Until the Division makes this determination, this regulation controls the unapproved portions of the local regulations.

B. Permit Application Requirements and Procedures

1. Prior to installing, altering, or repairing a system, the applicant must obtain a permit from the local public health agency.

2. An applicant must submit a complete application that is consistent with section 43.4.B.3. to the local public health agency 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 local public health agency.

(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 local public health agency to develop its own information from its own source at its own expense.

4. Permit Fees

a. A local board of health may set fees for permits. The permit fees may be no greater than required to offset the actual indirect and direct costs of the local public health agency. 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.

c. The local board of health may make provision for the waiver of any local permit fee normally required for an OWTS.

5. Other Fees

a. A local board of health may set fees for inspections, percolation tests, soil evaluation, and other services performed by the local public health agency. 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 local public health agency must collect a fee of twenty-three dollars for each permit issued for a new, repaired, or upgraded OWTS. Of that fee, the local public health agency must retain three dollars to cover the local public health agency's administrative costs and twenty dollars must be transmitted to theColorado 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 has not commenced or as specified by local board of health regulations.

b. 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 local public health agency 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 local public health agency. The applicant must apply for a repair permit within two business days after receiving notice from the local public health agency 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 local public health agency must inspect the system to ensure it is functioning properly. Concurrently with the issuance of a repair permit, the local public health agency 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.

8. A permit must be required for the expanded use of an OWTS. The OWTS must be replaced or modified to handle the increased design flow unless it is determined that the existing system is adequately designed and constructed for the higher design flow rate.

9. Regulations of the local board of health must include provisions that provide for review by the local board of health of applications denied by the local public health agency when requested by an applicant.

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 local public health agency 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 that provides public sewer service, except where such sewer service to the property is not feasible in the determination of the municipality or special district, or the permit is otherwise authorized by the municipality or special district.

C. Determination

1. A local public health agency 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 local public health agency 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 local public health agency access to the

property to make inspections, conduct required tests, take samples, and monitor compliance.

E. Inspection Stages

1. Local regulations must specify the stages of site evaluation, construction, installation, alteration, or repair at which the local public health agency must require inspections.

2. Before a system is placed in use, the owner, the owner's agent or the systems contractor must provide the local public health agency and the engineer, if engineer designed, with notice that the progress of the work has been sufficiently completed to allow inspections to determine if all work has been performed in accordance with the permit requirements and to determine compliance of the system with the OWTS Act and the regulations adopted thereunder.

F. Final approval of the permit by the local public health agency must include, but is not limited to:

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

2. Receipt of 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 local public health agency 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 local board of health or local public health agency is used in this regulation, said terms must 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 a local 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 local public health agency or local board of health as may be 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 local public health agency 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 local 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. A local 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 local public health agency 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 local 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 local public health agency 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 local public health agency 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 local public health agency.

10. The local public health agency 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 local public health agency 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 local public health agency.

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

J. Prohibition of OWTS in Unsuitable Areas

1. A local board of health may prohibit issuance of OWTS permits in accordance with applicable land use laws and procedures for defined areas in which the local 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. The local board of health may adopt regulations which provide for the licensing of systems contractors. A fee not to exceed actual local public health agency costs may be charged by the local public health agency for the initial license of a systems contractor; a fee not to exceed actual costs may be charged by the local public health agency 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 local 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. The local board of health may adopt regulations which provide for the licensing of systems cleaners. A fee not to exceed actual costs may be charged by the local public health agency 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 local 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. Transfer of Title Inspections

1. A local board of health may choose to require a property owner of a residence or other building/facility served by an OWTS to have an inspection of that system to demonstrate that the system is functioning according to design prior to the sale or transfer of title of the property. A local board of health is not required to develop a transfer of title inspection program.

2. The local board of health may identify types of transfer of title that are not required to have inspections.

3. Applications for transfer of title and inspection reports must be made on forms furnished or approved by the local public health agency. Inspectors must be certified by National Association of Wastewater Technicians or an equivalent program approved by the local public health agency. Inspectors for higher level treatment systems must have training relevant to the specific system or certification by the equipment manufacturer. The applications must include, as appropriate:

    a. Owner's name and contact information;

    b. Physical address of property;

    c. Legal description of property;

    d. Name of Inspector, Inspector's NAWT or other applicable certification number;

    e. Date and time of the inspection(s);

    f. A septic tank inspection report completed within the previous 12 months, including a septic tank pumping receipt, when applicable, based on the inspection report;

    g. An inspection report completed within the previous 12 months for any mechanical components such as pumps, alarms or higher level treatment systems; and

    h. An inspection report completed within the previous 12 months providing a detailed report noting the condition of the soil treatment area.

4. All components that are found to be in a state of malfunction must be noted and disclosed within the inspection report.

5. Minimum Criteria

    a. Items noted in the inspection report that do not comply with the following criteria and conditions must be corrected along with necessary permits and inspections prior to the issuance of a final acceptance document:

        (1) All tanks must be structurally sound and in good working order and provided with safe and secure lids;

        (2) All internal devices and appurtenances such as tees, effluent screens and baffles that were originally provided with the tank or added later must be intact and in working order;

(3) Alarms, control devices, and components necessary for the operation of the system are present and in good working order;

(4) A soil treatment area, or other means of subsurface wastewater treatment, must be present and not in a state of failure;

(5) There are no unapproved wastewater discharges from the system or structure; and

(6) Any items meeting the conditions of a “Failure” as defined in this regulation have been corrected to the acceptance of the local public health agency.

6. Issuance of an Acceptance Document

a. When the criteria set forth above have been met, the local public health agency must issue an acceptance document, using terminology adopted by the local public health agency, setting forth the terms and conditions of approval, including, as appropriate:

(1) Statement of the size, type and capacity of the system and a record drawing, either from the local public health agency records (verified by the inspector) or from the inspection reports;

(2) Evidence of past system failures as shown in local public health agency records;

(3) Circumstances or factors that may have affected the ability of the inspector to evaluate the system;

(4) Whether the system meets the permitting requirements of the local public health agency; and

(5) Other information the local public health agency may require.

7. The acceptance document will remain valid until the date of real estate closing or for a maximum period of twelve months, whichever comes first.

8. Renewal of an Acceptance Document

a. If a local public health agency has established a time period for the acceptance document of 6 months or less and provided it has not expired, an acceptance document may be renewed one time for a period of up to six months upon completion of the appropriate form and payment of the required fee.

9. Waiver of an Acceptance Document

a. If it is determined by the local public health agency that an OWTS does not meet the requirements for issuance of an acceptance document, a conditional acceptance document may be issued, provided that the purchaser of the property agrees to obtain a permit and complete all necessary repairs to the system (or connect to a sanitation district, if appropriate) within the time frame established by the local public agency.

10. Revocation of an Acceptance Document

a. An acceptance document must be revoked if it is determined that the system is no longer functioning in accordance with this regulation or that false or misleading material statements were made on the application or inspection reports.

11. Penalties

a. Failure to obtain an acceptance document for a covered transaction as provided by this regulation will subject the owner who failed to obtain the document to a penalty assessed under section 25-10-113, C.R.S.

M. Permit for the Continued Use of an On-site Wastewater Treatment System

1. A local board of health may choose to issue a permit authorizing the continued use of an OWTS. A local board of health is not required to develop an additional permit program for the continued use of an OWTS.

2. Permits for the continued use of an OWTS may be issued for purposes, including but not limited to:

a. An “Operating permit” used for maintenance and inspections performed on an OWTS at regular intervals;

b. A “Use permit” used for transfer of title inspections; or

c. Other situations deemed necessary or useful by a local public health agency.

3. A local public health agency may determine the time frame for the permit either at equal time intervals or based on recurring events.

4. A local public health agency may revoke the permit for non-compliance.

5. A local public health agency may assess penalties for non-renewal of a permit as required, or non-compliance with the terms of a permit as allowed in this regulation.

N. Variance Procedure

1. General

a. The purpose of this section is to provide a procedure for local public health agencies to consider variances from the design and/or siting requirements of the OWTS regulations. A local board of health may adopt these procedures or more stringent procedures, but is not required to adopt any variance procedure. Variances may only be included in permits issued by those local public health agencies which formally adopt and implement a state approved variance procedure.

b. The local 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. To consider a variance request, the local board of health must adopt a procedure for issuing variances.

b. Where the local board of health adopts a variance procedure, the board must hear the variance request.

c. The local 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.

d. 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.

e. 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 local 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 local 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 hearing procedures in 4.N.2, 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 local public health agency.

   b. The applicant must bear the burden of supplying the local 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.

O. 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 local public health agency 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 local public health agency makes a final inspection of the OWTS, provided for in section 25-10-106 (1) (h), C.R.S. and the local public health agency approves the installation.

2. The construction of new, or the repair of existing cesspools is prohibited. 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.

P. Cease and Desist Orders

1. The local public health agency 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.

Q. 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 local 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 local 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 local board of health.

2. Upon a finding by the local board of health that a person is in violation of this regulation, the local 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 local 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 local 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 local 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. Local public health agency 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 local public health agency.

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 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 competent technician.

   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. Layers and interfaces that interfere with the treatment and dispersal of effluent must be noted. Thus, 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 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 local public health agency. It is recommended that the data be verified, at a minimum, by performing an evaluation of a soil profile test pit excavation.

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 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. The percolation testing shall be performed by a professional engineer or by a trained person under the supervision of a professional engineer or by a competent technician.

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) A local public health agency may identify soil types in its area 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 local public health agency 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 local public health agency, if required by the agency. Excavations 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. The report and site plan may be attached to the design document or the report and site plan may be combined with the design information 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. Local public health agencies 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. A local public health agency 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. A local public health agency may only 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 must be for one-bedroom unless bedrooms are added.

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. A local public health agency may increase the number of persons per bedroom to two for all bedrooms for design purposes.

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

h. If a new home has unfinished areas, a local public health agency may increase the number of bedrooms used for the design of the OWTS by one or two bedrooms based on an assumption that 150 square feet of unfinished space can be converted into a bedroom, if the space can meet building code requirements for a bedroom.

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	300
3	6	75	450
4	7	75	525
5	8	75	600
6	9	75	675

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 local public health agency 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.

TABLE 6-2 For Design Purposes, the Estimated Daily Wastewater Flow and BOD_5 Load Per Person Unless Otherwise Noted

RESIDENTIAL WASTEWATER	**GPD**	**BOD_5 IN POUNDS PER DAY**
Single-family dwellings	75	.20
Auxiliary buildings, by fixture type		
Bath/Shower	14.7	.014
Dishwasher	1.8	.002
Kitchen sink with garbage grinder	5.8	.052
Laundry washer	19.5	.037
Lavatory	8.4	.021

Water closet (toilet)	24.8	.029
Hotels and motels per room	75	.15
Multiple-family dwellings or apartments	75	.20
Boarding and rooming houses (users absent during working hours)	50	.15
Tiny Homes[3], per unit	150	.40
Mobile home	75	.20
Mobile home park per space	300	.80
COMMERCIAL WASTEWATER	**GPD**	**BOD_5 IN POUNDS PER DAY**
Facilities with short-term or transient visitors		
Examples: 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]
Factories and plants exclusive of industrial wastewater per employee per eight-hour shift – no	20	.05

showers		
Factories and plants exclusive of industrial wastewater per employee per eight-hour shift - showers provided	35	.08
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
Work or construction camps semi-permanent without flush toilets	35	.02
FOOD SERVICE ESTABLISHMENT	**GPD**	**BOD_5 IN POUNDS PER DAY**
Restaurant open 1 or 2 meals per seat	50	.06/meal
24-hour restaurant per seat	75	.07/meal served
Restaurant with paper service only per seat	25	.01/meal served
Additional for bars and cocktail lounges per seat	30	.02
Drive-in restaurant per car space	50	.02
INSTITUTIONAL WASTEWATER WITHOUT KITCHENS UNLESS OTHERWISE NOTED	**GPD**	**BOD_5 IN POUNDS PER DAY**

Churches per seat; without any food service, or other uses	3.5	.01
Churches, per seat; warming kitchen only, no major food service	5	.01
Churches, per seat; with food service, per meal served[4]	4	.02
Hospitals per bed space	250	.20
Nursing homes; Group homes for developmentally disabled, per bed space	125	.20
Schools, Boarding per person	100	.17
Schools, Day without cafeteria, gym or showers	15	.04
Schools, Day with cafeterias, no gym or showers	20	.08
Schools, Day with cafeterias, gym and showers	25	.10
Schools, Day additional for school workers	15	.06
RECREATIONAL AND SEASONAL WASTEWATER USE	**GPD**	BOD_5 **IN POUNDS PER DAY**
Camps, day, no meals served	15	.12
Luxury resort	125	.17
Resort night and day	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	10	.01 lbs./fixture

per hour when park is open		
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 (a non-recreational vehicle) that has only one bedroom and has <400 sq.ft. of livable space, including lofts. In this instance, the OWTS may be sized for only one bedroom.

4 For churches with food service, the 4 gal/meal must be added to the 3.5 gal/seat to determine projected design flows.

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 local public health agency 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.

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.

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 local board of health or local public health agency and be in complete compliance with the variance procedures of this regulation and those of the local 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 local 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, if higher level treatment for that purpose is permitted by the local public health agency.

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 [2]	Structure w/basement, crawl space or footing drains	Structure without basement, crawl space or footing drains	Property Lines, Piped or Lined Irrigation Ditch, upslope curtain drain	Subsurface Drain, Intermittent Irrigation Lateral, Drywell, Stormwater Structure	Lake, Water Course, Irrigation Ditch, Stream, Wetland	Dry Gulch, Cut Bank, Fill Area (from Crest)	Septic Tank, Higher level treatment Unit, Dosing Tank, Vault or 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, Sub-surface Dispersal System, Seepage Pit	100 [3]	25 [2]	20	10	10	25	50 [3]	25	5
Lined Sand Filter	60	10 [2]	15	10	10	10	25	10	5
Lined Evapo-transpiration Field or Outside of Berm of Lined Wastewater Pond	60	10 [2]	15	15	10	10	25	10	5
Unlined Sand Filter in Soil With a	100	25 [2]	15	15	10	25	25	15	10

Percolation Rate Slower than 60 Minutes per Inch, Unlined or Partially Lined Evapotrans-piration System, Outside of Berm of Unlined Wastewater Pond, or System Not Relying on STA for Treatment Other than Aerosol									
Slit Trench Latrine, Pit Privy	100	50 [2]	25	25	25	25	100	25	N/A
System Not Relying on STA for Dispersal	100 [3]	10 [2]	125	125[5]	10	0	25 [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 local public health agency. 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 [ASTM Standard D 3034-16 (2016 version)] of sufficient diameter to easily slide over and completely encase the conveyance must be used. Rigid end caps of at least Schedule 40 rating [ASTM Standard D 3034-16 (2016 version)] 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 local public health agency.

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 local public health agency 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.

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 7-2 On-site Wastewater Treatment System Design Consideration and Treatment Requirements – Separation Distances from Soil Treatment Area

			PRESSURE DOSING REQUIRED	**PRESSURE DOSING REQUIRED**	**PRESSURE DOSING REQUIRED**
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 50 feet	Greater than or equal to 25 feet	Greater than or equal to 25 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

NOTE: Treatment levels are defined in Table 6-3. Reductions in separation distances with higher level treatment may be granted only if the local public health agency 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.

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, special headed bolts or screws, or sufficient weight (defined as 59 pounds) to prevent unauthorized access.

b. A local public health agency 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 for maintenance must include but not be limited to submerged bearings, moving parts, pumps, siphons, valves, tubes, intakes, slots, 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 must 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.

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 local public health agency 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 have 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 a local public health agency 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.

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 local public health agency 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:

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

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 (2013 version) (Standard Specification for Precast Septic Tanks) for concrete tanks or in Standard IAPMO/ANSI Z1000-2013 (2013 version) (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 local public health agency 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 (2013 version) (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 (2013 version) (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 local public health agency 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. Flexible couplings to connect pipes may only be used in portions of an OWTS that are intended for gravity flow of the wastewater.

b. Where unperforated plastic pipe and fittings are used for gravity flow, the minimum wall thickness of the pipe must conform to ASTM Standard D 3034-16 (2016 version) or equivalent or greater strength. Schedule 40 pipe is preferred.

c. Perforated distribution pipe surrounded by rock within a soil treatment area must have a minimum wall thickness and perforations conforming to ASTM Standard D 2729-17 (2017 version) or equivalent or greater strength. Corrugated polyethylene pipe with smooth interior that meets ASTM F405-13 (2013 version) or AASHTO M252-09 (2009 version) specifications or equivalent may be used.

d. Schedule 40 [ASTM Standard D 3034-16 (2016 version)] 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.

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

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

2. Bedding: All system piping, except for distribution laterals within the soil treatment area, must be bedded with select material before final inspection by the local public health agency. Select bedding material must consist of loose, granular material, free from stones, clods, frozen soil, or other deleterious material. Select material may consist of on-site job-excavated or imported material. Bedding material must be mechanically compacted to support piping.

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.

2. Cleanouts must be provided within five (5) feet of the outside of the building.

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 already exists within 40 feet upstream of this fitting. Where more than one change of direction greater than 45 degrees occurs within 40 feet of a developed length of piping, the cleanout for the first change of direction may serve as the cleanout for all changes within that 40 feet 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: 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. 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.

G. Drop Box: 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 at or above final grade, if the top of the drop box does not reach final grade. 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. 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 UL778 (Edition 6 or earlier version) 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 (2017 or earlier version) and bear the seal of approval of the NSF or equivalent testing and certification program.

2. 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.

c. Float switches must be certified to the UL60947-4-1 (Edition 3 or earlier version), or CSA C22.2 No. 205-17 (2017 or earlier version) electrical safety standards, 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.

3. 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 local public health agency 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.

4. 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 that is accessible from grade 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.

5. 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.

6. Splice Box

a. Splice boxes must be located outside the pump system access riser and be accessible from the ground surface.

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

7. 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 tracking 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. A local public health agency may require that effluent screens be installed in all septic tanks in new installations and repairs where the septic tank is replaced.

2. If a pump or dosing siphon is used to remove septic tank effluent from the final compartment of the septic tank, the effluent must be filtered prior to dispersal into the soil treatment area. An effluent screen, pump vault equipped with a filter cartridge, or a filter on the discharge pipe, would all be considered acceptable.

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

4. An alarm may be installed on an effluent screen indicating need for maintenance. A local public health agency may require all effluent screens to be equipped with alarms.

5. 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.

6. The handle of the effluent screen must extend to within 12 inches of grade.

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.

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 local public health agency:

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 10-1Aof this regulation;

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

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

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

5. Pressure distribution is used.

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:

$$\text{Soil Treatment Area in square feet required} = \frac{\text{Design Flow (in gallons per day)}}{\text{LTAR (in gallons per day per square foot)}}$$

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 increased LTAR's provided in Table 10-1

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 D 6913-17 (2017 version),

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.

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.

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 (Siphon or Pump)	Pressure Dosed
Trench	1.0	0.9	0.8
Bed	1.2	1.1	1.0

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.

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 must not exceed 150 feet.

c. Distribution laterals longer than 100 feet must be pressure dosed or the application of the effluent must be at the center of the lateral through a distribution box.

d. A local public health agency may limit the length of distribution laterals to a maximum of 100 feet.

e. 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.

f. 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.

g. 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.

h. 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 30 – 72 inch operating head at the distal end orifice;

(5) Pump/siphon information; Total Dynamic Head; gallons/minute;

(6) Drain-back volume from forcemain; 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. A local public health agency may require that all effluent be screened prior to discharging to a pressure distribution system. This may be accomplished by an effluent screen in the septic tank or pump chamber, or a filter placed on the discharge pipe from the pump or siphon.

F. Soil Treatment Area Requirements

1. Trenches

a. Trenches must be three feet wide or less.

b. The separating distance between trenches must be a minimum of four 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.

   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. In addition, a local public health agency may require an inspection port at the initial end of each lateral in a trench system.

e. 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 43-05 (2005 version) size No. 3 coarse aggregate meets this specification.

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 maximum thickness rating of 2.0 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 1/2 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 maximum thickness rating of 2.0 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 applicable 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 local public health agency

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 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. Unless the design follows the criteria for a sand filter or mound system design as required in section 43.11, the TL1 long-term acceptance rate for the receiving soil must be used.

c. A gradation of the sand media used must be provided. The gradation 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 other 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, if the local board of health permits them.

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 local board of health as outlined in section 43.4.O, if the local board of health has opted to allow variances.

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, potential for risk to public health and water quality may be evaluated by the local public health agency. If risk is low in the determination of the local public health agency, a seepage pit without higher level treatment may be used.

   b. If the risks are not low, higher level treatment of at least TL2 must be attained prior to discharge to these systems for final dispersal.

   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 43-05 (2005 version) 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.

e. The requirements for the design and construction of seepage pits for the treatment and dispersal of on-site wastewater on new sites is defined in section 43.12.C.

7. Wastewater Ponds

a. Construction of new wastewater ponds is prohibited.

b. For repairs of an existing wastewater pond, the potential for risk to public health and water quality may be evaluated by the local public health agency. If risk is low in the determination of the local public health agency, the repair of a wastewater pond may be permitted, however the following criteria must be followed:

(1) A septic tank must precede the wastewater pond.

(2) The depth of the design volume of the wastewater pond must be at least five feet.

(3) A wastewater pond must have two feet of free board above the design volume of the pond.

(4) A wastewater pond must be fenced to keep out livestock, pets, vermin, and unauthorized people.

(5) Wastewater ponds must be designed on the basis of monthly water balance including design flow, precipitation, evaporation, and seepage.

(6) Wastewater ponds must be constructed so the seepage out of the bottom or sides does not exceed 1/32 of an inch per day. If this limit cannot be achieved using compacted natural soil materials including soil additives, an impermeable synthetic membrane liner must be used.

(7) If the evapotranspiration does not exceed the rate of inflow of effluent from the structure, a soil treatment area meeting the requirements of this regulation must be installed to accept the excess flow.

(8) Maintenance must include preventing aquatic and wetland plants from growing in or on the edge of the pond, protecting sides from erosion, and mowing grasses on the berm and around the pond.

(9) Wastewater ponds must be designed by a professional engineer.

8. Vaults

a. The allowable use of vaults for repairs in a local jurisdiction is determined by the local board of health.

b. Criteria for vaults are in section 12.C. of this regulation.

9. Higher Level Treatment Options

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

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

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. A local public health agency 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 permit for this work from the local public health agency.

d. Upon approval of the local public health agency, 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 local public health agency.

g. The local public health agency 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 local public health agency. 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. Reductions to soil treatment area or separation distances based on higher level treatment must not be permitted unless the local public health agency has adopted a program for permitting and oversight of inspections and maintenance in section 43.14.D.

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

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

6. 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.

7. 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 (Also see section 43.11.C.b.5 below)

(4) Orifice spacing: 18 inches – 48 inches

(5) Operating head at the distal end of distribution pipes: 30 inches – 72 inches (60 inches typ.). Larger orifices allow for an operating head at the lower end of this range, while smaller orifices will necessitate an operating head at the higher end of this range.

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 must be dated no more than <u>one month</u> 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 43-05 (2005 version) 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) 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 33-16 (2016 version), No. 8, coarse aggregate meets this specification.

e. A minimum four-inch diameter slotted Schedule 40 PVC [ASTM Standard D 2729-17 (2017 version)] 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 43-05 (2005 version), 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. Engineer must justify through calculations or design software that the selected values will concur with industry standards.

(1) Distribution pipe size: 3/4 inch – 2 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) Pressure head at end of distribution pipe: 24 inches – 72 inches (60 inches typ.)

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 43-05 (2005 version), 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 33-16 (2016 version), No. 8 coarse aggregate meets this specification.

g. Under-drain requirements:

(1) A minimum four-inch diameter slotted Schedule 40 PVC [ASTM Standard D 2729-17 (2017 version)] 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 43-05 (2005 version), 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 area of the media receiving wastewater effluent is at or above the natural ground surface at any point, 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). 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.

3. Mound systems must conform to the design requirements of sections 43.11.C.3.a through 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 above a limiting layer. 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.

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

5. 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.

6. 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.

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

8. A suggested reference for the design and installation of mound systems is, "*The Wisconsin Mound Soil Absorption System: Siting, Design, and Construction Manual, January 2000*". Note that this is suggested guidance, and where the requirements of this regulation differ from those in the referenced mound document, the requirements of this regulation will govern in those cases.

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 – Other Facilities

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. 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.

Table 12-1 Gradation of Wicking Sand for Evapotranspiration Beds (Fine Sand)

Sieve Size	Percent Passing
4	100
40	50-70
200	<15

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 local public health agency, 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) $$\text{Area (sq. ft.)}^* = \frac{\text{Flow (gpd)}}{(\text{LTAR} + \text{ETR})}$$

(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. Seepage Pits

1. The construction of new seepage pits for the treatment and dispersal of on-site wastewater on new sites is prohibited unless:

   a. A trench or bed system will not meet the design, sizing or setback requirements of this regulation on the proposed site;

   b. The seepage pit is designed by a professional engineer; and

   c. The design includes higher level treatment of at least TL2.

2. The design requirements for new seepage pits must also comply with requirements as defined in 43.10.I.6.c and d.

3. Pressure distribution is not required for dispersal into a seepage pit.

C. Vaults Other Than Vault Privies

1. Vaults for full time use in new construction are prohibited where a property can accommodate an OWTS with a soil treatment area.

2. A local board of health may allow or prohibit vaults for use at a permanently occupied facility, except where section 43.12.D.1 applies.

3. Vaults for full time use may be permitted when a failing OWTS cannot be replaced.

4. Vaults may be permitted for limited use occupancy on a property which cannot accommodate an OWTS with soil treatment area.

5. A vault may be permitted if the facility is on land where the installation of an OWTS with soil treatment area is not permitted.

6. 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 OWTS sized per the requirements of this regulation.

7. Variances may be granted for specialized commercial uses.

8. A vault, if permitted by the local public health agency, must have a minimum 500 gallon effective volume or be capable of holding a minimum of the 48-hour design wastewater flow, whichever is larger.

9. 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.

10. 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.

D. Privies

1. Vault Privy

a. A local board of health may prohibit the new construction of vault privies.

b. A local board of health may prohibit the continued use of existing vault privies.

c. Effective volume of the vault must be no less than 400 gallons and it must be constructed of concrete or plastic. The vaults for privies must meet the structural and watertightness standards of vaults.

d. A vault privy 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.

2. Pit Privy

a. A local board of health may prohibit the new construction of pit privies.

b. A local board of health may prohibit the continued use of existing pit privies.

c. If pit privies are permitted by the local public health agency:

(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.

E. Incinerating, Composting and Chemical Toilets

1. The local board of health may permit incinerating, composting and chemical toilets. The use of an incinerating, composting or chemical toilet will not reduce the required size of the OWTS as noted in section 43.8.A.

2. Permitting of an incinerating or composting toilet 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.

3. An incinerating or composting toilet may be used for toilet waste where an OWTS is installed for treating wastewater remaining after removal of toilet waste. Subject to local

board of health or other applicable regulations or codes (e.g., Colorado Plumbing Code if a local code does not exist), the compartment may be located within a dwelling or 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.

4. Incinerating Toilets: An approved incinerating toilet must be designed and installed in accordance with all applicable federal, state, and local air-pollution requirements and manufacturer’s instructions.

5. Composting Toilets

    a. Composting toilets must meet the requirements of NSF/ANSI Standard 41 (2016 version) and bear the seal of approval of the NSF or an equivalent testing and certification program.

    b. 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.

    c. 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.

    d. 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.

    e. If a system will be installed where low temperature may be a factor, design and installation must address the effects of the low temperature.

    f. Composting toilets must be operated according to manufacturer's specifications.

6. Incinerating Toilets Acceptance Requirements

    a. Incinerating toilets must meet the requirements of the NSF Protocol P157 (2014 version) and bear the seal of approval of the NSF or an equivalent testing and certification program.

    b. Incinerating toilets must be operated according to manufacturer's specifications.

7. Portable Chemical Toilets

    a. A portable chemical toilet may be used by permit from the local public health agency or other agency with authority to issue permits for portable chemical toilets.

b. Use of a portable chemical toilet in permanently occupied buildings is prohibited except during construction or under emergency circumstances as determined by the local public health agency. Proper ventilation of a chemical toilet used inside must be required.

F. Slit Trench Latrine

1. If permitted by the local board of health, a slit trench latrine must be utilized only in remote or emergency situations when other approved sanitary means are unavailable. Other agencies may have more stringent regulations that must be adhered to.

2. A slit trench latrine must be considered a temporary convenience to be used no longer than seven days and must be backfilled and graded to match its surroundings when its use is discontinued.

3. A slit trench latrine must be located only in a place that does not adversely affect public health or the environment. The location must provide ample privacy and should be exposed to several hours of sunlight each day. A slit trench latrine must not be located:

a. In a building;

b. In a covered or partially covered location such as a cave or overhanging cliff; or

c. On a slope of greater than 30 percent.

4. A slit trench latrine must be installed only in suitable soil.

5. A slit trench latrine must be excavated approximately one foot wide and two feet deep for the required length. All human waste and tissue placed into the slit trench latrine must be covered with at least two inches of soil at least once a day or more frequently if requested by the local public health agency.

G. 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 local 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.

3. The local board of health may choose to permit only systems that do not allow drainage of effluent off the property of origin.

4. 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.

5. 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 local public health agency for compliance with the permit requirements.

6. 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, 22nd edition, 2012 (International Standard Book Number: 9780875530130).

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 local public health agency 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 local public health agency 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 (2013 or earlier version) certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 40 (2013 or earlier version) 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 (2013 or earlier version) certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 245 (2013 version) 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 (2013 or earlier version) 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 local 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 local public health agency 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. Purpose: 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. The local board of health may choose to permit reductions in the size of soil treatment areas and horizontal and vertical separation distances based on higher level treatment of effluent, only if an oversight program for inspection, maintenance, and repair is implemented by the local public health agency. The local public health agency may designate a separate entity to conduct and maintain the oversight of this program. However, enforcement of the requirements of this regulation will remain with the local board of health. System monitoring may be required.

3. A local board of health is not required to allow reductions in soil treatment areas or vertical or horizontal separation distances based on higher level treatment. If these reductions are not allowed, the local board of health is not required to implement section 43.14.D.

4. Before permitting systems with a reduced soil treatment area as a result of higher level treatment, a local public health agency must develop an oversight program for inspections, maintenance, recordkeeping and enforcement to ensure and document that the systems are meeting the designed higher level treatment standards. At a minimum:

   a. Maintain accessible 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 local public health agency 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) Local public health agency 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.

5. 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 local public health agency within 30 days of signing.

6. Maintenance provider responsibilities:

a. Must notify the local public health agency 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 local public health agency 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 local public health agency in conjunction with an enforcement action.

3. Any owner or occupant of property on which an OWTS is located may request the local public health agency to collect and test an effluent sample from the system. The local public health agency may perform such collection and testing services. The owner or occupant must pay for these services.

a. If the local public health agency 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 local public health agency 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, 22nd edition, 2012 (International Standard Book Number: 9780875530130).

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 March 12, 2018, 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

CPOW, Colorado Professionals in Onsite Wastewater
P.O. Box 918

Strasburg, CO 80136
Phone: 720-626-8989
www.cpow.net

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

43.22 Statement of Basis and Purpose – September 20, 2000

The Individual Sewage Disposal System Guidelines mandated by Article 10 of Title 25, Section 25-10-104 (1) C.R.S., were first adopted in October of 1973 as temporary emergency guidelines. The State Board of Health then adopted those Guidelines, with minor revisions, in 1974.

As more experience was gained in the field, many questions were directed to the Water Quality Control Division for resolution. Based on the subsequent discussions held with local health agencies, the General Services Section of this Division conducted a limited investigation into the various causes of the ISDS failures throughout the State during the summer of 1977.

The Office of the Attorney General advised the Division of the need to review the 1974 Guidelines. The Division's experience had shown that some local jurisdictions had not adopted their own ISDS regulations as required by Section 25-10-104 (2). This made monitoring and enforcement difficult for this Division. Therefore, the Guidelines, which were adopted in May of 1979, contained a provision that the Guidelines became the local ISDS regulations for any jurisdiction, which failed to adopt its own regulations within one year.

The advent of alternatives in on-site treatment and disposal technology and the 1983 passage of HB 1400, which redefined an individual sewage disposal system, necessitated the revision of the 1979 Guidelines. The Department notified all local boards of health of the opportunity to participate in this revision and accepted all that attended the first two meetings as committee members.

The Colorado Court of Appeals ruled on June 9, 1988 that Language in Section IX of the 1984 Guidelines, providing that systems must "consistently meet" certain standards, is unconstitutionally vague. The 1988 Guidelines identified effluent sampling frequencies and defined the allowable amount and frequency of exceedances of those standards in response to the Court of Appeals ruling.

Further advances in on-site treatment and disposal technologies, as well as a need for general housekeeping review of the regulations, necessitated a revision of the 1988 Guidelines in 1994. This process was initiated by members of the Western Colorado Association of Environmental Health Officers who authored the initial draft of the revised Guidelines. Input was then solicited from all local health agencies. The resulting revisions were then referred back to all local health agencies and to those individuals who had expressed interest in the process.

The main objectives in the 1994 Guidelines were to incorporate new treatment and disposal alternatives, to generally improve the readability of the document, and to correct a long-standing error in the formula for sizing of evapotranspiration systems.

In 1997 the Colorado General Assembly made significant revisions to the Individual Sewage Disposal Systems Act. Among the revisions to the ISDS Act was a provision allowing the local board of health "to grant variances to ISDS rules in accordance with the guidelines for rules adopted and revised by the state board" (Section 25-10-105 (2) (a)). On January 19, 2000 the State Board of Health adopted Section XVIII Variance Procedure. This addition to the Guidelines established the framework for that local variance process. All other elements of the Guidelines remained as adopted in 1994.

A review of the newly adopted Section XVIII by the staff of the Office of Legislative Legal Services commenced a discussion of the respective roles of local boards of health and staff regarding the hearing and issuance of variances. The concern centered on the compatibility of the delegation of authority by the board of health to the health officer, environmental health specialist, or similarly qualified individual with the legislative provision granting the authority to grant variances to the local board of health. Ultimately, it

was the opinion of the staff of the Office of Legislative Legal Services that the provisions of paragraph B.2.b., providing that "the board may delegate the authority to approve or deny variance requests to the health officer, environmental health specialist, or similarly qualified individual, as designated" to impose requirements and conditions on an approved variance, conflict with the ISDS Act. The ISDS Act, in Paragraph (2) (a) of 25-10-105 provides that "a local board of health shall have authority to grant variances to ISDS rules".

The purpose for adoption of these Guidelines is to bring the variance procedure into compliance with the provisions for such a process as defined in the enabling statute.

In these revised 2000 Guidelines, changes are made to delete provisions related to the delegation of authority from the Local Board of Health to the health officer, environmental health specialist, or other similarly qualified individual with respect to the variance process. The remaining changes proposed are for the purpose of readopting changes made at the previous rulemaking hearing so that the rule as published in CRS is consistent with that adopted by the Board. Language related to liability on the part of local boards of health, which grant variances, is also deleted. The description of the ISDS permit fee is expanded to cover permits with variances. Examples are provided describing conditions, which might exist, or actions, which might be taken to justify the granting of a variance. The prohibition on the granting of variances to mitigate construction errors is expanded to cover issues other than the ISDS itself.

All other element of the Guidelines remain as adopted in 1994 and all other provisions of Section XVIII establishing minimum procedural requirements regarding the application for, review of, and decision making regarding variances from elements of the ISDS Guidelines remain as adopted in January of 2000.

This statement of basis and purpose applies only to the current Guidelines and not to any previous version.

The above statements are intended to comply with section 24-10-103 C.R.S.

43.23 Statement of Basis, Specific Statutory Authority and Purpose; March 12, 2013 Rulemaking, Final Action May 13, 2013, Effective June 30, 2013

The provisions of sections 25-10-101 through 113, C.R.S. provide the specific statutory authority for adoption of this regulation. The Commission also adopted, in compliance with section 24-4-103(4), C.R.S., the following statement of basis and purpose.

Basis and Purpose

The March 2013 hearing culminated the efforts of many parties, both before and after the release of the "Recommendations of the Individual Sewage Disposal System Steering Committee" in February 2002, to improve Colorado’s On-site Wastewater Treatment System (OWTS) framework. The Water Quality Control Division and numerous interested parties were engaged in a robust stakeholder process since the summer of 2009 to evaluate and recast the previous Individual Sewage Disposal System (ISDS) Guidelines that had not been substantively modified since 1994.

Because of the many changes and the reorganization of the ISDS Guidelines, the Commission repealed the ISDS Guidelines and adopted the On-site Wastewater Treatment System Regulation, Regulation #43. The new regulation built on the previous ISDS regulation to reflect a more current state of On-site Wastewater Treatment System industry practice and to provide more options and flexibility in design and local regulation.

In addition, provisions were included in the new regulation to incorporate changes made in House Bill (HB) 12-1126, the OWTS Act passed by the Colorado General Assembly in the 2012 legislative session. The major changes include revised versions of previous and addition of new definitions, updated terminology (such as changing "Individual Sewage Disposal Systems" to "On-site Wastewater Treatment

Systems"), new requirements for design of OWTS, and optional provisions for local public health agencies to adopt in the areas of OWTS design, permitting, and operation.

An "authority" section was included to indicate the statutory authority for the regulation.

Previous section XII. on discharges to State waters from the ISDS Guidelines was incorporated into section 2. (Scope and Purpose). Content from other sections from the ISDS Guidelines were moved as appropriate. These included moving several sections scattered throughout the ISDS Guidelines into section 4. of Regulation #43 (Applicability).

The terms individual sewage disposal system and local health departments were replaced throughout the regulation by the terms On-site Wastewater Treatment System and local public health agency, respectively, to reflect the terms used in statute.

The major definitions revised or added by the Commission include:

The definition of absorption system from the amended OWTS statute is still included in the regulation. However, the term soil treatment area based on current industry terminology has largely superseded its importance.

A definition of cesspool was added based on the definition in the OWTS statute as included in HB 12-1126.

The definition of drywell was revised to limit its use to non-wastewater sources.

A definition of effluent screen was included as there were several references to this component added throughout the regulation.

Definitions of OWTS failure and malfunction were added, as these are critical terms in implementation of an OWTS program by local public health agencies.

A definition of field performance testing was added for testing during normal operation at a field installation of new treatment systems that are being considered for acceptance by the Division.

The definition of design flow was modified to remove the reference to 150 percent of the average daily flow rate, as this concept is no longer in use for OWTS.

The definition of grey water system was removed as the Commission found that the OWTS application of the separation of toilet wastes with the remaining wastewater being treated in a down-sized OWTS is inconsistent with other uses of the term grey water.

The definition of liner was revised to be written in more general terms and the specific reference to the thickness of the material was incorporated into design criteria.

The definition of long-term acceptance rate (LTAR) was revised to be stated in terms of what the LTAR is rather than how it relates to other factors such as design flow and soil treatment area.

The definition of "mound system" was changed to "mound" and revised to clarify distinctions between mounds and other OWTS.

A definition of performance standard was added, as this concept is fundamental to revisions made in this version of the regulation.

The definitions of sanitarian and seepage bed or absorption bed were deleted based on their being redundant with other defined terms (environmental health specialist and soil treatment area bed,

respectively).

A definition of septage was added consistent with the new definition added to the statute by HB 12-1126.

New definitions of site evaluation, site evaluator, soil, soil evaluator, soil profile hole and soil profile test pit excavation were added based on the increased emphasis in the new regulation on the need for robust soils and site evaluations in the design of OWTS. In addition, several technically based definitions were added such as consistence, distribution, several sub-definitions under the definition of dosing, infiltrative surface, inspection port, limiting condition, nitrogen reduction, redoximorphic, remediation system, restrictive layer, riser, rock-plant filter, sequential distribution, soil morphology, soil structure, soil texture, and visual and tactile evaluation of soil. Many of these terms were included to provide context and greater detail to better describe the necessary processes for site and soil evaluation and designing an OWTS.

As previously indicated, content was moved from section II of the ISDS Guidelines to section 4. of Regulation #43. The Commission included several subsections to the Applicability section to identify other Commission regulations that may apply to OWTS with a design capacity of 2,000 gallons per day or greater and to be explicit that the requirements for maintenance and standards of performance (e.g., effluent limitations) will be determined by the site application approval and discharge permit processes for such OWTS. Also, the Commission adopted section 4.A.1.b to indicate that all other aspects of permitting, performance, and construction will be in conformance with the regulations adopted by the local board of health.

The Commission modified, in section 4.B. of Regulation #43, the provision from section IV.A.1. of the ISDS Guidelines to clarify that a permit must be issued by the local public health agency before construction is commenced on a new, altered, or repaired system. New detailed requirements for information to be submitted with a permit application were included.

In conformance with HB 12-1126, the Commission included language in section 4.B.4. on fees to indicate that fees for permits shall be based on the actual direct and indirect costs up to the statutory maximum and clarified that fees for other services such as soil evaluations will also be based on actual indirect and direct costs.

In section 4.B.7., the Commission clarified that the owner of a malfunctioning OWTS is required to obtain a repair permit whereas the applicable section of the ISDS Guidelines (IV.A.5) only required that application for a repair permit be made.

In section 4.F., the Commission established requirements for final approval of a permit for an OWTS.

The Commission included section 4.I. ("Product Development Permits") for proprietary treatment systems undergoing testing under actual operating conditions. It includes application requirements for such systems and other requirements such as for reporting of any data collected and authority for the local public health agency to revoke or amend the permit based on several identified factors.

The Commission, consistent with changes made in HB 12-1126, replaced the provisions of section IV.K.1. of the ISDS Guidelines with section 4.K. removing the requirement to hold a public hearing prior to prohibiting a permit for an OWTS and deleted the provision that such prohibitions are limited to areas where there are more than two dwellings per acre or areas that are subdivided for more than two dwellings per acre. Pursuant to the changes in the statute, the Commission adopted a simpler condition that provides that the areas shall be identified based on applicable local land use laws or areas defined by potential problems.

The Commission, in sections 4.L.1. and 4.L.3., modified the provisions of ISDS Guidelines sections IV.M.1. and 2., respectively, to authorize local boards of health to charge fees for initial licensing of OWTS contractors and cleaners and renewal of those licenses based on the actual cost to the local public health agency rather than the specific amounts in the Guidelines.

The Commission established a new optional transfer of title inspection provision that the local board of health may choose to implement at its discretion. If adopted by a board of health, the local regulation would have to be consistent with the requirements of Regulation #43 except that the local board of health would have the authority to identify types of title transfers that are not required to be inspected. The Commission established application requirements, criteria determining that an OWTS is acceptable, a requirement that unacceptable OWTS be repaired, and other provisions, including for penalties should a property in a local public health agency jurisdiction transfer without obtaining a required inspection. The Commission finds it appropriate to adopt an optional title transfer inspection provision based on interest shown in the stakeholder group for a consistent approach to this practice and that there will be costs to be borne by the local public health agency in implementing the program so a mandate is not appropriate.

Provisions for a new optional renewable permit program were established. These permits could be used to set requirements for activities such as required maintenance, a schedule for required inspections of the performance of higher level treatment systems, when a transfer of title inspection is required or other requirements deemed necessary by the local board of health. Similar to the transfer of title inspection program, stakeholders indicated a desire for a consistent approach and the Commission did not find it appropriate to create a mandate where there would be a cost to the local public health agency.

Content in section XVIII. of the ISDS Guidelines regarding variance provisions became section 4.O. of Regulation #43. The Commission modified the requirements for local board of health hearings regarding variances and required a public hearing to be held on all variances.

The Commission moved content in section XV. of the ISDS Guidelines to section 4.O.7. of Regulation #43. Similarly, the Commission moved the un-numbered "General Prohibitions" section that follows section XV. to section 4.P. and the unnumbered "Penalties" section to section 4.R. The Commission, consistent with a change made in HB 12-1126, removed the prohibition against allowing an OWTS that did not meet required separation distance between maximum seasonal ground water table and the bottom of an absorption system to remain in use without compliance with the Guidelines. The Commission, consistent with section 25-10-112 (5) added a new requirement to properly dispose of septage.

The Commission incorporated site and soil evaluation requirements into section 5. of Regulation #43. These include significant revisions to the previous soil test provisions in section VII. of the ISDS Guidelines as well as the addition of more specific information to be provided regarding the proposed site such as a legal description of the property, location of features on and off the property for which setbacks may apply, and the characteristics of the site such as topography.

There had been no specific process identified in the ISDS Guidelines for a site and soil evaluation. The Commission determined that there are several elements of each that are consistent with current standard OWTS design industry practice and therefore appropriate to include in Regulation #43. These include a requirement to conduct an initial site evaluation, a reconnaissance evaluation of the site, and detailed soil evaluations, and prepare a report that documents the required information that will be used to support the design of the OWTS.

The process builds from a "desktop" preliminary investigation to identify site location and ownership information, soils information from available sources such as the Natural Resources Conservation Service, and, most importantly, information on physical features (property boundaries, streams, wells, etc.) from which setbacks will have to be determined. This information, facility information, and local OWTS regulations are used to identify a preliminary OWTS size. This is a sensible first step that will allow the system designer to become familiar with the general information to be refined and verified in the following steps.

The next step the Commission identified is a reconnaissance investigation to identify topography, landscape position, natural and cultural features, and vegetation. This is information that will assist in determining a preliminary location for the soil treatment area (STA) and where the soil investigation will be conducted.

The final step is to conduct the soils evaluation. The Commission found it imperative that this process be based on a thorough physical examination of the soil in the proposed STA. The soils provide critical treatment of the wastewater including reduction of pollutant concentrations and filtration to remove microorganisms before the treated wastewater reaches the ground water. The use of soil profile test pit excavations is accepted practice in the OWTS industry and the Commission, as part of its move to "modernize" the OWTS regulations, adopted this approach to ensure that the required level of treatment in the soils is achieved.

The ISDS Guidelines allowed a soil profile hole to be drilled along with the use of percolation tests. The Commission found that the use of soil profile holes does not provide critical information such as the seasonally high ground water level and limiting layers that are not bedrock. In order to provide for a transition to the use of soil profile test pit excavations, which allow an examination of the in-situ soil profile, the Commission allowed soil profile holes in conjunction with percolation tests to be used for a three-year period from the effective date of Regulation #43. After that time, at least one soil profile test pit excavation will be required if percolation tests are to be used to determine the LTAR. Visual and tactile evaluation in soil profile test pit excavations may be used to determine the LTAR without percolation tests.

The Commission included additional information on the conduct of percolation tests and soil evaluations based on current OWTS industry practice to ensure that the information used to size the soil treatment area is as accurate as practicable.

Percolation tests and soils evaluations are required to be conducted under the supervision of a professional engineer licensed under Colorado law or a competent technician as defined in the regulation. The Commission established expertise that the competent technician must possess to conduct percolation tests and soils evaluations and identified means by which the required expertise can be obtained. The Commission expects that individuals that do not possess this expertise will obtain the necessary training or degree. The Commission is aware that there is training available in soils evaluation, such as that available through the Colorado Professionals in On-Site Wastewater, and, to the extent practical, encourages the Division to ensure that training is available in different areas of the state.

The Commission required the preparation of a report documenting the site and soils information collected, to be used for the design of the OWTS and to determine whether other treatment prior to the STA is necessary. The Commission established elements of the report in order to ensure that the required information was provided for the design of the OWTS and that it was properly collected.

The Commission modified the requirements previously in section V. of the ISDS Guidelines in section 6. of Regulation #43. Modifications include establishing that the minimum size of a new single-family home for determination of the OWTS design flow is two bedrooms and providing the local public health agency the authority to increase the number of bedrooms based on unused space that could be converted into one or more bedrooms. The Commission included these provisions based on its intent that OWTS are often used for thirty or more years and that it is appropriate to size the OWTS based on an assumption that additional bedrooms are likely to be added in these types of situations. Also, the Commission deleted the provision that the maximum flow be 150 percent of the design flow and be used as the basis for the OWTS design. The Commission modified calculations of STA size rather than apply a factor to flow rates.

The other requirements regarding flow (gallons per day) and biochemical oxygen demand (pounds per day) for multi-family, commercial, and institutional facilities remains the same as in the ISDS Guidelines.

The Commission also included in section 6, various treatment levels (e.g., TL2 and TL2N) with associated levels of carbonaceous BOD_5, total suspended solids, and total nitrogen that are used in conjunction with provisions in section 7, to determine where STA size or the depth of required soil can be reduced.

The Commission maintained the table of minimum horizontal distances between components of an OWTS and pertinent physical features from section VI of the ISDS Guidelines and added an option for reducing the applicable distance where higher level treatment (e.g., TL2N) is provided. This provides

options to reduce the distance between the STA and identified physical features where higher level treatment is provided in contrast to the previous approach under which setback distances from identified features were required to be met regardless of level of treatment unless a variance was granted. This provides flexibility and the beginning of what may be a transition to a performance-based regulatory approach.

Where the distance from an STA to proximate physical features is allowed to be reduced due to provision of higher level treatment, the Commission included a requirement for mandatory operation and maintenance of the system in accordance with section 14.D. of Regulation #43.

The Commission, in section 8. of Regulation #43 (Design Criteria – General), modified the requirements from section VIII. of the ISDS Guidelines to add requirements in section 8.C. to ensure that septic tanks and treatment components are accessible for inspection, maintenance and servicing. The Commission finds that these activities must be performed in order for an OWTS to function properly and in order to protect public health and the environment. This will require installation of a riser at or above the ground surface for tanks, effluent screens and treatment components of new systems. Where risers are not provided or components are buried at a great depth, they often cannot be located when maintenance is required.

Minor modifications to the other provisions from section VIII. of the ISDS Guidelines in section 8. of Regulation #43 were made to clarify or add additional detail. The Commission included section VIII.D.7. of the ISDS Guidelines in section 8.K. whereas the remaining requirements of section VIII.D. were included in section 10 of Regulation #43.

The Commission, in section 9. of Regulation #43, modified the provisions of the ISDS Guidelines to require watertight testing of tanks either at the manufacturing site or at the property where the tank is to be installed. This is necessary to provide documentation of the tank's watertight condition prior to installation. For septic tanks, the Commission required that accepted test methods be used to demonstrate watertight conditions. The local public health agency inspector will conduct a field inspection after the tank has been placed in the final excavation but before the tank is buried and may require a watertightness test. This will aid in evaluating that factory tested tanks have not been damaged in transit. The Commission also modified the requirement that had been in the Guidelines regarding tank anchoring. Instead, manufacturer's instructions may be followed where provided or, where such instructions are not provided or a choice is made to use an alternate approach, a professional engineer is required to design the anchoring system.

The Commission bolstered the provisions for septic tank structural integrity to require that the manufacturer provide documentation regarding what load conditions a tank can withstand, including depth of burial and other loads or pressures including from the seasonally high level of ground water.

The Commission added more specific requirements for structural integrity for septic tanks (concrete and fiberglass/plastic) that identify generally accepted industry standards to be met. Also, more specific requirements for pipe and pipe bedding and pumping and dosing systems were added based on current industry standards and practice.

Consistent with current industry practice for septic tank design, the Commission increased the minimum size of a tank for a residential application to 1,000 gallons and reduced the minimum tank size for OWTS serving non-residential buildings to 400 gallons. The requirements in section 9.B.4.d. of Regulation #43 for inlet and outlet tees or baffles were modified to ensure that installation and servicing of effluent screens can be accommodated. Other minor changes to tank dimension requirements were also made.

The Commission added a provision authorizing the use of effluent screens and providing that the local public health agency can require such screens. Additional requirements to ensure proper cleaning of screens and requiring an effluent screen where effluent is pumped from a septic tank were also included. The Commission encourages the use of effluent screens as they can prevent clogging of STA distribution piping and extend field life.

A requirement for a grease interceptor was added for commercial food establishments and other facilities that generate significant quantities of fats or grease. This is necessary to reduce organic load and wastes that are difficult to treat.

In section 10. of Regulation #43, the Commission laid out significantly more detailed requirements for the design of STA. As previously indicated, the design of the STA is to be based on information developed in the site and soil evaluation.

In section 10.B., the Commission expanded the conditions under which a professional engineer is required to design an STA to include presence of an impervious layer and different soil types rather than the requirements in the ISDS Guidelines that had limits based on presence of bedrock and percolation rate, respectively. This is in keeping with the increased focus on the importance of soil evaluation in the design of an STA.

The Commission adopted a design approach upon which the STA sizing is based on the LTAR rather than a calculation using the percolation rate. Soil percolation values, where collected, can be used to establish the LTAR. Of course, as indicated in section 5. (site and soil evaluation), the design of an STA can be based wholly on a soil evaluation through the use of visual and tactile examination of soils in a test pit excavation. This change in approach is supported by significant research in the field.

The Commission established LTARs based on the soil type and provided for an increase in the LTAR where higher-level treatment is provided prior to the soil absorption system. This approach adjusts the level of treatment that is required in the soil based on treatment having been provided prior to distribution into the STA. The Commission established a specific requirement for a sand filter to be provided where the soils contain large amounts of rock. This is appropriate, as rocky soils will likely allow wastewater to pass through the STA without being fully treated. The depth of the required sand filter is greater (three feet) for TL1 (septic tank effluent) treatment systems than for other (types 2N, 3, and 3N) systems (two feet).

The allowance of reduction in seepage bed or trench area where dosing and chambers are used is continued, although the reductions were adjusted. The Commission also added a reduction for manufactured media based on the reduction of fines in natural gravel and reduced compaction from the deposition of gravel. The Commission, based on research indicating that beds do not perform as well as trenches, included an upward adjustment (STA sizing factor greater than 1.0) for beds in table 10-2.

The Commission maintained the previous provisions regarding distribution systems and trenches/beds in Regulation #43 and also added requirements that limit the width of a bed to 12 feet to aid in air/oxygen transfer to improve aerobic treatment in the soil. Width of beds may be greater than 12 feet if treated septic tank effluent is applied. The width of evapotranspiration beds may be greater than 12 feet because air/oxygen transfer to the soil is not a component of evapotranspiration beds.

The Commission added a provision in section 10.E.1.b. limiting the depth of the infiltrative area to four feet, to improve oxygen transfer. The depth will be measured from the downslope side of the trench or bed. The Commission, in section 10.E.2., limited the length of gravity fed distribution lines to 100 feet and pressure dosed lines to 150 feet. A requirement to install an inspection port at the terminal end of each distribution line was added to allow the STA to be visually inspected to determine whether plugging or a structural problem is occurring. Also, criteria were included for the use of chambers, manufactured media, pressure distribution, sequencing systems, and drip lines as these commonly used design approaches/components were not addressed in the ISDS Guidelines.

The Commission modified the requirements for alternating systems to allow reductions to be given where dosing or manufactured media systems are used. The Commission deleted the required frequency of dosing that had been included in the ISDS Guidelines to allow more design flexibility.

The Commission added specific provisions for repairs allowing the use of deep gravel systems, wider

beds, and seepage pits. These technologies had been allowed for new/enlarged systems under the ISDS Guidelines. The Commission determined that these technologies do not provide the same level of treatment or public health/water quality protection as the systems allowed under this regulation. Therefore, their use should be limited to repair situations where an allowed system cannot be properly installed due to site constraints or other limiting factors.

The Commission included additional requirements for new seepage pits to offset, as much as practicable, their performance limitations.

The Commission adopted section 11. for design criteria for higher level systems. This section generally replaces or consolidates the criteria previously in section VIII.B.2. and sections IX. and X. of the ISDS Guidelines. The Commission distinguished between higher level treatment systems using public domain technology design information and proprietary systems. The Commission required public domain technology systems to be designed, installed, and maintained in accordance with established criteria such as applicable references and any conditions established by the local public health agency. Proprietary systems must be designed, installed and maintained in accordance with manufacturer's instructions and any additional criteria established through the technology review and acceptance process in section 13. The Commission established these requirements to ensure that these more complex technologies will perform at the intended level since they are replacing simpler systems that may not rely on mechanical systems that are subject to failure and that require much less operational attention and maintenance. These systems will be assigned a treatment level based on those described in section 6.

In section 13., the Commission added significant detail to the previous provisions for sand filters in section VIII.C.5. of the ISDS Guidelines. These include subcategories for several different sand filter types and associated sizing requirements and minimum requirements. Other detail was added to ensure proper design and performance, such as allowable slope for a mound system and the distance between the bottom of the sand filter and the ground water or bedrock.

The Commission prohibited new wastewater ponds for single-family residences based on the difficulty of maintaining adequate water levels in a small pond in semi-arid conditions. Additional items were added such as maintenance requirements and a maximum allowable seepage rate.

The Commission clarified that vaults may be used for full time occupancy properties where a failing OWTS cannot be replaced or for new systems where an OWTS with an STA is not feasible or for properties where an STA is not allowed.

The Commission provided authorization for local public health authorities to prohibit new and the use of existing vault privies and pit privies.

For incinerating and composting toilets, the Commission clarified that these may be subject to the requirements of a local plumbing agency or the Colorado Plumbers Board, whichever has jurisdiction in the specific location. The Commission added requirements for composting toilets including proper disposal of residue and accounting for low temperatures in the design.

The Commission expanded the provisions for acceptance of new product technology in section 13. of Regulation #43. This included a new requirement and associated elements for an application to be submitted in support of a proprietary treatment or remediation product. Also, product acceptance requirements were established for many types of products ranging from meeting National Sanitation Foundation requirements for composting toilets to detailed field performance testing to demonstrate performance for proprietary treatment products. Details for both the application and acceptance processes were added to provide the Division and technology proponents with a clear understanding of the level of information required and the basis for the Division's decision.

Also, the Commission established specific criteria for acceptance of remediation products that are necessary to ensure that owners of failing systems are not led to believe that the system can be

remediated by the use of a remediation product when, in fact, repair or replacement is the only option.

The Commission, subject to a proprietary treatment product having met the NSF/ANSI Standard 40 or equivalent testing program and where at least one unit has been installed in Colorado as of the effective date of Regulation #43, allowed the continued use of a proprietary treatment product with a treatment level of TL2.

The provision of a public hearing where approval of a product has been denied has been removed as it is unnecessary. Final decisions of the Division, including the denial of a technology, may be appealed to the Commission pursuant to sections 25-8-202(k) and 25-8-401, C.R.S. The Commission's decision can be appealed by either party to the district court.

The Commission established new operation and maintenance (O&M) requirements including a mandatory O&M program where higher-level treatment is used as the basis for reduction of a vertical or horizontal setback distance or for a reduction in the STA area. This is appropriate given that the protection of public health and water quality under these circumstances depends on the proper functioning of the higher level treatment system and these systems must be operated and maintained to function at the intended level of treatment.

A local board of health must adopt regulations requiring appropriate O&M in order to offer a reduction in the setback distance or in the size of the STA where higher level treatment is proposed. The local board of health is not required to adopt this provision of the regulation. Where the provisions of the regulation are adopted, however, they must include requirements for the local public health agency to develop a program of inspections, maintenance, recordkeeping, and enforcement to ensure that the systems are meeting the designed higher level treatment standards and maintaining appropriate records.

The Commission included required minimum inspection and maintenance frequencies, depending on the type of higher level treatment (e.g., with or without mechanical parts), and a requirement for system owners to maintain an active maintenance contract at all times. The Commission modified the monitoring provisions of section XIV.D. of the ISDS Guidelines to clarify that a local public health agency can require monitoring where there are indications of inadequate performance, where an OWTS is located in a sensitive area, and for experimental systems and systems under product development permits. The monitoring of experimental systems and systems under product development permits is necessary in order to establish a baseline expectation for system owners and local public health agencies. A local board of health could choose to require additional monitoring at its discretion.

The Commission encouraged stakeholders to consider the following issues in the next review of Regulation #43: 1) mandatory inspections at title transfer (currently an option of the LPHA), 2) inspection ports at both ends of the distribution lines (currently an option of the LPHA), 3) use of E. coli instead of fecal coliform in Section 43.12.H, and 4) training and licensing. Although few training requirements are included in Regulation #43, the Commission supports efforts to increase training opportunities and requirements for OWTS practitioners in Colorado.

PARTIES TO THE RULEMAKING HEARING

1. Colorado Professionals in Onsite Wastewater

2. Eljen Corporation

3. Tri-County Health Department

4, Colorado Directors of Environmental Health

5. Board of County Commissioners for the County of Gunnison, Colorado

6. Underground Solutions, Inc.

7. Jefferson County School District R-1

8. Front Range Precast Concrete

9. Colorado Hospital Association

43.24 Statement of Basis, Specific Statutory Authority and Purpose: April 10, 2017 Rulemaking, Final Action May 8, 2017, Effective June 30, 2017

The provisions of sections 25-10-101 through 113, C.R.S. provide the specific statutory authority for adoption of this regulation. The Commission also adopted, in compliance with section 24-4-103(4), C.R.S., the following statement of basis and purpose.

Basis and Purpose

The April 10, 2017 Commission hearing culminated efforts of an extensive stakeholder process. Stakeholders from all sectors of the onsite industry including, regulators, practitioners and manufacturers reviewed and provided comment on the proposed revisions to Regulation 43.

The adoption of Regulation 43 in June of 2013 was the first major revision to these regulations since 1994. The purpose of the revision was to reflect current standards applied to the On-site Wastewater Treatment System industry and to provide more options and flexibility in design and local regulation. Subsequent to the implementation of Regulation 43 it was noted that several sections throughout the regulation were in need of clarification. These items were defined and addressed by the stakeholders for the 2017 modification. In addition, there were a few sections within the regulation that were perceived to be in conflict with other sections of the regulation. These items were also identified and addressed by the stakeholders. Other various sections throughout the regulation were modified so as to provide clarity to the intent of that specific section as well as the overall regulation.

To align with the Colorado Legislative Drafting Manual,Chapter 5, 5.7.1 Guidelines for the Use of Plain Language and Principles of Grammar and Style, the Commission replaced technical language with plain language, where possible, and also replaced "shall" with "must" or “will” throughout the regulation when a thing or person "is required to" meet a condition for a consequence to apply.

Section 43.3

New definitions for the following terms were added to assist in the clarification of regulatory requirements: accessible, bedroom, deficiency, record drawing, and repair. The following definitions were also added to provide clarification on system design and separation requirements: basal area, cistern, cut-bank, holding tank, linear loading rate, enhanced manufactured media.

The definition of “competent technician” was revised to more accurately define this term per the actual requirements of the regulation.

The definition of “domestic wastewater treatment works” was corrected to match the Colorado Water Quality Control Act.

The definition of “effective size” was revised to provide an accurate definition of this item.

The definition of “failure” was revised to further clarify what the stakeholders decided actually constitutes the failure of an OWTS and to assist in system evaluation under the Transfer of Title program.

The definition of “infiltrative surface” was revised to further clarify the distinct soil interfaces that would be considered an infiltrative surface.

A definition of “limiting layer” was developed to provide clarity and to address perceived conflicts between the separate definitions of limiting condition and restrictive layer, which were both removed. This new term will serve as the standard term for several site conditions that require specific OWTS design considerations. This term was applied at various locations within the regulation as appropriate.

The definition of “liner” was revised to clarify the minimum thickness requirement of the liner material.

The definition of “malfunction” was revised to further define a condition that required attention, but would not necessarily be defined as a failure.

The definition of “manufactured media” was revised to clarify the difference between this component and the newly created category for “enhanced manufactured media”.

The definition of “mound” was revised to address the perceived conflict between the definition of a mound and the requirements for a mound in the design criteria within the regulation.

The definitions of “pressure distribution” and “dosing, pressure” were revised to further state the requirements of a distribution system in order to be considered a pressure dosed system.

The definitions of “sand filter, lined sand filter, and unlined sand filter” were revised to provide consistency and clarity across these three items.

The definition of “soil profile hole” was removed from the regulation as it is no longer used. Soil evaluations are now conducted by a visual and tactile evaluation of a soil profile test pit excavation.

The definition of “suitable soil” was revised to more concisely define the intent of the regulation, and to include new concepts and terms used in this revision.

The definition of “wastewater, high strength” was revised to further clarify the requirements and to accurately equate to Table 6-3 found later in the regulation.

An abbreviation for Non-pressurized Drip Dispersal System was added to Table 3-1.

Section 43.4

The Commission modified 43.4.A.1 from a reference to “equal to or greater than 2000 gpd” to “greater than”, to match the Colorado Water Quality Control Act.

The Commission modified sections 43.4.A.2 and 3 to refer to the update or revision of a local regulation compared to a promulgation or adoption as was required with the initial acceptance of Regulation 43.

The Commission modified section 43.4.F.2 by removing the term “as-built” and inserting “record drawing”, with additional requirements. This revision was suggested by industry to address potential legal concerns when using the term “as-built”.

The Commission revised the section on “Product Development Permits”, and removed the “Experimental Systems” section. The verbiage from the “Experimental Systems” section was modified and relocated to the “Product Development Permit” section; 43.4.I to be consistent with the OWTS Act. The Commission also further defined how a product can “qualify” for testing under a product development permit, and that local agencies are to supply the Division with a copy of the completed product development permit.

The Commission modified section 43.4.L; Transfer of Title Inspections. These modifications included extending the time that an inspection report was valid and redefining what items noted in the report were required to be repaired or replaced prior to issuance of an acceptance document, while others items were only required to be identified to the owner. The Commission also removed the set time frame required to complete repairs per an acceptance waiver, now allowing the local public health agency to define the length of time allowed by the waiver.

The Commission renamed section 43.4.M from “Renewable Permits” to “Permits for the Continued Use of an OWTS”. The intent was to provide consistency where permits were issued for operation and maintenance of existing systems and for the acceptance of an OWTS at the time of Transfer of Title.

The Commission modified section 43.4.N.5.d to rescind the requirement that a variance to an off-site feature must not be granted without written consent of the owner of the property containing said feature. The Commission decided that this section could cause a taking of property without evidence of an environmental or public health concern. A clause was added to ensure that the adjacent property owner of the feature in question was notified of the time and date of the hearing.

The Commission modified section 43.4.N.5.g to further clarify that variances for system sizing or separation reductions were not allowed with the use of higher level treatment systems unless the LPHA had implemented a system maintenance and oversight program.

The Commission modified section 43.4.O.2 to also prohibit the repair of an existing cesspool; requiring the installation of a conforming OWTS. Previously, only new installations were prohibited.

The Commission decided to not provide additional requirements for the disposal of septage within section 43.4.O.5. The Commission recommends compliance with EPA 40 CFR, Part 503 Biosolids Rule as additional guidance regarding provisions and requirements for land application, surface disposal, pathogen destruction, vector attraction reduction and incineration of biosolids.

The Commission modified items within 43.4.P; Cease and Desist Orders, from allowing “a reasonable period of time” to bring the system into compliance, to “30 days”, to accurately comply with the requirements of the Colorado On-site Wastewater Treatment System Act.

The Commission modified items within 43.4.Q.1 to reference the correct statute regarding a Class 1 petty offense.

The Commission inserted sections from the OWTS Act, 25-10-113 (2) and (3), C.R.S., into 43.4.Q.2 and 3 to clarify the allowance for penalties based on comments received from local public health agencies.

Section 43.5

The Commission modified items within 43.5.B and C to further clarify what is required as part of a “Preliminary Investigation” and a “Reconnaissance Visit” prior to the design of an OWTS.

The Commission modified items within 43.5.D.1 to match the delayed implementation language of the original Regulation 43. Specifically, that following three years after the original effective date of Regulation 43 (June 30, 2013), a soil profile test pit excavation must be conducted during a site evaluation. The Commission also required a minimum of two soil profile test pit excavations to determine soil type and identify if any limiting layers exist. A percolation test still may be conducted in addition to the excavation in order to obtain additional information.

The Commission included a requirement indicating that the minimum depth of a soil profile test pit excavation must be to a limiting layer, or at least four feet below the infiltrative surface of the proposed soil treatment area.

The Commission included a specific reference to the evaluation of soil consistence and other similar conditions that may interfere with treatment and dispersal of effluent.

The Commission clarified the “Procedures for performing percolations tests”, in order to coincide with proper methodology for soil percolation testing.

The Commission modified items within 43.5.E.1; “Marking of Soil Profile Test Pit Excavations or Percolation Holes”, to require that excavations shall be suitably barricaded to prevent unauthorized access.

The Commission modified section 43.5.F.1.g indicating that site plan drawings are to include a fixed non-degradable temporary or permanent benchmark to ensure a more accurate OWTS installation, consistent with the approved design plans.

The Commission modified section 43.5.G.3 indicating that a design document for all dosing systems must now include calculations for total dynamic head and gallons per minute. Scaled drawings must now include separation distances to water supplies and surface water on both the subject and adjacent properties. Elevations or relative depth for the infiltrative surface, septic tank invert, and all other OWTS components must be provided.

The Commission removed the specific reference to septic tanks in former section 43.5.G.3.e regarding specifications for loads for burial depth and ground water, noting that per 43.13 the division must review and accept septic tanks from a manufacturer prior to the allowance of the installation of the tank.

The commission included the requirement that the proposed site for the soil treatment area be protected not only during OWTS construction, but also prior to OWTS construction so as to prevent soil compaction from other site activities.

The Commission modified items within 43.5.J.2.b to allow for a testing requirement within the soils training for a competent technician, if the training or workshop includes an exam.

Section 43.6

The Commission modified section 43.6.A.2 to only allow for a local public health agency to increase the design flow per person from 75 gpd to 100 gpd, “on a case-by-case basis”. This will increase statewide consistency but retain local flexibility where justified.

The Commission modified section 43.6.A.4 to allow for composite sampling when testing wastewater from multi-family or commercial systems.

The Commission included the allowance in section 43.6.A.5.e for the installation of a timed dosed NDDS where flow equalization is utilized.

The Commission made the following modifications to Table 6-2: separated out flows by fixture type to clarify that calculating flows using fixture values is strictly for auxiliary buildings; inserted estimated flows from a “tiny home” (<400 sq. ft.); increased the estimated flows for travel trailer parks with individual sewer and water connections to 100 gpd (this is in compliance with NFPA 1194, Section 7.8.2); provided additional direction for OWTS sizing for a church and group home.

The Commission made the following modifications to Table 6-3: indicated that septic tank effluent will be measured in BOD_5 and higher level treatment effluent will be measured in $cBOD_5$ so as to adhere to industry standards. Also, the constant of multiplying BOD_5 by 0.85 to obtain $cBOD_5$ was removed since there is not a set ratio for these constituents.

The Commission created Table 6-4 to assist in further clarifying the existing definition of “Wastewater, High Strength”.

Section 43.7

The Commission made the following modifications to Table 7-1: created separate isolation requirements for structures with and without basements, crawl spaces or footing drains to an OWTS; revised the separation requirements from a cistern to an OWTS to comply with the Water Well Contractors rules; added separation requirements from upslope curtain drains to an OWTS; added irrigation wells and monitoring wells set in a potable aquifer under well setbacks; added an allowance for other methods of encasement for crossings and encroachments; and referenced the Colorado Plumbing Code regarding the separation requirements to a building sewer.

The Commission made the following modifications to Table 7-2: expanded the vertical separation requirements above a limiting layer for TL2N and TL3 effluent to two and one-half feet to recognize that these treatment levels do not provide the same treatment as TL3N; further clarified that a horizontal separation reduction to 75 feet is allowed for TL3N effluent only after a variance is obtained from the Water Well Contractors Rules; and noted that the minimum vertical separation from the bottom of a seepage pit to a limiting layer is four feet.

Section 43.8

The Commission inserted a requirement within 43.8.D indicating that the maximum depth to the top of a new septic tank, new dosing tank or new vault shall be four feet and further clarified the requirements for riser lids. These requirements will allow for proper maintenance of each component.

The Commission further explained that the “sufficient weight” of a riser lid is defined as 59 pounds. This aligns with industry standards.

The Commission expanded the requirements within 43.8.G by requiring both an audio and visual alarm signal to ensure that the user will be notified if an electrical component is not functioning properly.

Section 43.9

The Commission modified section 43.9.A.1 to require a watertight seal between the final and the previous compartment of a tank if the last compartment is used as a pump or siphon chamber.

The Commission modified sections within 43.9 to reference the most current national standards for septic tank construction.

The Commission modified section 43.9.B.4 to ensure that the design of septic tanks, baffles, tees and access openings follow accepted industry standards.

The Commission inserted requirements for cleanouts in sewer lines so as to allow for proper access for maintenance.

The Commission inserted a section that requires a siphon-dosed system for pressure dosing and higher level treatment systems to be able to track the number of doses to the soil treatment area.

The Commission further clarified section 43.9.I.3 which references the design requirements for multiple compartment tanks that use the final compartment for the installation of a pump or dosing siphon.

The Commission inserted a section that provides for a smaller diameter riser over a pump chamber, but only when the riser is an integral component of a specific product that is accepted by the Division.

The Commission inserted a section that requires all intrusions on a pump chamber riser to be watertight.

The Commission modified the section on “Controls” to align with applicable codes and industry standards. This section now requires the following: To comply with applicable electrical codes, an electrical disconnect must be provided within line of sight of the pump chamber. To assist in operation and maintenance, a means of tracking both the pump run time and number of cycles for pressure dosing and higher level treatment systems is now required. All panels or boxes must bear the seal of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL was expanded from only allowing UL listed.

The Commission modified section 43.9.J by defining what type of effluent screening is acceptable when effluent is dosed from the final compartment of a septic tank, and inserted a section that requires an effluent screen to be placed on the outlet from the septic tank when an ejector pump, grinder pump or non-clog pump is used prior to the septic tank.

The Commission inserted a section that requires the handle of an effluent screen to extend to within 12 inches of grade to allow for ease of maintenance.

The commission expanded the section relating to the size and design of “grease interceptor tanks” and their internal components to bring the regulations more into alignment with accepted industry standards.

Section 43.10

The Commission inserted a section that allows for the application of higher level treated effluent by gravity distribution in soil types 3, 3A, 4, 4A, and 5 for designs where reductions in soil treatment area size or vertical/horizontal separation are not applied.

The Commission modified Table 10-1 to allow for increased long-term application rates (10%+/-) in cases where higher level treated effluent is applied to a soil type 1, 2, 3, or 3A. These increases are within accepted industry parameters for the application of treated effluent. This was completed to modify parts of the current regulation whereby certain designs using the sizing adjustment factors provided in Tables 10-2 and 10-3 would be smaller in size than a design applying higher level treated effluent to the same site. With this modification, the commission removed section 43.10.D.3, which only allowed for a fifty percent size reduction to the baseline system when the size adjustments for Tables 10-2 and 10-3 were applied. The Commission also modified the identifiers for soil structure so as to accurately concur with the USDA soils manual.

The Commission removed soil type “0” from Table 10-1 and placed it within a new Table 10-1A. This new table was created to address concerns from local agencies regarding design requirements within the current regulation for sites with a high content of rock. To clarify and provide flexibility, the table includes three “Type R” soil identifiers describing a soil that contains a certain percentage and size of rock that is allowed, how it is to be applied to the soil, at what rate it is to be applied, and the depth of treatment sand that is required below the distribution system. This table will provide for more engineered design options in these soil types. While percentages of media sizes are determined by weight through ASTM gradation testing, the Commission chose to also allow characterization of rock size percentages by volume, similar to USDA field methods, to provide designers the ability to evaluate rock percentages in the field. The Commission recommends that future discussions regarding changes to this regulation include consideration of whether the regulation should allow a facility to apply for a variance from the design criteria requirements outlined in Table 10-1A where alternative or additional testing methods have been conducted and where it can be demonstrated that the alternative design will provide equal or improved treatment of the effluent.

The Commission modified Table 10-3 to clarify the manufactured media terminology by creating new categories for proprietary manufactured distribution media; “Enhanced Manufactured Media” and “Other Manufactured Media” (both defined in the definition section of this revision). Other Manufactured Media will receive a 0.9 reduction in system size, while Enhanced Manufactured Media will receive a 0.7

reduction in system size. Additional sections for these two types of manufactured media indicating design and installation criteria has been provided in section 43.10.G. The acceptance criteria for these products defined in section 43.13.E have also been expanded.

The Commission clarified Section 43.10.E.1.b by stating that the infiltrative surface may only be greater than four feet deep if TL2 or greater effluent is applied and the system is inspected and maintained as per section 43.14.D of this regulation. The Commission also modified the maximum infiltrative surface depth for systems installed on a slope. The 4 foot maximum depth will now be measured from the up-slope side of the trench or bed. This provides consistency throughout the regulation and promotes aerobic conditions within the treatment zone.

The Commission clarified various sections of the regulation by revising specific references of distribution “lines”, to distribution “laterals”.

The Commission inserted a sub-section in 43.10.E.2 which requires the forcemain or distribution pipe to be connected to a distribution header as near to the center of the header as possible. The intent is to provide more equal distribution to the entire distribution system.

The Commission moved and expanded the section on “Pressure Distribution” to ensure that system designs align with industry standards. This section now requires the following: the inclusion of pump information, drain-back volume and calculations or a design software reference that indicates equal flow to the entire distribution system will be provided, parallel distribution lines must not exceed four feet center to center and the outer distribution pipe must be located at least two feet to the sidewall and endwall, and flushing assemblies must be installed on each lateral and be accessible from grade. A LPHA may require that all effluent dosed to a pressure distribution system be screened prior to entering the distribution system.

The Commission modified the section on trenches by reducing the required distance between adjacent trenches from six feet to four feet (sidewall to sidewall) to assist in constructing systems on sites with steep slopes or restricted area.

The Commission modified the section on inspection ports by requiring a 4 inch minimum inspection port at the terminal end of each lateral in a trench system and at each corner of a bed system. This modification was implemented after discussions with local public health agencies relative to the Commission’s request in the original Statement of Basis and Purpose that stakeholders consider inspection ports at both ends of distribution lines.

The Commission modified the section on “Alternating Systems”, now requiring each new soil treatment area in an alternating system meet the minimum sizing requirements of the regulation. The fifty percent sizing will remain for repairs to existing systems.

The Commission modified various sections of the regulation to provide a consistent size requirement for coarse aggregate (stone) when it is used. All applicable sections were changed to reference a range in size from ½” to 2 ½”. AASHTO M 43 size No. 3 coarse aggregate is noted as meeting this specification.

The Commission modified and greatly expanded on Section 10.H, “Soil Replacement Systems” in response to local agency and practitioner comments. Three cases are now described. Case 1, for use with a soil type R; added soil must meet either the specifications of “preferred” or “secondary” sand media (as defined in section 43.11.C). Sand depth requirements and application rates are defined in Table 10-1A. Case 2, for use with a soil type R-1 (option 2); a maximum rock percentage and rock size has been defined. Soil depth requirements and application rates are defined in Table 10-1A. Case 3, for use when sand is proposed to be added above a soil type 1 – 5. Added soil must meet either the specifications of “preferred” or “secondary” sand media (defined in section 43.11.C). In each case where sand is added, a recent gradation of the sand media must be provided to ensure the quality of the product.

The Commission inserted a section that further defines the allowance for the reductions to setbacks in a repair situation where an existing OWTS is failing.

The Commission inserted a section for the allowance of “deep beds” in a repair situation of up to five feet deep. However, size adjustments allowing area reductions within Tables 10-2 and 10-3 may not be used in this case.

The Commission removed the reference of a “bed” from the section on “Deep Gravel Trenches”.

The Commission modified the following items within the section on Seepage Pits (Repairs): Changed the reference from a vertical cylinder to a “structure of precast perforated concrete with holes, or cinder or concrete block laid dry with open joints.”, noted that the excavation may not exceed 5 feet beyond the structure wall, revised the infiltrative surface to include the entire bottom area of the excavation, required that the bottom of a seepage pit must be a minimum of four feet above a limiting layer in all instances, and moved the requirements for the installation of “new” seepage pits to section 43.12.C for clarity.

The Commission moved the section on Remediation Systems from section 43.13.F and included it within the section on “repairs”, 43.10.I. The Commission also removed remediation systems from the divisions review for proprietary products acceptance and placed the acceptance under the control of the local public health agencies along with some specific review parameters.

Section 43.11

The Commission modified the following items within the section on Sand Filters: The treatment levels for single-pass and recirculating sand filters was defined. General design parameters for sand filters were established to ensure that the design of such systems will comply with accepted industry standards. Exact specifications (effective size, and uniformity coefficient) for “preferred” and “secondary” sand media are defined in this section. A recent gradation of the sand media (no more than one month old) must be provided to ensure the quality of the product.

The Commission modified the following items within the section on a Unlined Sand Filters: Application rates and sand depth requirements for “preferred” and “secondary” sand media was defined relative to the quality of effluent the was applied to the infiltrative surface.

The Commission modified the following items within the section on a Lined Sand Filters: Application rates and sand depth requirements for “preferred” and “secondary” sand media was defined. General design parameters for lined sand filters were established to ensure that the design of such systems will comply with accepted industry standards.

The Commission modified the following items within the section on Recirculating Sand Filters: General design parameters for recirculating sand filters were established to ensure that the design of such systems will comply with accepted industry standards. Specifications included, lateral and orifice spacing, recirculation ratios, gallons/dose, timer settings, media requirements, under-drain and liner requirements.

The Commission modified the section on “mound systems” to clarify design requirements and to bring the design criteria into alignment with accepted industry standards. The following items are noted: General mound design specifications, distribution piping requirements, sand media specifications, loading rates, vertical separation requirements, grading requirements, among others, have been further defined.

Section 43.12

The Commission moved and expanded on Section 43.12.A in order to clarify its original intent. This section was moved to 43.8.A as it references “general design criteria” which is a more appropriate location. This section was expanded to ensure that all OWTS for single family homes are sized per the flow requirements from section 43.6.A.2, and that the installation of low-flow fixtures or the separation of

toilet waste does not allow for the reduction in the size of an OWTS. This is also consistent with the requirements of Regulation 86.

The Commission inserted the section on "Non-Pressurized Drip Dispersal System" in response to local agency and practitioner comments. A Non-Pressurized Drip Dispersal System is considered a type of an evapotranspiration/absorption system. The general design specifications noted in the "Colorado Professionals in Onsite Wastewater Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (NDDS) September, 2016" must be followed when these systems are proposed.

The Commission modified the section on Evapotranspiration and Evapotranspiration/Absorption Systems. General design parameters for evapotranspiration and evapotranspiration/absorption systems were established to ensure that the design of such systems will comply with accepted industry standards.

The Commission expanded on the design requirements for "new" seepage pits. New items in this section state that the general design requirements for the repair of these systems must be followed. New seepage pits will only be allowed when the site cannot accommodate a trench or bed system. Pressure distribution is not required when TL2 or higher effluent is applied to the seepage pit.

The Commission modified the section on Wastewater Ponds by adding, "at least" when referencing the required depth of five feet.

The Commission modified the section on "Treatment Systems Other Than Those Discharging Through a Soil Treatment Area or Sand Filter System". The following item was added: "These types of systems must not allow drainage of effluent off of the property of origin."

The Commission modified all references to "fecal coliform". Those references were changed to "*E. coli*".

Section 43.13

The Commission modified section 43.13.D.3.b, reducing the number of residential home test sites for proprietary treatment products from twelve to six if the product received NSF/ANSI certification for the treatment level requested.

The Commission clarified section 43.13.D.3.j, noting that manufacturers that request continued acceptance of their product must submit a request for this acceptance and provide documentation of an actual installation to the Division.

The Commission clarified the section regarding the requirements for the testing of proprietary higher level treatment systems outside of Colorado.

The Commission revised section 43.13.E.1, noting that a "gravity" proprietary distribution product must provide equivalent storage volume to a rock and pipe system. Pressure distribution products are exempt from this requirement.

The Commission clarified section 43.13.E.1, noting that a proprietary distribution product must cover at least 90 percent of the excavation in order to receive sizing adjustments provided for in Table 10-3.

The Commission clarified section 43.13.F, providing more detail regarding the requirements for the acceptance of proprietary remediation products.

The Commission clarified the testing and reporting requirements for septic tank manufacturers' testing of five percent of the tanks. The testing must be conducted "annually" and submitted to the Division, or the certifications from IAPMO, CSA or NPCA must be submitted to the Division on an annual basis.

Section 43.14

The Commission modified section 43.14.C.2 by allowing the local public health agency to designate a separate entity to maintain the oversight of OWTS maintenance where reductions in soil treatment area or vertical/horizontal separation distances are applied. The enforcement of the requirements of the regulation must remain with the local agency.

The Commission modified section 43.14.D.2 in response to local agency comments. The regulation now allows for the local public health agency to designate a separate entity to conduct and maintain the oversight program for the inspection and maintenance of higher level treatment systems. However the enforcement of the requirements of the regulation will remain with the local board of health.

The Commission modified section 43.14.D.4.b. The frequency of inspection and maintenance for higher level treatment systems was changed to require, at a minimum, two inspections at six month intervals for the first year of system operation, then once every 12 months for the life of the system; or more stringent as required by the manufacturer or the local public health agency. The Commission recommended that future discussions regarding changes to this regulation explore whether higher level treatment systems should be required to conduct ongoing sampling for the life of that system.

The Commission inserted sections which define specific requirements of maintenance providers for higher level treatment systems. Providers must notify the LPHA when a contract has been terminated, and the provider must obtain appropriate training for specific proprietary treatment products from the manufacturer.

The Commission declined to adopt a mandatory operations and maintenance requirement for all onsite wastewater treatment systems. The Commission recommends that future discussions regarding changes to this regulation explore what level of operations and maintenance is needed for the different levels of these systems and how that should best be accomplished. In addition, the Commission encourages the future discussions consider whether onsite treatments system professionals should have certification or training requirements.

PARTIES TO THE RULEMAKING HEARING

1. Tri-County Health Department

2. Mesa County

3. Underground Solutions, Inc.

4. Infiltrator Water Technologies

5. Colorado Professionals in Onsite Wastewater (CPOW)

6. Colorado Directors of Environmental Health

43.25 Statement of Basis, Specific Statutory Authority and Purpose: March 12, 2018 Rulemaking, Effective April 30, 2018

The provisions of sections 25-10-101 through 113, C.R.S. provide the specific statutory authority for adoption of this regulation. The Commission also adopted, in compliance with section 24-4-103(4), C.R.S., the following statement of basis and purpose.

Basis and Purpose

At its March 12, 2018 rulemaking hearing, the Commission revised several sections in response to comments from the Office of Legislative Legal Services that additional information was needed to comply

with section 24-4-103(4), C.R.S. The Commission conducted a “written comment only rulemaking hearing” to address these relatively minor issues as described below.

Regulation 43 references peer-reviewed technical standards developed by national technical organizations as the industry standard of practice for various OWTS components. Regulation 43 did not consistently include clear indication of the version of the standards being referenced. The references to these peer-reviewed technical standard were modified to clearly indicate the current version being referenced. As noted below, the contact information for the national organizations was also included in section 43.16.

There were some abbreviations used in the text that were not included in the table of abbreviations and acronyms, so Table 3-1 was expanded to include the following: CPOW, ETL, and NRTL.

In section 43.4.B.5.b, there was a reference to a section of the Water Quality Control Act and the water quality fund in regards to the requirement for counties to remit their state surcharge payments. The statutory cross-reference and the fund are no longer in existence. Section 43.4.B.5.b was therefore revised to clarify where counties are to send their surcharge payments to the state.

In section 43.9.I.1.b, the certification reference for pumps was unclear. The section was modified to indicate the UL778 (Edition 6) electrical safety standard for pumps.

In section 43.9.I.2.c, the certification reference for float switches was unclear. The section was revised to indicate the UL60947-4-1 (Edition 3) and CSA C22.2 No. 205-17 (2017 version) electrical safety standards for the float switches.

In section 43.9.I.7.a.6, the Nationally Recognized Testing Laboratory designation did not identify the source of the designation and was unclear about the seal requirement. Therefore, the section was modified to clarify that the seal indicates acceptable product testing, and to identify the U.S. Department of Labor, Occupational Safety and Health Administration as establishing the designation for testing laboratories.

In Table 10-1A, footnote 5 indicated that the gradation could be performed following ASTM standards or a field evaluation by volume, but did not include identification of the ASTM standard. The footnote was updated to identify ASTM standard D6913-17 (2017 version) for gradations.

In section 43.11.C.5.f.1, the previous reference to an acceptable example aggregate was in parentheses, but unclear. The section was revised to clarify that the example aggregate meets the requirement for the intermediate layer of pea gravel.

In section 43.12.A.1.b, the requirement for a design of a non-pressurized drip dispersal system (NDDS) was rephrased to clearly state the requirement to follow the procedures in the Colorado Professionals in Onsite Wastewater (CPOW) NDDS Guidelines document and to provide information for the original source organization.

In section 43.16, it was noted that standards developed by national technical organizations and identified in Regulation 43 were available for viewing at the Division office or could be purchased from the national organizations, but did not indicate where copies are available from those national organizations. The section was thus expanded to include contact information for the national organizations.

Separate from the Office of Legislative Legal Services review, there were a few formatting and typographical errors that were identified in the previous version (e.g., missing words, double period). These errors were corrected in the rulemaking.