Boulder County, Colorado

ONSITE WASTEWATER TREATMENT SYSTEM (OWTS) REGULATIONS

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TABLE OF CONTENTS

Section 1. Title and Authority 8
Section 2. Scope and Purpose 8
2.1 Declaration 8
2.2 Purpose 8
2.3 Jurisdiction 8
2.4 Effluent Discharged to Surface Waters 8
2.5 Prohibition of OWTS Where Public Sewer Service is Available and Feasible 8
2.6 Regulation Coverage 9
2.7 Procedures to Adopt or Revise Regulations 9
Section 3. Definitions 9
Section 4. New, Repair, and Product Development Permits and Inspections 18
4.1 Permit Required, Application Requirements and Procedures 18
4.2 Fees 18
4.3 Permit Terms and Changes in Condition after Issuance 19
4.4 Repair Permits for Noncompliant OWTS 19
4.5 Denial of Permits and Appealing Denial 19
4.6 Determination 20
4.7 Authorization to Enter Upon Property 20
4.8 Inspection Stages 20
4.9 Permit Final Approval Requirements 22
4.10 Division Authority to Administer and Enforce 22
4.11 Primary Enforcement Responsibility 22
4.12 Product Development Permit 22
4.13 Prohibition of OWTS in Unsuitable Areas 23
4.14 Variance Procedures 24
4.15 General Prohibitions, per C.R.S. §25-10-112 25
4.16 Cease-and-Desist Orders 26
4.17 Penalties, per C.R.S. §25-10-113 26
Section 5. Regulation of Systems Contractors, Systems Cleaners, and Systems Inspectors 27
5.1 Systems Contractors 27

5.2 Systems Cleaners 27
5.3 Systems Inspectors 28
5.4 Revocation of Licenses 28
Section 6. Permits for Continued Use of an OWTS (i.e. Use Permits). 28
6.1 Use Permit Requirements 28
6.2 Use Permit Issuance 29
6.3 Use Permit Application Requirements 29
6.4 Minimum Criteria for Use Permit Renewals 29
6.5 Use Permit Revocation 30
6.6 Use Permit Penalties 30
6.7 Malfunctioning Systems 30
Section 7. Property Transfer Inspections 30
7.1 Applicability 30
7.2 Additional Requirements for Commercial Systems 30
7.3 Property Transfer Requirements 31
7.4 Exemptions from Property Transfer Requirements 31
7.5 Property Transfer Certificate Application Requirements 31
7.6 Inspection Minimum Criteria 32
7.7 Issuance and Term of Property Transfer Certificates 33
7.8 Issuance of Conditional Property Transfer Certificates 33
7.9 Revocation of Property Transfer Certificates 33
7.10 Penalties 33
Section 8. Site and Soil Evaluation 33
8.1 Requirements for Site and Soil Evaluation 33
8.2 Preliminary investigation 34
8.3 Reconnaissance 34
8.4 Detailed Soil Investigation 34
8.5 Reports and Site Plans 38
8.6 Design Documents 39
8.7 Site Protection 39
8.8 Qualifications for a Competent Technician 39
Section 9. Wastewater Flow and Strength 40

9.1 Wastewater Flows 40
9.2 Single-Family Residential Homes 40
9.3 Auxiliary Buildings 40
9.4 Multi-Family and Commercial Onsite Wastewater Treatment Systems 41
9.5 Flow Equalization 41
9.6 Wastewater Strength 41
Section 10. Minimum Distances Between Components of OWTS and Physical Features 42
10.1 Required Minimum Horizontal Distances-Applicability 42
10.2 Reduction in Minimum Distances – Operation and Maintenance Required 42
10.3 Dry Gulches, Cut Banks, and Fill Areas 42
10.4 Site Evaluation, Design, and Treatment Level Considerations for Use of Table 7-2 42
Section 11. Design Criteria: General 43
11.1 General 43
11.2 Accessibility for Inspection, Maintenance, and Service 43
11.3 Plumbing Codes 44
11.4 Electrical Equipment 44
11.5 Indicators of Failure or Malfunctioning for Systems Utilizing Mechanical Apparatus 44
11.6 Sampling Access 44
11.7 Component Operating Instructions 44
11.8 Surface Activity 44
11.9 Floodplains 45
11.10 Business Commercial, Industrial, Institutional, or Multi-Family Dwelling Wastewater Systems 45
Section 12. Design Criteria: Components 45
12.1 Tanks and Vaults 45
12.2 Septic Tanks 46
12.3 Abandonment of Tank 47
12.4 Pipe Standards and Bedding Requirements 48
12.5 Distribution Box 49
12.6 Drop Box 49
12.7 Stepdown/Relief Pipe 49
12.8 Wastewater Pumping and Dosing Siphon Systems 50

12.8 Effluent Screens 51
12.9 Grease Interceptor Tanks 51
Section 13. Design Criteria: Soil Treatment Area 52
13.1 Size and Design 52
13.2 Engineered Systems 52
13.3 Calculation of Infiltrative Surface of Soil Treatment Area 52
13.4 Allowable Soil Treatment Area Sizing Adjustments 53
13.5 Design of Distribution Systems 53
13.6 Soil Treatment Area Requirements 54
13.7 Storage/Distribution Media 55
13.8 Soil Replacement Systems 56
13.9 OWTS Repairs 57
Section 14. Design Criteria: Higher-Level Treatment Systems 59
14.1 General 59
14.2 Treatment Levels 59
14.3 Sand Filters 59
14.4 Mound Systems 63
14.5 Rock Plant Filter (Constructed Wetland) Treatment Before a Soil Treatment Area 64
Section 15. Design Criteria: Other Facilities 64
15.1 Evapotranspiration and Evapotranspiration/Absorption Systems 64
15.2 Seepage Pits 66
15.3 Wastewater Ponds 66
15.4 Vaults Other Than Vault Privies 66
15.5 Privies 67
15.6 Incinerating, Composting, and Chemical Toilets 67
15.6 Slit Trench Latrines 68
15.7 Treatment Systems Other Than Those Discharging Through a Soil Treatment Area or Sand Filter System 68
Section 16. Technology Review and Acceptance 69
Section 17. Operation and Maintenance 69
17.1 Responsibility 69
17.2 Service Label 69

17.3 Inspection, Maintenance and Cleaning 69
17.4 Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher-Level Treatment ... 70
17.5 Monitoring and Sampling 71
Section 18. Severability 71
Section 19. Materials Incorporated by Reference 72
APPENDIX A: Tables 73

Boulder County, Colorado
Onsite Wastewater Treatment System (OWTS) Regulations

Section 1. Title and Authority

A. These regulations are promulgated pursuant to the Onsite Wastewater Treatment System Act, Colorado Revised Statutes (C.R.S.) §25-10-101, et seq., hereinafter "OWTS Act."
B. These requirements shall be known as the "Boulder County Onsite Wastewater Treatment Systems Regulations."
C. These requirements have been adopted by the Boulder County Board of Health, acting as the board of health pursuant to and under authority contained in the Onsite Wastewater Treatment System Act, C.R.S. §25-10-101, et seq., and has designated Boulder County Public Health to implement these regulations on behalf of the Boulder County Board of Health.

Section 2. Scope and Purpose

2.1 Declaration

A. In order to preserve the environment; protect public health and water quality; eliminate and control causes of disease, infection, and aerosol contamination; and reduce and control pollution of the air, land, and water, it is declared to be in the public interest to establish minimum standards and regulations for onsite wastewater treatment systems (OWTS) in Boulder County and to provide the authority for the administration and enforcement of such minimum standards and regulations.
B. These regulations applies to all onsite wastewater treatment systems in Boulder County, Colorado, as defined in C.R.S. §25-10-103.

2.2 Purpose

The purpose of these regulations is to establish the minimum standards for the location, design, construction, performance, installation, alteration, and use of OWTS with a design capacity 2,000 gallons per day or less within Boulder County.

2.3 Jurisdiction

The jurisdiction of Boulder County Public Health ("BCPH") extends over all unincorporated areas and over all municipal corporations within the territorial limits of Boulder County, Colorado, but not over the territory of any municipal corporation that maintains its own public health agency.

2.4 Effluent Discharged to Surface Waters

A. Any OWTS system ("system") that will discharge into State of Colorado ("State") waters must be designed by a professional engineer.
B. A discharge permit application must be submitted for preliminary approval to Boulder County Board of Health ("Board"). Once approved by the Board, the application must be submitted to the Colorado Water Quality Control Division ("Division") for review, in accordance with the Water Quality Control Act, C.R.S. §25-8-101, et seq., and all applicable regulations of the Water Quality Control Commission ("Commission"). Compliance with such a permit will be deemed full compliance with these regulations.

2.5 Prohibition of OWTS Where Public Sewer Service is Available and Feasible

An OWTS permit will not 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 per 5 CCR-1002-43.4(B)(11).

2.6 Regulation Coverage

A. An OWTS with design capacity less than or equal to 2,000 gallons per day ("gpd") must comply this regulation and the OWTS Act. Within the jurisdiction of BCPH, the regulations promulgated by the Board 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 C.R.S. §25-8-702, and the discharge permit requirements in the Water Quality Control Act, C.R.S. §25-8-501, et seq.

2.7 Procedures to Adopt or Revise Regulations

A. The Board must submit its proposed regulations to the Division for preliminary review at least 30 days prior to a public hearing before the Board.
B. The Board must hold a public hearing on the proposed regulations before adopting final regulations.
C. The Board 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 Board 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 Board before the 45th 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 Board. For those portions of its regulations that do not comply, the Board may submit revisions to the Division. Only after the Division has determined that the Board's revised regulations comply with the OWTS Act and this regulation may the Board's revised regulations take effect and be published. Until the Division makes this determination, this regulation controls the unapproved portions of the local regulations.

Section 3. Definitions

The following definitions are used in these regulations:

1. *Absorption System:* A leaching field and adjacent soils or other system for the treatment of sewage in an onsite wastewater treatment system by means of absorption into the ground. See "soil treatment area."
2. *Accessible:* Easily reached, attained, or entered by the necessary equipment or maintenance provider.
3. *ANSI:* American National Standards Institute, which establishes national consensus standards and conformity assessment systems.
4. *Applicant:* A person who submits an application for a permit for an onsite wastewater treatment system.
5. *Basal Area:* 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.
6. *Bed:* 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.

7. *Bedrock:* 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.
8. *Bedroom:* 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.
9. *Biochemical Oxygen Demand, Five-Day (BOD 5):* 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).
10. *Biochemical Oxygen Demand, Carbonaceous Five Day" (CBOD 5):* 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).
11. *Building Sewer:* Piping that conveys wastewater to the first system component or the sewer main.
12. *Carbonaceous Biochemical Oxygen Demand:* See "biochemical oxygen demand, carbonaceous five day."
13. *CCR:* Rules and regulations of the Colorado Code of Regulations.
14. *CDPHE:* The Colorado Department of Public Health and Environment, which was created by C.R.S. §25-1-102.
15. *Cesspool:* 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.
16. *Chamber:* An open, arch-shaped structure providing an open-bottom soil interface with permeable sidewalls used for distribution of effluent in a soil absorption system.
17. *Cistern:* An underground, enclosed unpressurized reservoir or tank for storing water as part of a potable water supply system.
18. *Cleaning:* The act of removing septage or other wastes from a wastewater treatment system component or grease/waste from a grease interceptor.
19. *Colorado Plumbing Code:* Rules and Regulations of the Colorado State Plumbing Board (3 CCR 720-1).
20. *Commission:* The State of Colorado Water Quality Control Commission, which was created by C.R.S. §25-8-201.
21. *Competent Technician:* 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 8.8.
22. *Component:* A subsection of an onsite wastewater treatment system; a component may include multiple devices.
23. *Composting Toilet:* A self-contained waterless toilet designed to decompose non-water-carried human wastes through microbial action and to store the resulting matter for disposal.
24. *Consistence:* 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 USDA-NRCS* Field book for Describing and Sampling Soils; Version 3.0, Sept. 2012 (*-United States Department of Agriculture – National Resources Conservation Service).
25. *Crest:* The highest point on the side of a dry gulch or cut bank.
26. *C.R.S.:* Rules and regulations of the Colorado Revised Statutes.

27. *CSA:* Canadian Standards Association, which provides product testing and certification services for a variety of products, including electrical, mechanical, plumbing, and gas products.
28. *Cut-bank:* A nearly vertical slope caused by erosion or construction that has exposed historic soil strata.
29. *Deep Gravel System:* A soil treatment area for repairs only where the trenches utilize a depth of gravel greater than six inches below the distribution pipe and sidewall area is allowed according to a formula specified in this regulation.
30. *Deficiency:* See “malfunction.”
31. *Department:* The Colorado Department of Public Health and Environment, created by C.R.S. §25-1-102.
32. *Design:* 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.
33. *Design Capacity:* See “flow, design.”
34. *Design Flow:* See “flow, design.”
35. *Designer, Onsite Wastewater Treatment System:* A practitioner who utilizes site evaluation and investigation information to select an appropriate OWTS and prepares a design document in conformance with this regulation.
36. *Distribution:* The process of conveying wastewater or effluent to one or more components, devices, or throughout a soil treatment area.
37. *Distribution Box:* 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.
38. *Division:* The division of administration of the department of which the Colorado Water Quality Control Division is a part.
39. *Domestic Wastewater:* See “wastewater, domestic.”
40. *Domestic Wastewater Treatment Works:* 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. C.RS. §25-8-103(5).
41. *Dosing:* A high rate periodic discharge into a soil treatment area.
42. *Dosing, Demand:* Configuration in which a specific volume of effluent is delivered to a component based upon patterns of wastewater generation from the source.
43. *Dosing, Pressure:* 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.
44. *Dosing, Timed:* A configuration in which a specific volume of effluent is delivered to a component based upon a prescribed interval, regardless of facility water use.
45. *Dosing Siphon:* 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. This is accomplished by means of atmospheric pressure and the suction created by the weight of the liquid in the conveying pipe.

46. *Dosing Tank:* 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.
47. *Drainfield:* See "soil treatment area."
48. *Drop Box:* A device used for serial or sequential distribution of effluent by gravity flow to a lateral of a soil treatment area.
49. *Dry Gulch:* See "gulch, dry."
50. *Drywell:* 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.
51. *Effective Size:* The size of granular media, such that 10% by weight of the media is finer than the size specified.
52. *Effluent:* The liquid flowing out of a component or device of an onsite wastewater treatment system.
53. *Effluent Filter:* See "effluent screen."
54. *Effluent Pipe:* Non-perforated pipe that conveys effluent from one onsite wastewater treatment system component to the next.
55. *Effluent Screen:* 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.
56. *Environmental Health Specialist:* A person trained in physical, biological, or sanitary science to carry out educational and inspectional duties in the field of environmental health.
57. *Evapotranspiration/Absorption System:* An unlined onsite wastewater treatment system component that uses evaporation, transpiration, and absorption for the dispersal of effluent.
58. *Evapotranspiration System:* An onsite wastewater treatment system component with a continuous, impermeable liner that uses evapotranspiration and transpiration for the dispersal of effluent.
59. *Experimental System:* A design or type of system based upon improvements or development in the technology of sewage treatment that has not been fully tested.
60. *Failure:* A condition existing within any component of an OWTS that 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 groundwater, or which results in the backup of sewage.
61. *Field Performance Testing:* Data gathering on a system in actual use that is being proposed for Division acceptance.
62. *Flood Fringe:* The portion of the floodplain overlay district that are not in the floodway.
63. *Floodplain (100-year):* An area of land susceptible to being inundated as a result of the occurrence of a one-hundred-year flood.
64. *Floodplain Overlay District:* is defined as the FEMA Floodplain combined with the Boulder County floodplain as defined in Section 4-403(A) of the Boulder County Land Use Code.
65. *Floodway:* The portions of the Floodplain Overlay District required for the passage or conveyance of the 1% annual-chance (100-year) flood in which waters will flow at significant depths or with significant velocities, including the channel of a river or other watercourse and any adjacent floodplain areas that must be kept free of development and other encroachments in order to protect the health and safety of the residents of and visitors to Boulder County, and to discharge the 100-year flood without cumulatively increasing the water surface elevation more than a designated height (also called 'surcharge' and described in Section 4-404.2(E)(3)).

66. *Flow, Daily:* The measured volume of wastewater generated from a facility in a 24-hour period expressed as gallons per day.
67. *Flow, Design:* 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.
68. *Flow Equalization:* 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.
69. *Flow Equalizer:* An adjustment device to evenly distribute flow between outlets in a distribution box or other device that may be out of level.
70. *Grease Interceptor Tank:* A watertight device located outside a facility designed to intercept, congeal, and retain or remove fats, oils, and grease from sources (e.g. commercial food service) that will generate high levels of fats, oils, and greases.
71. *Groundwater:* That part of the subsurface water that is at or below the saturated zone.
72. *Groundwater Surface:* The uppermost limit of an unconfined aquifer at atmospheric pressure.
73. *Guidelines:* Colorado State Board of Health Guidelines on Individual Sewage Disposal Systems, 5 CCR-1003-6 – predecessor of Regulation 43, Onsite Wastewater Treatment System Regulation, 5 CCR-1002-43.
74. *Gulch, Dry:* A deep, narrow ravine marking the course of an intermittent or ephemeral stream.
75. *Health Officer:* The Executive Director of BCPH, or otherwise appointed by the EDor the board of health.
76. *Higher-level Treatment:* Designated treatment levels other than Treatment Level 1 (see Table 6-3).
77. *HOA:* Hand/off/auto switch
78. *Holding Tank:* See “vault.”
79. *Infiltrative Surface:* 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, and the other at the interface of the fill sand and in-situ soil.
80. *Inspection Port:* An access point in a system component that enables inspection, operation, and/or maintenance.
81. *Invert:* Elevation of the bottom of the inside pipe wall or fitting.
82. *Lateral:* A pipe, chamber, or other conveyance used to carry and distribute effluent.
83. *Leachfield:* See “soil treatment area.”
84. *Limiting Layer:* 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 groundwater surface.
85. *Liner:* 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.
86. *Linear Loading Rate:* The amount of effluent applied per linear foot along the contour (gpd/linear ft.).
87. *Long-term Acceptance Rate (LTAR):* 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).

88. *Malfunction:* 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.
89. *Manufactured Media:* See "media, other manufactured."
90. *Media:* Solid material that can be described by shape, dimensions, surface area, void space, and application.
91. *Media, Enhanced Manufactured:* 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.
92. *Media, Other Manufactured:* An accepted proprietary manufactured distribution product made of synthetic media for distribution of effluent that is placed directly on the in-situ soil.
93. *Media, Treatment:* Non- or slowly-degradable media used for physical, chemical, and/or biological treatment in an onsite wastewater treatment system component.
94. *Mound:* A soil treatment area whereby the infiltrative surface is at or above original grade at any point.
95. *Nitrogen Reduction:* A minimum 50% reduction of influent nitrogen strength, which is the minimum objective of NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction.
96. *NRTL:* Nationally Recognized Testing Laboratory.
97. *NSF:* National Sanitation Foundation/, which sets public health standards and certification programs to protect the world's food, water, consumer products and the environment.
98. *Onsite Wastewater Treatment System (OWTS, aka "system"):* 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.
99. *OWTS Act:* The Onsite Wastewater Treatment System Act, C.R.S. §25-10-101, et seq.
100. *Percolation Test:* 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.
101. *Performance Standard:* 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.
102. *Permeability:* The property of a material which permits movement of water through the material.
103. *Permit:* A permit for the construction or alteration, installation, and use or for the repair of an onsite wastewater treatment system.
104. *Person:* An individual, partnership, firm, corporation, association, or other legal entity and also the state, any political subdivision thereof, or other governmental entity.
105. *Pressure Distribution:* See "dosing, pressure."
106. *Privy:* 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.
107. *Privy, Pit:* Privy over an unlined excavation.
108. *Privy, Vault:* Privy over a vault.
109. *Professional Engineer:* An engineer licensed in accordance with C.R.S. §12-25-1.
110. *Professional Geologist:* A person who is a graduate of an institution of higher education that is accredited by a regional or national accrediting agency, with a minimum of 30 semester (45 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. CR.S. §23-41-208 and 34-1-201.

111. *Proprietary Product:* A manufactured component or other product that is produced by a private person. It may be protected by patent, trademark, or copyright.
112. *Public Domain Technology:* 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.
113. *Record Drawing:* 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.
114. *Redoximorphic:* 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.
115. *Remediation System:* A treatment system, chemical/biological additive, or physical process that is proposed to restore the soil treatment area of an OWTS to intended performance.
116. *Repair:* Restoration of functionality and/or treatment by reconstruction, relocation, or replacement of an onsite wastewater treatment system or any component thereof in order to allow the system to function as intended.
117. *Replacement System:* See "repair."
118. *Riser:* A watertight vertical cylinder and lid allowing access to an OWTS component for inspection, cleaning, maintenance, or sampling.
119. *Rock-Plant Filter:* 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."
120. *Sand Filter:* An engineer-designed OWTS that utilizes a layer of specified sand as filter and treatment media and incorporates pressure distribution.
121. *Sand Filter, Lined:* 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.
122. *Sand Filter, Unlined:* 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.
123. *Seepage Pit:* 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.
124. *Septage:* 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.
125. *Septic Tank:* 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.
126. *Sequential Distribution:* 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.

127. *Serial Distribution:* 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.
128. *Sewage:* 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."
129. *Sewage Treatment Works:* Same meaning as "domestic wastewater treatment works" under C.R.S. §25-8-103.
130. *Site Evaluation:* A comprehensive analysis of soil and site conditions for an OWTS.
131. *Site Evaluator:* 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.
132. *Slit Trench Latrine:* A temporary shallow trench for use as disposal of non-water-carried human waste.
133. *Soil:* 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.
134. *Soil Evaluation:* 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.
135. *Soil Horizon:* 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.
136. *Soil Morphology:* 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.
137. *Soil Profile Test Pit Excavation:* 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 OWTS.
138. *Soil Structure:* 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).
139. *Soil Texture:* Proportion by weight of sand, silt, and clay in a soil.
140. *Soil Treatment Area:* The physical location where final treatment and dispersal of effluent occurs. Soil treatment area includes drainfields, mounds, and drip fields.
141. *Soil Treatment Area, Alternating:* Final treatment and distribution component that is composed of two soil treatment areas that are independently dosed.
142. *Soil Treatment Area, Sequencing:* A soil treatment area having more than two sections that are dosed on a frequent rotating basis.
143. *State:* State of Colorado.
144. *State Waters:* Any and all surface and subsurface waters contained in or that flow in or through the state of Colorado; it does not include waters in sewage systems, waters in treatment works

of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed.

145. *Strength, Wastewater:* The concentration of constituents of wastewater or effluent; usually expressed in mg/L.
146. *Suitable Soil:* 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.
147. *System:* Onsite wastewater treatment system.
148. *Systems Cleaner:* A person engaged in and who holds himself or herself out as a specialist in the cleaning and pumping of OWTS and removal of the residues deposited in the operation thereof.
149. *Systems Contractor:* A person engaged in and who holds himself or herself out as a specialist in the installation, renovation, and repair of OWTS.
150. *Total Suspended Solids:* Measure of all suspended solids in a liquid; typically expressed in mg/L.
151. *Transfer of Title:* Change of ownership of a property.
152. *Treatment Level:* Defined concentrations of pollutants to be achieved by a component or series of components of an OWTS.
153. *Treatment Media:* See "media, treatment."
154. *Treatment Unit:* A component or series of components where solids or pollutants are removed from wastewater or effluent from a preceding component.
155. *Trench:* 1) below-grade soil treatment area consisting of a shallow excavation with a width of three feet or less containing distribution media and one lateral; and 2) excavation for placement of piping or installation of electrical wire or conduit.
156. *UL:* Underwriters Laboratories, a safety consulting and certification company.
157. *Uniformity Coefficient:* A value which is the ratio of D60 to D10, where D60 is the soil diameter of which 60% of the soil weight is finer and D10 is the corresponding value at 10% finer (a soil having a uniformity coefficient smaller than four would be considered "uniform" for purposes of this regulation).
158. *Vault:* 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 2,000 gallons per day or more at full occupancy, the vault is a domestic wastewater treatment works. Vaults are OWTS.
159. *Visual and Tactile Evaluation of Soil:* Determining the properties of soil by standardized tests of appearance and manipulation in the hand.
160. *Volume, Effective:* 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.
161. *Wastewater, Domestic:* 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 that are discharged from a dwelling, building, or other structure.
162. *Wastewater, High Strength:* 1) wastewater from a structure having BOD_5 greater than 300 mg/L; and/or total suspended solids (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.

163. *Wastewater Pond:* A designed pond that receives exclusively domestic wastewater from a septic tank, and which provides an additional degree of treatment.
164. *Water Quality Control Commission:* See "Commission."
165. *Water Quality Control Division:* See "Division."
166. *Wetland, Constructed:* See "rock-plant filter."
167. *Wetlands:* 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.

(Also see Table 3-1, Acronyms, in the appendix)

Section 4. New, Repair, and Product Development Permits and Inspections

4.1 Permit Required, Application Requirements and Procedures

A. Before installing, altering, or repairing an onsite wastewater treatment system (OWTS) in Boulder County, Colorado, the property owner/occupants ("applicant") must obtain a permit from BCPH.
B. The applicant must submit a complete application to BCPH that is consistent with Section 4.1.C of these regulations before installing, altering, or repairing the OWTS.
C. Minimum OWTS permit application requirements include provision of the following:
    1. Owner name and contact information.
    2. Property address.
    3. Property legal description.
    4. Type of permit.
    5. Report from site and soil evaluation (see Section 5).
    6. System design with a legible and accurate site plan showing pertinent physical features on the subject property and adjacent properties, as noted in Table 7-1.
    7. Any other information, data, plans, specifications, and tests required by BCPH, such as:
        a) Additional hydrological, geological, engineering, or other information provided by a professional engineer or geologist, which may be required if specific evidence suggests undesirable soil conditions exist. Note: This requirement will not prejudice the right of BCPH to develop its own information from its own source at its own expense.
        b) A completed current BCPH permit application to install, construct, alter, or repair an OWTS.

4.2 Fees

A. Permit Fees:
    1. The Board may set permit fees, which shall be no greater than is required to offset the actual indirect and direct costs of BCPH (C.R.S. §25-10-107).
    2. Permit application fees shall not exceed maximum fees established in C.R.S. §25-10-107. Applicants must submit the applicable OWTS permit application fees with their completed OWTS permit applications, as permit fees are due and payable upon submission of the OWTS permit applications.
    3. The Board has the authority to make provisions for waiving local permit fees normally required for an OWTS.
B. **Other Fees:** The Board may require additional fees for inspections, percolation tests, soil evaluation, and other services performed by BCPH; however, the fees shall be no greater than is required to offset actual indirect and direct costs of the services provided by BCPH and must not exceed maximum amounts that have been specified in C.R.S. §25-10-107.

C. **Surcharge:** BCPH will collect a surcharge fee of $23 for all permits issued for a new, repaired, or upgraded OWTS. BCPH will retain $3 of the fee to help cover BCPH's administrative costs, and the remaining $20 must be transmitted to the Colorado Department of Public Health and Environment for use in funding the State's OWTS Program.

4.3 Permit Terms and Changes in Condition after Issuance

A. OWTS construction permits expire one year after date of issuance if construction has not yet commenced.
B. OWTS renewals may be requested in writing prior to expiration of OWTS construction permits. Extensions can be granted for up to a total of 36 months for extenuating circumstances, including but not limited to site conditions preventing construction or new construction of dwelling or structures.
C. Regulation revisions made before renewal requests are submitted may also be applicable to the renewal and may require submission of a revised OWTS design.
D. Renewal fees may be applicable.
E. The requirements in this section are applicable to:
    1. Construction permits issued after May 24, 2018.
    2. Existing construction permits issued before May 24, 2018, that have not received final approval have until May 24, 2019, to receive final approval of the OWTS. After May 24, 2019, renewal and reissuance requirements described in 4.3.B and 4.3.C will be required.
F. Any changes to OWTS plans or specifications after a permit is issued will invalidate the permit unless the permittee receives written approval from BCPH of the changes.

4.4 Repair Permits for Noncompliant OWTS

A. The owner or occupant ("applicant") of a property that has a non-compliant OWTS must obtain a repair permit from BCPH. If they received a notice from BCPH that their OWTS is not functioning in compliance with the OWTS Act or other applicable regulations or their OWTS constitutes a nuisance or hazard to public health or water quality, the applicant must apply for a repair permit within two (2) business days after receiving such notice from BCPH.
B. The repair permit must provide a reasonable amount of time for the applicant to make the necessary repairs. At the end of that period, BCPH must inspect the OWTS to ensure it is functioning properly. Concurrently with the issuance of a repair permit, BCPH may issue an emergency use permit to authorize continued use of the malfunctioning system on an emergency basis; however, the emergency use permit may not exceed the period stated in the repair permit. Emergency use permits may be extended, for good cause shown, if the repairs can't be completed by the date noted on the repair permit through no fault of the owner or occupant and only if the owner or occupant continues making repairs to the OWTS.
C. A repair permit must also be required for the expanded use of an OWTS or replacement of existing components, including the septic tank, distribution components, soil treatment area, and other components, as determined by BCPH. 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.

4.5 Denial of Permits and Appealing Denial

A. If BCPH denies an OWS permit, BCPH must send written notice to the applicant that details why the permit was denied and include requirements for reconsideration of the application.
B. Any applicant denied an OWTS permit may appeal to the health officer in accordance with the following:
    1. The appeal must be filed in writing with BCPH within 30 days after the denial was mailed.

2. If the health officer determines that BCPH erred in its decision to deny the permit, the health officer shall approve the permit.
3. Upon finding that strict enforcement of these regulations would cause undue hardship to the applicant and upon further finding that non-compliance with the regulations would not be injurious to public health or the environment or be less restrictive than State Guidelines, the health officer may authorize issuance of a permit despite non-compliance.
    a) In such a case the burden of proof is upon the applicant to show that the system will not injure adjacent properties, will not conflict with the purposes of these regulations, and will not adversely affect anyone's health or the environment.
4. The denial will become final upon expiration of the 30-day appeal timeframe or when final action is rendered, whichever occurs first.

C. In the event the health officer denies the appeal request, the applicant may request the Board to reconsider the health officer's denial. Such request for reconsideration must be submitted within 30 days after the decision of the health officer's denial.
D. The issuance of a permit and specifications of terms and conditions therein will not constitute assumption of liability, nor will it create a presumption that BCPH 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.

4.6 Determination

BCPH must determine if 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 the regulations adopted pursuant thereto. If the submittal is determined to be in compliance, authorization to begin installation may be given by BCPH.

4.7 Authorization to Enter Upon Property

For the purpose of inspecting and enforcing applicable regulations and the terms and conditions of all OWTS permits issued in Boulder County, and to appropriately investigate and respond to OWTS complaints, BCPH shall be authorized to enter upon private property at reasonable times and upon reasonable notice to the property owner or occupant. The property owners and occupants must allow BCPH officials to gain access to the property in order to conduct inspections, conduct required tests, collect samples, and monitor compliance to determine if the system is functioning in compliance with the OWTS Act and applicable regulations and permit requirements.

4.8 Inspection Stages

A. **Site inspections:** BCPH will conduct site inspections for all OWTS permit applications to verify soil observations, determine presence of a limiting layer, identify physical features requiring setbacks, and assess other site-specific details required to evaluate proposed OWTS design documents.
B. **Open-hole inspections:** When required, BCPH will inspect the open hole for the soil treatment area to determine if there are any limiting conditions and to document the dimensions of the soil treatment area.
C. **Final inspections:** Before a system is placed in use, the owner, the owner's agent, or the systems contractor must provide BCPH and the engineer, if the OWTS is engineer-designed, with notice that the progress of the work has been sufficiently completed. BCPH will conduct an inspection to ensure that the work was performed satisfactorily in compliance with the OWTS Act and applicable OWTS regulations and permit requirements.
    1. **Standard systems:**

a) The system contractor or property owner must notify BCPH once construction of the OWTS is completed and before replacing soil over the system.
b) Once notified, BCPH will conduct a final inspection of the system as soon as it is practicable.
c) Upon final inspection, if BCPH finds that the OWTS was properly installed in accordance with applicable regulations and permit requirements, BCPH will issue final approval for the completed OWTS. The BCPH inspector will leave written notice at the site informing the property owner or systems contractor that the installation was approved.
d) Such notice of approval shall be considered permission for the property owner or systems contractor to replace the soil or fill over the inspected system components.
e) Final approval of the OWTS will be withheld until all components of the system, including building sewer and house connections, have been inspected.

2. **Registered professional engineer (RPE)-designed systems:**
    a) During construction of an OWTS designed by an RPE, the systems contractor or property owner must notify BCPH and the design engineer regarding all inspections specified in the permit and in the design.
    b) Once construction of an OWTS requiring engineer design has been completed and before replacing soil over the system, the systems contractor or owner must notify both BCPH and the design engineer.
    c) Once notified, BCPH will conduct a final inspection of the system as soon as it is practicable.
    d) Upon final inspection, if BCPH finds that the OWTS was properly installed in accordance with applicable regulations and permit requirements, BCPH will issue final approval of the completed OWTS. The BCPH inspector will leave written notice at the site to inform the property owner or systems contractor that the installation was approved.
    e) Permission to replace the soil or fill over the inspected system components will not be granted until BCPH and the design engineer have both examined and declared the installation to be satisfactory.
    f) Final approval for the system will be withheld until all components of the system, including building sewer and house connection, have been inspected and the design engineer or engineering firm provides written notice to BCPH that they've inspected and determined that the OWTS was installed in accordance with the approved design.
        1) Such written notice must include:
            i. Date of inspection(s).
            ii. Details of observations during inspection.
            iii. Specifics verifying installed components and materials.
            iv. Verification of the suitability of final cover soil when using manufactured media.

3. **Failure to pass final inspection:** If the final inspection by BCPH discloses significant departure from the description or design of the system outlined in the OWTS application or permit, or if any aspect of the system fails to comply with any applicable requirements, BCPH will withhold approval and:
    a) Leave written notice of the denial at the site that details the deficiencies responsible for the failed inspection.

b) An additional inspection must be scheduled with BCPH after the deficiencies have been corrected and the system is brought into compliance with all applicable OWTS requirements.

4.9 Permit Final Approval Requirements

A. Final approval by BCPH of the OWTS permit must include, but is not limited to, the following:
    1. If the OWTS was designed by an engineer, a copy of a letter from the engineer certifying that the OWTS was constructed per the approved design.
    2. Receipt of record drawing, including but not limited to the following:
        a) A scale drawing showing all components of the OWTS, including its location from known and findable points.
        b) Dimensions and size.
        c) Depths.
        d) Tank size(s) and manufacturers' names and models.
        e) Setbacks.
        f) Other information relative to locating and maintaining the OWTS components.
    3. A final inspection by BCPH prior to backfilling the OWTS that confirms the OWTS was installed according to permit requirements and applicable regulations and regulation variances.
    4. Identification of the system contractor.

4.10 Division Authority to Administer and Enforce

Wherever the terms "Board" or "BCPH" are used in these regulations, the terms also infer the "Division" under its designated authority for the purposes of administering and enforcing the provisions of these regulations where necessary to protect the public health and environment.

4.11 Primary Enforcement Responsibility

A. The primary responsibility for enforcing the provisions of the OWTS Act and applicable OWTS regulations lies with the Board.
B. In the event the Board fails to administer and enforce the provisions of the these regulations and the OWTS Act, the Division may assume such functions of BCPH or the Board, as may be necessary to protect the public health, per C.R.S. §25-10-110.

4.12 Product Development Permit

A. For products that have not received Division acceptance under 5 CCR-1002-43.13.D, the manufacturer may apply to BCPH for a product development permit. Requirements for proprietary treatment product acceptance are located in said Section 5 CCR-1002-43.13.D.
B. For products or types of systems which have not been otherwise accepted by the Division pursuant to 5 CCR-1002-43.13.D, BCPH 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 engineer's 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 installed system.
    1. Before BCPH can issue a product development permit, the Division must determine that the product to be tested qualifies for testing under the product development evaluation that is based on information submitted to the Division.
        a) The 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.

2. BCPH will not arbitrarily deny any person the right to consideration of an application for such a system and will apply reasonable performance standards in determining whether to approve such an application, per C.R.S. §25-10-108 (2).
3. A completed application for a product development permit must be submitted to BCPH at least 30 days in advance of installation of the product.
4. Applications for product development permits 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 BCPH and Division for inspection of the site.
    d) Design documents, as required in 5 CCR-1002-43.5.G.
5. Other than the performance standards identified in 5 CCR-1002-43.4.I(3), BCPH may stipulate additional requirements for the product development permit, as necessary to ensure that the system performs as intended.
6. A product development permit is a site-specific permit. Product development testing at multiple sites will require a product development permit for each site.
7. During the term of the product development permit, all data collected must be submitted to the Division and BCPH.
8. BCPH 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) The developer of the product fails to comply with any requirements stipulated on the permit by BCPH or the Division.
9. If the product development permit is revoked, the product developer must install a replacement OWTS within the timeframe established by BCPH.
10. Once the system is installed and approved, BCPH must supply the Division with a copy of the completed permit.

4.13 Prohibition of OWTS in Unsuitable Areas

A. The Boulder County Board of Health ("Board") may conduct a public hearing – after providing public notice posting on the BCPH website and Boulder County official public notice board at least 20 days prior to the hearing – to consider the prohibition of OWTS permits in defined areas that contain or are subdivided for a density of more than one dwelling unit per acre.
B. The Board may order such prohibition upon a finding that the construction and use of additional OWTS within the defined area will constitute a hazard to the public health or the environment.
C. For such public hearing, the Board may also request affected property owners to submit engineering and geological reports concerning the defined area and provide a study of the economic feasibility of constructing a community sewage treatment system.

4.14 Variance Procedures

A. **General variance requirements:**
   1. The Board is required to hear all OWTS variance cases in a public hearing, and approval of the variances requires a majority vote of the Board.
   2. The Board may set fees for processing OWTS permits with variances in accordance with C.R.S. §25-10-107. Such permit fees may be the standard OWTS permit fee or they may be a separate fee based upon the cost of processing an OWTS permit with a variance.

B. **Variance procedures:**
   1. Before rendering a decision on a variance request, a public hearing with the Board is required. The hearing must include the posting of a public notice on the BCPH website and Boulder County official public notice board at least 20 days prior to date of the public hearing.
   2. Variance requests must be accompanied by:
      a) Site-specific request identifying the specific criteria for which the variance is being requested.
      b) Technical justification from a professional engineer or professional geologist indicating what specific conditions exist and/or measures that will be taken to support the finding that the requested variance won't result in greater risk than what is associated with compliance with regulation requirements.
         1) Examples of such conditions or measures include, but are not limited to, the following:
            i. Evidence of a natural or manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested;
            ii. Placement of a manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; and
            iii. 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.
      c) A discussion of alternatives considered in lieu of the requested variance.
      d) Technical documentation for selected alternative that may include a testing program confirming that the variance does not increase the risk to public health and the environment.
      e) A statement of the hardship creating the necessity for the variance.
   3. The applicant will have the burden of proof to demonstrate that the variance is justified and will pose no greater risk to public health and the environment than a system would that meets the regulations.

C. **Site-specific variance requirements:** The Board has the authority to impose site-specific requirements and conditions on any variance granted.

D. **Variance proceeding outcomes:**
   1. The applicant must be notified, in writing, of the Board's decision regarding the request for a variance.
   2. Any notice of denial of a variance must include the reasons that formed the basis for the denial.
   3. Any notice of approval of a variance must include the conditions of the variance approval.

4. The variance, and any conditions thereof, must be recorded on the deed to the property, and any expenses associated with such recording will be the responsibility of the party obtaining the variance.

E. **Unaccepted variance requests:** No variance will be granted under the following circumstances:
   1. When the property can accommodate a conforming OWTS.
   2. To mitigate an error in construction involving any element of property improvements.
   3. If solely for economic gain.
   4. 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 considering and concerns of the owner of property containing said feature; property lines are considered offsite features. The property owner containing said features must be notified of the time and date of the public hearing.
   5. If it reduces the separation to groundwater or bedrock based on the level of treatment in Table 7-2.
   6. From the horizontal setback from a well unless it also meets the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors.

F. **Variance for repair of failing OWTS**:
   1. When a proposed variance for an OWTS repair or upgrade would result in encroachment on minimum distances to physical features on neighboring properties required by the Division, the public hearing procedures outlined in Section 4.14 must be followed.
   2. For the repair of or upgrade to an existing OWTS where the existing system does not meet the required separation distances, and where the 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.

G. **Variance decision appeals:**
   1. Any request to appeal the Board's decision to deny a variance request must be made within 60 days following denial by the Board of an OWTS variance application.
   2. The appeal applicant shall bear the burden of supplying the Board with sufficient evidence documenting that the denied system would:
      a) Be constructed and used in a manner that would result in no greater risk than that associated with compliance with the requirements of all applicable OWTS regulations and requirements.
      b) Comply with the declaration and intent of these regulations.
      c) Comply with all applicable state and local regulations and required OWTS permit terms and conditions.

4.15 General Prohibitions, per C.R.S. §25-10-112

A. No city, county, or "city and county" shall issue to any person:
   1. A permit to construct or remodel a building or structure that is not serviced by a sewage treatment works until BCPH has issued a permit for an OWTS.
   2. An occupancy permit for the use of a building that is not serviced by a sewage treatment works until BCPH makes a final inspection of the OWTS, provided for in C.R.S. §25-10-106(1)(h), and BCPH approves the installation.

B. The construction of new or 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 13.9 of these regulations must be followed.

C. More than one dwelling, commercial, business, institutional, or industrial unit cannot be connected to the same OWTS unless the multiple connection was specified in the application submitted to BCPH and is included in the permit issued by BCPH for the system.
D. No dwelling or other occupied structure can be constructed or maintained that is not equipped with adequate facilities for the sanitary disposal of sewage.
E. The disposal of septage removed from systems in the process of maintenance or cleaning must be done so at an approved site and in an approved manner.

4.16 Cease-and-Desist Orders

A. The health officer may issue an order to cease and desist from the use of any OWTS or sewage treatment works if it is found by the health officer that the OWTS is not functioning in compliance with the OWTS Act or applicable OWTS regulations or permit requirements; is found to constitute a hazard to public health or the environment; or the OWTS has not otherwise received timely repairs under the provisions of C.R.S. §25-10-106(1)(j).
B. Such cease-and-desist order may be issued only after an administrative hearing is conducted by the health officer. The hearing must be held not less than 48 hours after written notice is given to the owner or occupant of the property where the OWTS is located.
C. The order must require that the property owner or occupant must bring the OWTS into compliance or eliminate the health hazard within thirty days, or thereafter cease and desist from using the system.
D. Any cease-and-desist order issued by the health officer must 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.

4.17 Penalties, per C.R.S. §25-10-113

A. Any person who commits any of the following acts or violates any of the provisions of this section has committed a Class 1 petty offense, as defined in C.R.S. §18-1.3-503:
    1. Constructs, alters, installs, or permits the use of any OWTS without first having applied for and received a permit as provided for in C.R.S. §25-10-106.
    2. 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.
    3. Violates the terms of a cease-and-desist order that has become final under the terms of C.R.S. §25-10-106(1)(k).
    4. Conducts a business as a systems contractor without having obtained the license provided for in C.R.S. §25-10-109(1), in areas which the Board has adopted licensing regulations pursuant to that section.
    5. Conducts a business as a systems cleaner without having obtained the license provided for in C.R.S. §25-10-109(2), in areas which the Board has adopted licensing regulations pursuant to that section.
    6. Falsifies or maintains improper records concerning system cleaning activities not performed or performed improperly.
    7. Willfully fails to submit proof of proper maintenance and cleaning of a system, as required by regulations adopted by the Board.
B. Upon a finding by the Board that a person is in violation of this regulation, the Board may assess a penalty of up to $50 for each day of violation. In determining the amount of the penalty to be assessed, the Board shall consider the seriousness of the danger to the health of the public that is caused by the violation, the duration of the violation, and whether the person has previously been determined to have committed a similar violation.

C. A person who is subject to a penalty assessed pursuant to Section 4.17 may appeal the penalty to the Board by requesting a hearing before the appropriate body. The request must be filed within 30 days after the penalty assessment is issued. The Board will conduct a hearing upon the request in accordance with C.R.S. §24-4-105.

Section 5. Regulation of Systems Contractors, Systems Cleaners, and Systems Inspectors

5.1 Systems Contractors

A. No person may engage in business as a systems contractor without possessing a valid Boulder County systems contractor license:
    1. The initial fee for a systems contractor license is payable to BCPH and must be submitted at the time the systems contractor license application is submitted to BCPH.
    2. The licenses will expire on December 31 each year, at which time the annual renewal fee shall be due.
    3. A license that lapses because of failure to renew or because it is revoked will be subject to the fees established for new licenses upon reapplication.
    4. Employees of licensed systems contractors will not be required to be individually licensed.

B. The application for a systems contractor license or renewal must be made using forms supplied by BCPH. Prior to the issuance or renewal of such license, BCPH may require the applicant to demonstrate adequate knowledge of these regulations and experience installing OWTS.
    1. Systems contractors must provide proof of adequate training and certification equivalent to the National Environmental Health Association (NEHA) Certified Installers of Onsite Wastewater Treatment Systems (CIOWTS).
    2. A total of six hours of ongoing refresher training and continuing education will be required for the renewal of licenses. Beginning January 1, 2020, two of such training hours must be from a Boulder County OWTS class.
    3. Beginning January 1, 2020, systems contractors (“installers”) will be required to pass an exam every other year to renew their license, as well as each time a contractor is required to obtain a new license.
    4. In accepting a license, a systems contractor must agree that all work performed in the construction, installation, alteration, or repair of OWTS will be done in compliance with the OWTS Act and all applicable regulations and permit requirements.

5.2 Systems Cleaners

A. No person may engage in business as a systems cleaner without possessing a valid Boulder County systems cleaner license.
    1. Systems cleaners must provide proof of adequate training and certification equivalent to the National Association of Wastewater Technicians (NAWT) Operations and Maintenance (O&M) training.
    2. Effective January 1, 2019, a total of six hours of ongoing refresher training and continuing education will be required for the renewal of licenses. Beginning January 1, 2020, two of such training hours must be from a Boulder County OWTS class.
    3. The initial fee for a systems cleaner license is payable to BCPH and must be submitted at the time the systems cleaner license application is submitted to BCPH.
    4. The licenses will expire on December 31 each year, at which time the annual renewal fee shall be due.
    5. A license that lapses because of failure to renew or because it is revoked will be subject to the fees established for new licenses upon reapplication.

6. Employees of a validly licensed systems cleaner business will not be required to be individually licensed.

B. All systems cleaners will be required to dispose of septic tank waste at a site approved by BCPH for accepting or treating such wastes and in a manner that is not injurious to the public health or the environment.
    1. Systems cleaners must maintain their pumping and disposal records for a period of one year and produce records at the request of BCPH.
C. All systems cleaners will be required to maintain their vehicles such that leakage and spillage does not occur. Discharge valves must be drip-tight.
D. Systems cleaners' trucks must bear the business name and address with two-inch or larger letters in a color that contrasts with the truck color.
E. In the event of a spill, septage must be immediately cleaned up to the satisfaction of BCPH.

5.3 Systems Inspectors

A. Effective January 1, 2019, no person may engage in business as a systems inspector without possessing a valid Boulder County systems inspector license.
B. Systems inspectors must provide proof of adequate training and certification equivalent to the National Association of Wastewater Technicians (NAWT) OWTS Inspector Course or equivalent program approved by BCPH.
C. The initial fee for a systems inspector license is payable to BCPH and must be submitted at the time the systems inspector license application is submitted to BCPH.
D. The licenses will expire on December 31 each year, at which time the annual renewal fee shall be due.
E. A license that lapses because of failure to renew or is revoked will be subject to the fees established for new licenses upon reapplication.

5.4 Revocation of Licenses

A. Licenses for systems contractors, systems cleaners, and systems inspectors may be revoked for failure to comply with these regulations:
B. Written notice of the proposed license revocation that details the regulation violations will be sent by BCPH to the licensee by certified mail, return receipt requested.
C. Revocation may take place only after a hearing before the Board is conducted. The licensee shall be given not less than 20 days' notice of the public hearing and may be represented at the hearing by counsel.

Section 6. Permits for Continued Use of an OWTS (i.e. Use Permits).

6.1 Use Permit Requirements

A. The owner of a property served by an OWTS must obtain a use permit, or renewal of a use permit, as applicable upon the occurrence of one or more of the following events:
    1. Upon final approval of an OWTS construction permit.
    2. A remodel that includes an additional source of wastewater.
    3. Reconnecting a structure to a previously permitted and installed OWTS.
    4. A change in use of the property from residential to commercial.
    5. Change in commercial operation or tenant.
    6. Connection of a modular unit or mobile home to the system.
    7. Other conditions that BCPH may deem appropriate.

6.2 Use Permit Issuance

A. For OWTS installed on or after May 24, 2018, BCPH will issue a use permit upon final approval that authorizes use of the OWTS.
B. For OWTS issued a use permit and completed before May 24, 2018, final approval of the completed OWTS will constitute issuance of a use permit for purposes of these regulations.
C. As of May 24, 2018, OWTS that never completed the BCPH permitting or approval process will be deemed operating without a valid use permit.
D. The use permit sets forth the following approval terms and conditions:
    1. Statement of the size, type, and capacity of the OWTS and a record drawing.
    2. Documentation of repair or remediation of past failures.
    3. System meets BCPH permitting requirements.
    4. Other information as deemed appropriate by BCPH.
E. Use permits will remain valid until OWTS failure, malfunction, or renewal is required, per these regulations.
F. Use permits must be renewed as outlined in current use permit requirements.

6.3 Use Permit Application Requirements

A. The applicant must submit the following items to BCPH when applying for or renewing an OWTS use permit:
    1. Completed application on forms provided by BCPH that include:
        a) Owner's name and contact information.
        b) Physical address of property.
        c) Legal description of property.
        d) Full name, company name, and contact information of OWTS inspector.
        e) Date and time of the inspection(s).
        f) Septic tank inspection report completed within the previous 12 months, which must include a septic tank pumping receipt, when applicable, based on the inspection report.
        g) Inspection report completed within the previous 12 months for any mechanical components (e.g. pumps, alarms, or higher-level treatment systems).
        h) Engineer evaluation of wastewater design flow for changed commercial operation, when applicable.
    2. Completed inspection report(s) on BCPH forms from an approved systems inspector, as defined in Section 5.3.
    3. Current, non-refundable use permit fee or use permit renewal fee, as established by the Board. The fee shall be payable to BCPH and is due at the time of application.

6.4 Minimum Criteria for Use Permit Renewals

A. For OWTS systems (new or repair) originally permitted and approved by BCPH where the applicant must obtain a use permit renewal, an OWTS inspection is required. The inspection must verify that the OWTS system meets, at a minimum, the following criteria and conditions:
    1. Submittal of an inspection report on approved BCPH forms.
    2. Verification that the OWTS was originally permitted and approved by BCPH and the property continues to conform to the conditions in the previous use permit or construction permit.
    3. Verification that all deficiencies identified in the inspection, as outlined in the inspection report, have been corrected in accordance with these regulations.
B. If it is determined that the OWTS meets the foregoing criteria, BCPH will issue a use permit renewal, which sets forth the approval terms and conditions.

6.5 Use Permit Revocation

A. A use permit may be revoked under the following circumstances:
    1. Failure to comply with the terms of the use permit.
    2. Failure to obtain a property transfer certificate, as outlined in Section 7.

6.6 Use Permit Penalties

A. Failure to obtain a use permit for a covered transaction, as outlined in these regulations, will subject the property owner who failed to obtain the required document to a penalty.
B. BCPH will issue a notice of violation (NOV) to the property owner that provides the owner 30 days to comply with the NOV. If a use permit has not been acquired after the 30 days have expired, a hearing will be convened per Section 4.16. The owner can be assessed a penalty of up to $50/day of violation. Assessment of the penalties will cease once the owner obtains a use permit, as required in these regulations.

6.7 Malfunctioning Systems

OWTS found to be malfunctioning during inspection by the use permit inspector must be repaired in accordance with the terms of these regulations.

Section 7. Property Transfer Inspections

7.1 Applicability

A. Prior to the sale or transfer of a property served by an OWTS, the new property owners must obtain, or have in their possession, a property transfer of title certificate (i.e. property transfer certificate) for the OWTS unless they have been exempted or waived per Section 7.4.
B. The purpose of a property transfer inspection is to verify the adequacy of the existing OWTS at the time of property transfer (i.e. sale of property), that the OWTS was previously approved and permitted or to assure that an unapproved OWTS will be permitted and approved in compliance with these regulations, and to demonstrate that the system is functioning according to design and approved permit.

7.2 Additional Requirements for Commercial Systems

A. The owners of commercial systems must complete a title transfer inspection for all OWTS on the property and submit engineer evaluation that the approved OWTS capacity is able to support the wastewater flow for continued operation or change in use. The engineer evaluation must include:
    1. Calculated design flow of proposed business use.
    2. Determination that the system is adequately sized for the calculated design flow using previous soils evaluation data from the approved permit.
    3. A signed affidavit if the business operation is to remain the same (i.e. existing tenant will continue to operate and has a current permit approved for that use).
    4. Statement that all U.S. Environmental Protection Agency (EPA) Class V injection well requirements have been met.
    5. Overview of the business operation, including but not limited to:
        a) Number of employees.
        b) Business type.
        c) Anticipated number of non-employee visits, if applicable.
        d) Biochemical oxygen demand (BOD), where applicable.
B. Undocumented commercial OWTS are subject to the same title transfer requirements as all other undocumented systems.

7.3 Property Transfer Requirements

A. When a property with an approved OWTS is transferred (e.g. sold) , the OWTS must pass a new property transfer inspection to confirm that the OWTS is continuing to operate appropriately. If the OWTS does not pass the inspection, the property owner must obtain an OWTS repair permit and correct the deficiencies, or the new property owners must submit a notarized agreement, using the current BCPH form, to acknowledge that they have accepted responsibility for repairing the identified deficiencies.

B. BCPH will issue a property transfer certificate when the property owner submits a property transfer inspection report with required documents that verify the OWTS is functioning in compliance with applicable OWTS regulations and permit requirements and according to design.

C. All properties must have an existing approved OWTS permit from BCPH; therefore, property owners without a current permitted and approved OWTS must apply for an OWTS repair permit or obtain a conditional property transfer certificate.

D. Property owners that have an OWTS permit but haven't received final approval from BCPH must contact BCPH to determine the necessary steps for obtaining OWTS approval.

7.4 Exemptions from Property Transfer Requirements

A. A property transfer certificate will not be required under the following circumstances:

1. The entire OWTS serving the dwelling or structure was installed and given final BCPH approval less than five years before the property sale closing date. An inspection will be required if any part of the OWTS is more than five years old (building sewer line is excluded).
2. The change in property ownership is solely to include or exclude a spouse.
3. The property transfer is creating or ending a joint ownership if at least one person is an original owner of the property and/or the spouse of an original property owner.
4. The property transfer contains a building or buildings connected to an OWTS that will be demolished (or already has been), and the building/buildings will not be occupied after the property transfer occurs.
5. The property transfer is being made to a trust that's in the same name as the property owner.
6. The property transfer is to effect the foreclosure or forfeiture of real property.
7. The property owner or person acquiring the title has signed an enforceable agreement with BCPH to repair the OWTS.
8. The property owner will connect the dwelling or occupied building to a sanitary sewer or shared wastewater treatment system within two years following transfer of title, provided that such agreement has been disclosed to and is binding on the subsequent owner(s).
9. The property owner is part of a community plan or management district for which their OWTS has received written approval from BCPH, and the OWTS's been inspected, per plan requirements.

B. If the OWTS is not functioning according to design, the system must be repaired so it is functioning appropriately. Photo documentation of all malfunctions and failures must be submitted to BCPH with the applicable inspection report.

7.5 Property Transfer Certificate Application Requirements

A. Applications for property transfer certificates must be submitted following the application requirements and BCPH property transfer inspection report form, which include:

1. Name, address, and phone number of current owner.
2. Property street address.
3. Property legal description.
4. Property size in acres, rounded to the nearest tenth (1/10) acre.

5. All water supply types, including irrigation wells, and their location on the property.
6. Type(s) of all existing buildings or structures; if commercial, list all uses or tenants.
7. Inspection date and time.
8. Number of bedrooms in the dwelling(s).
9. Statement from current property owner regarding the present OWTS operational status.
10. Non-refundable property transfer certificate fee, as established by BCPH.
11. Septic tank pumping receipt from a cleaner licensed by BCPH.
12. Where required, copy of current maintenance contract if the OWTS contains any mechanical components, such as an aeration or secondary treatment system, and an inspection report from the service provider.
13. Inspection report on current BCPH form; must be from an inspector licensed by BCPH, as outlined in Section 5.3. The inspection cannot be older than 12 months before the date on the property transfer certificate application and must contain the following:
    a) Drawing that shows the location of the dwelling or structure with two-point triangulated distance measurements to the septic tank lid(s) or global positioning system (GPS) coordinates.
    b) OWTS inspection report that states whether each component is in good repair and proper working order, and that the inspection conducted meets all BCPH requirements, as outlined in guidance provided by BCPH.
    c) Any other information required by BCPH.
    d) Statement of length of the vacancy if the property is unoccupied.
    e) Inspector's NAWT or other applicable certification number, full name, company name, and contact information.

B. All reports must be submitted using a current BCPH OWTS property transfer inspection report form.
C. Any components found to be in a state of malfunction must be noted and disclosed in the inspection report.

7.6 Inspection Minimum Criteria

A. The existing OWTS must meet the following criteria and conditions, at a minimum:
    1. A primary (and secondary, where applicable) tank must be structurally sound, watertight, and in good working order and provided with safe and secure lids. Metal tanks will not be approved.
    2. The number of bedrooms in the house must be the same as listed on the permit.
    3. All internal devices and components (e.g. tees, effluent screens, and baffles) that were originally provided with the tank or added later must be intact and in good working order.
    4. Alarms, control devices, and components necessary for the operation of the OWTS must be present and in good working order.
    5. A soil treatment area or other means of subsurface wastewater treatment must be present and not in a state of failure.
    6. If the system utilizes mechanical components, operating permits and service contracts must be current.
    7. There cannot be any unapproved wastewater discharges from the OWTS, dwelling, or structure.
    8. The OWTS has not been significantly altered from its original design and configuration, as documented by BCPH.
    9. Any items meeting the conditions of a "failure," as defined in these regulations, have been corrected to the acceptance of BCPH.

7.7 Issuance and Term of Property Transfer Certificates

A. Once the above criteria have been met, BCPH will issue a property transfer certificate using terminology adopted by BCPH, that sets forth the terms and conditions of OWTS approval, including the following, as appropriate:
    1. Statement of the size, type, and capacity of the OWTS and a record drawing from the inspection report.
    2. Evidence of past system failures, as documented in BCPH records.
    3. Circumstances or factors that may have affected the ability of the inspector to evaluate the OWTS.
    4. Whether the system meets BCPH's permitting requirements.
    5. The existence of any OWTS permits in BCPH files.
    6. Any other information deemed appropriate by BCPH.
    7. A copy of the inspection report must be included with the certificate.

B. The property transfer certificate will remain valid until the date of real estate closing, or for a period of 12 months, whichever occurs first.

7.8 Issuance of Conditional Property Transfer Certificates

A. If BCPH determines that an OWTS does not meet the requirements for the issuance of a property transfer certificate, a conditional property transfer certificate may be issued, provided that the purchaser of the property agrees to obtain an OWTS permit and complete all necessary repairs to the system within one year of occupancy of the structure. The property buyer must use the current BCPH form, sign the agreement, and have it notarized.

B. If conditions are such that they limit the property owner's ability to complete the necessary repairs within one year, BCPH may extend the OWTS repair agreement on a case-by-case basis if good cause is shown.

7.9 Revocation of Property Transfer Certificates

A property transfer certificate will be revoked if BCPH determines that the OWTS is no longer functioning in accordance with applicable OWTS regulations permit requirements, or if false or misleading statements were made on any OWTS applications or inspection reports.

7.10 Penalties

A. If a property owner fails to obtain a property transfer certificate, as required in this section, BCPH will issue a notice of violation (NOV) to the property owner of record that provides the owner 30 days to comply with the NOV. If a property transfer certificate has not been acquired after the 30 days have expired, a hearing will be convened per Section 4.16.

B. The owner can be assessed a penalty of up to $50/day of violation.

C. Assessment of the penalties will cease once the owner obtains a property transfer certificate, as required in these regulations.

Section 8. Site and Soil Evaluation

8.1 Requirements for Site and Soil Evaluation

A. A site and soil evaluation must be conducted for each property for which an OWTS is being proposed in order to determine the suitability of a location to support the OWTS and to provide the designer with sound basis for selecting the most appropriate OWTS design for that particular location and OWTS application.

B. Each site evaluation must contain:
    1. Preliminary investigation.

2. Reconnaissance.
3. Detailed soil investigation, including a soil log.
4. Report and site plan.

8.2 Preliminary investigation

A. Research of information relative to the site and anticipated conditions will be conducted. The information that will be gathered as part of the preliminary investigation will include, but is not limited to:
    1. Property information:
        a) Address.
        b) Legal description.
        c) Existing structures.
        d) Location of existing or proposed wells on the property.
    2. Local public health agency records.
    3. Published site information:
        a) Topography.
        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 the existing or planned facility and local regulations.
    6. Other information required by BCPH.
    7. Additional information that may be useful to the specific evaluation may include:
        a) Survey.
        b) Easements.
        c) Floodplain maps.
        d) Geology and basin maps and descriptions.
        e) Aerial photographs.
        f) Climate information.
        g) Delineated wetlands maps.

8.3 Reconnaissance

A. 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. The information that will be 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.
    5. Current and historic land use.
    6. Use and plumbing information for every structure on the property.

8.4 Detailed Soil Investigation

A. Soil investigations to determine the long-term acceptance rate (LTAR) of a soil treatment area must be conducted per the following criteria:
    1. Visual and tactile evaluation of two or more soil profile test pit excavations to determine soil type, as well as whether a limiting layer is encountered.
    2. Percolation testing is not required but may be conducted to obtain additional information regarding the LTAR of the soil.

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

B. Soil test pit excavations must meet the following criteria:
   1. 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. Soil may not be replaced in the soil profile test pit excavation until BCPH has inspected the site.
   2. The excavation must be of sufficient width to permit evaluation of soil types throughout the excavations.
   3. The excavation must be left open for a minimum of 24 hours prior to BCPH's site inspection.

C. The procedure for performing visual and tactile evaluations of soil to determine a LTAR is as follows:
   1. 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 two will be based on the judgement of the competent technician. At BCPH's discretion, additional soil profile test pit excavations may be required.
   2. 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.
   3. Layers and interfaces that interfere with the treatment and dispersal of effluent must be noted. Thus, any limiting soil characteristic (e.g. consistence) must also be evaluated. The evaluation of consistence may also include an evaluation of excavation difficulty, rupture resistance, and/or penetration resistance.
   4. 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.
   5. 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.
   6. The soil observation method must allow observation of the different soil horizons that constitute the soil profile.
   7. 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 the percolation tests must be conducted.
   8. 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 2-4 feet, depending on the required thickness for the treatment level below the infiltrative surface, as shown in Item 4, Table 7-2.
   9. At the discretion of BCPH, soils data previously collected by others at the site can be used for the purposes of an OWTS design. It is recommended that the data be verified, at a minimum, by performing an evaluation of a soil profile test pit excavation.

D. Soil descriptions for determination of a limiting layer must include:
   1. The depth of each soil horizon measured from the ground surface, a description of the soil texture, and structure of each soil horizon.
   2. Depth to the bedrock.
   3. Depth to the periodically saturated soil, as determined by:
      a) Redoximorphic features and other indicators of water levels; or
      b) Depth of standing water in the soil observation excavation measured from the ground surface, if observed, unless redoximorphic features indicate a higher level.

4. BCPH may require that a groundwater test hole be monitored for a maximum period of one year prior to issuing a permit for OWTS installation in a suspected high groundwater area in order to determine the maximum seasonal high groundwater table.

E. The procedure for performing percolation tests is as follows:
   1. The percolation testing must be performed by a professional engineer, a trained person under the supervision of a professional engineer, or by a competent technician.
   2. **Number of test holes and location:**
      a) Soil percolation tests must be performed in at least three test holes in the area the soil treatment area will be located, and they must be spaced evenly over the proposed area.
      b) 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.
   3. **Dimensions:** The percolation test hole must have a diameter of 8-12 inches and be terminated a minimum of six inches and a maximum of 18 inches below the proposed infiltrative surface.
   4. **Change in soil:** If there is a change of soil type, color, or structure 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.
   5. **Percolation tests:**
      The percolation tests must be conducted using the hole preparation, soil saturation, and rate measurement procedures described below:
      a) Preparation of percolation test holes:
         1) Excavate the hole to the depth and diameter required.
         2) 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.
         3) Remove all loose soil from the hole.
         4) Add two inches of very coarse sand or fine gravel to protect the bottom of the hole from scouring and sediment.
      b) Presoak:
         1) The hole must be presoaked adequately to accomplish both saturation (i.e. filling the void spaces between the soil particles) and swelling (i.e. the intrusion of water into the individual soil particles).
         2) 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 will be 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 overnight.
         3) Determine the percolation rate 24 hours after water is first added to the hole. This is to ensure that the soil has been given ample time to swell and approach the condition it will be in during the wettest season of the year. In sandy soils containing 5% 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.
      c) **Percolation rate measurement:**

1) With the exception of sandy soils containing 5% or less particles passing the #200 sieve, by weight, percolation rate measurements must be made on the day following the presoak procedure.
2) 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.
3) 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.

d) **Sandy soils:**
1) 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.
2) If the soil is so sandy or coarse-textured that it will not retain any water, the infiltration rate must be recorded as less than one minute per inch.

e) **Special soil types:**
1) BCPH may identify soil types in the areas for which different procedures, such as extra presoaking or an extended testing time to obtain a valid percolation rate, will be required.

f) **Percolation rate determination and reporting:**
1) 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 (see Table 10-1). If the tests in the area vary by more than 20 minutes per inch, variations of soil type are indicated, and the percolation rates will not be averaged. Use of the slowest percolation rate may be allowed, or additional percolation tests may be required.
2) The technician performing the percolation tests must furnish an accurate scale drawing showing the location of the soil profile test pit excavations and percolation holes tied to lot corners or other permanent objects. The drawing must meet the criteria in Section 8.5.A.7. The information in Subsections 8.5.A.7(a-e) may be included but 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. Percolation test data sheets must be submitted to show entire test data.

g) **Alternate percolation testing:**

1) Alternate percolation test procedures may be approved, provided that the test results of alternate procedures are substantially equivalent to those determined using the test procedures described in this section.
2) Prior approval from BCPH of alternate percolation test procedures will be required.

F. **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.
2. Soil profile test pit excavations and percolation holes (if required) must remain open until after evaluation by BCPH.
3. Excavations must be suitably barricaded to prevent unauthorized access and to address safety concerns.

8.5 Reports and Site Plans

A. A written report must describe the results of the preliminary investigation, reconnaissance, and detailed evaluations. This 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, and it may be included as part of the OWTS design document. The report must include, but is not limited to:
1. Company name, address, telephone number, e-mail address, as well as the name, credentials, and qualifications of the individual conducting the site evaluation.
2. Preliminary and detailed evaluations that provide information from the surface site characteristics assessment and soils investigation.
3. Dates of preliminary and detailed evaluations.
4. A graphic soil log, to scale, indicating depth of the soil profile 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.
5. Setback distances to features listed in Table 7-1.
6. Setback distances to features listed in Table 7-2 that exist on-site or within applicable setback limits, whichever is greater.
7. A drawing created to a scale that provides the complete property boundary lines. The minimum drawing size is 8.5” x 11”, and the maximum drawing size is 11” x 17”. 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 detailed drawing including that information will be required from the site and soil evaluation that will impact the location of the OWTS. Drawings must indicate dimensions, have a north arrow and graphic scale, and include:
    a) 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, other surface waters, and detention or retention ponds; and property lines.
    b) Contours or slope direction and percent slope.
    c) The location of any visible or known unsuitable, disturbed, or compacted soils.
    d) The estimated depth of periodically saturated soils and bedrock, or flood elevation, if applicable.

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

8. Anticipated construction-related issues, if applicable.
9. 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.
10. 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.

8.6 Design Documents

A. Design documents must include the following:

1. The report and site plan attached to the design document, or the report and site plan may be combined with the design information as a single document.
2. A brief description of the facility and its proposed use, basis and calculations of design flow, and influent strength.
3. All plan details necessary for permitting, installation, and maintenance, which include:
    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, 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.
4. References to all design manuals or other technical materials used.
5. Installation procedures, as applicable.
6. Operation and maintenance manuals or instructions.
7. Other information that may be useful to BCPH (e.g. photos, cross-section drawings, etc.).

8.7 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 site protection methods.

8.8 Qualifications for a Competent Technician

A. Percolation tests.

1. Required competencies include the ability to:
    a) Set up equipment.
    b) Perform and run percolation tests according to the procedures outlined in these regulations.
    c) Record results and calculate percolation rates.
    d) BCPH may approve training for percolation testing.

B. Visual and tactile evaluation of soil.

1. Required competencies include the ability to:
    a) Identify soil types by hand texturing and observation.
    b) Identify presence or absence of soil structure.
    c) Identify type and grade of soil structure.
    d) Recognize evidence of highest seasonal water surface.
    e) Identify layers and interfaces that will interfere with effluent movement.
    f) Determine the most promising depth for infiltrative surface of OWTS and for percolation tests, if used.
    g) Understand basic principles of OWTS siting and design.
2. Possible demonstrations of competence in visual and tactile evaluation of soil include:
    a) A degree in soil science, agronomy, geology, other majors if a course(s) in soil morphology.
    b) Attendance at training or an OWTS workshop for soil evaluation that includes both class and field work.
        1) If the training or workshop includes an exam to verify acceptable completion of the course, a passing grade on the exam is required.
    c) The Division must approve training for visual and tactile evaluation of soil.

Section 9. Wastewater Flow and Strength

9.1 Wastewater Flows

BCPH may require the installation of a meter to measure flow into the facility or the OWTS.

9.2 Single-Family Residential Homes

A. Design flow per person must be 75 gallons per day (gpd).
B. BCPH may increase the wastewater design flow per person to 100 gpd on a case-by-case basis, where justified.
C. The minimum design flow for a new home must be for a two-bedroom house unless otherwise noted in this regulation. The minimum design flow for the repair or replacement of an OWTS of an existing one-bedroom home must be for one bedroom unless bedrooms have been 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 (i.e. first three bedrooms times two persons per bedroom) plus one additional person for each bedroom in excess of three bedrooms.
F. Table 6-1 summarizes the design flows for single-family residential homes up to six bedrooms.
G. If a new home has unfinished areas, BCPH 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.

9.3 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.

9.4 Multi-Family and Commercial Onsite 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 BCPH for approval. The analysis must include:
        a) Metered water flows for inside use only for at least one 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.
        b) Total suspended solids and biochemical oxygen demand, five-day (BOD_5) or biochemical oxygen demand, carbonaceous five-day ($CBOD_5$) 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.
        c) Explanation and justification for the comparability of the tested facilities with the proposed facility.

9.5 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.
    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 non-pressurized drip dispersal systems (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.

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

9.6 Wastewater Strength

A. 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 Treatment Level 1 (TL1) produced by a septic tank alone, must be approved by CDPHE. If soil treatment area or vertical separation distance reductions are permitted, it must meet requirements of BCPH maintenance oversight program under Section 17 of these regulations.
B. High-strength waste must be reduced to at least TL1 quality or lower before applying to a soil treatment area. Waste strength levels defined in Table 6-3 and 6-4 must be used to determine compliance.

Section 10. Minimum Distances Between Components of OWTS and Physical Features

10.1 Required Minimum Horizontal Distances-Applicability

A. Horizontal distances from the various components of a system to pertinent terrain features, such as streams, lakes, water courses, springs, wetlands, wells, subsurface drains, cisterns, water lines, suction lines, dry gulches, cut banks, dwellings, and other occupied buildings and property lines, must be in accordance with Table 7-1.

B. The setback requirements are applicable for minimum system performance and treatment levels with specific modifications allowed for higher treatment levels (see Table 7-2).

C. All distance setback modifications must be analyzed and approved by the Board or BCPH and must be in complete compliance with the variance procedures outlined in Section 4.14.

D. 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 groundwaters.
   2. Contacting adjacent property owners for potential conflicts with property line encroachments.
   3. Analyzing potential impacts that system locations may have on building foundations and other potentially affected features.

10.2 Reduction in Minimum Distances – Operation and Maintenance Required

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 17.

10.3 Dry Gulches, Cut Banks, and Fill Areas

A. 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 effluent from the soil treatment area to move laterally and surface. In this instance, a greater distance may be required.

B. A shorter distance may be allowed if a professional engineer or professional geologist is able to demonstrate that the use of a barrier (e.g. minimum 30 mil PVC liner placed between the soil treatment area and slope of the dry gulch, cut bank, or fill area) would prevent effluent from surfacing laterally.

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

10.4 Site Evaluation, Design, and Treatment Level Considerations for Use of Table 7-2

A. Components of an OWTS listed in Table 7-1 must be installed or located in accordance with the minimum distance requirements provided in Table 7-1 or increased distances, as outlined in these regulations.

B. 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 the soil treatment area to the onsite well.

b) Setback distance from the soil treatment area to water features.
c) Setback distance from the 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 to accommodate the site conditions, if higher-level treatment for that purpose is permitted by BCPH.

Section 11. Design Criteria: General

11.1 General

A. The OWTS for single-family homes must be designed to accommodate the proposed flows from the structure, as defined in Section 9.2. Flow estimates for multi-family or commercial OWTS must comply with Section 9.4. Expected waste strength, as noted in Tables 6-3 and 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. The OWTS must be designed and constructed to achieve the treatment level specified by the design.
C. The OWTS must be designed and constructed so each component will function, once installed and operational, in a manner that will not adversely be affected by normal operating conditions (e.g. 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 that may cause injury to persons, animals, or property. The design must provide for efficient operation and maintenance and prevent access by flies, rodents, and other vectors, and prevent other nuisances and public health hazards.

11.2 Accessibility for Inspection, Maintenance, and Service

A. All septic tanks must have watertight risers over each access manhole, and all risers must extend above final grade.
B. For new construction, the top of any septic tank, dosing tank, or vault must be no deeper than four feet below finished grade.
C. 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 above final grade, and they must be located to easily accommodate periodic physical inspection, collection, and testing of samples, as well as maintenance of all components and compartments.
D. **Riser lids:**
    1. Each riser lid must be watertight, brought above the surface, and have a secure closing mechanism (e.g. lock, special headed bolts or screws, or sufficient weight – defined as 59 lbs.) to prevent unauthorized access.
    2. BCPH may require that 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.
E. Components that require access for maintenance must include, but are 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.
F. Components must be designed and constructed so that when installed, they will be easily maintained, sampled, and serviced according to the manufacturers' recommendations. Easy physical access to treatment components by maintenance personnel and equipment must be provided.

11.3 Plumbing Codes

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

11.4 Electrical Equipment

A. Requirements for electrical equipment, if used, include the following:
    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).
    2. A local electrical permit.
    3. Electrical components must be protected from moisture and corrosive gases.

11.5 Indicators of Failure or Malfunctioning for Systems Utilizing Mechanical Apparatus

A. A signal device must be installed that will provide a recognizable indication or warning to the user that the system or component is not operating as intended.
B. The indication or warning must be a visual signal, an audible signal, and must 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.

11.6 Sampling Access

A. If sampling for testing or as a requirement for a permit is required of effluent from a component other than the soil treatment area, an accessible sampling point must be provided.
B. If sampling of the treated wastewater from the soil treatment area is required for testing or of permit, a monitoring well or wells must be constructed. Monitoring wells must be located down gradient from the soil treatment area, be accessible, and must be 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 BCPH or other issuer of the permit.

11.7 Component Operating Instructions

A. The manufacturer of proprietary treatment units utilizing mechanical components must provide clear, concise, written instructions covering the components that, when followed, will assure proper installation and safe and satisfactory operation and maintenance.
B. If the OWTS uses public domain technology, the design engineer must provide clear, concise, written instructions covering the components that, when followed, will assure proper installation and safe and satisfactory operation and maintenance.

11.8 Surface Activity

A. Activity or use on the surface of the ground over any part of the OWTS must be restricted.
B. 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 must be conducted.
C. The OWTS must be redesigned if the permeability has changed.

11.9 Floodplains

A. New or repair/replacement of an OWTS located in the Boulder County Floodplain Overlay District as defined in Section 4-403 of the Boulder County Land Use Code must meet the requirements in Section 4-405(G) of the Boulder County Land Use Code. A floodplain development permit from Boulder County Transportation will be required before an OWTS permit will be issued.

B. New or repair/replacement of an OWTS located in a 100-year floodplain within the territorial limits of a municipality that is subject to these regulations must meet the requirements of the local municipal floodplain regulations for that jurisdiction. If applicable, proof of a municipal floodplain permit will be required before an OWTS permit will be issued.

C. The OWTS must be designed by a registered professional engineer (RPE). The system, as approved by BCPH, must be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the system into the floodwaters.

D. No new or expanded OWTS may be installed in a floodway designated in a 100-year floodplain. For any system repair that may affect the floodway delineation, appropriate procedures must be followed, including revision of the floodway designation, if necessary.

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

A. All OWTS that will serve a business, commercial, industrial, or institutional property, or a multi-family dwelling must:

1. Be designed by an RPE.
2. Receive only such biodegradable wastes for treatment and distribution that are compatible with the biological treatment processes occurring within the septic tank, any additional treatment units, and the soil treatment area.
3. Receive authorization by rule or a Class V underground injection permit from the 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, BCPH may choose to also issue a permit for this type of use.

Section 12. Design Criteria: Components

12.1 Tanks and Vaults

A. **Watertightness:**

1. Septic tanks, vaults, dosing tanks, other treatment components, risers, and lids cannot allow infiltration of groundwater or surface water and must not allow the release of wastewater or liquids through other than designed openings. This regulation applies to onsite wastewater treatment systems defined in C.R.S. §25-10-103(12).
2. When the final compartment of a tank is being proposed for use as a pump or siphon chamber, the wall between the chamber and the previous chamber must be watertight except for the intended hydraulic opening.
3. Acceptable watertightness testing methods performed at a manufacturer's site or in the field must include water filling the tank or vacuum testing.

B. **Tank anchoring:** In locations where groundwater or floodwaters may cause instability problems to the septic tank, vault, or other treatment unit in the OWTS due to flotation, then the tank, vault, or unit must be anchored in a manner that will be sufficient to provide stability when the tank is empty. Risers must be included in the buoyancy calculations.

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

2. If a manufacturer does not provide recommendations for provisions to compensate for buoyancy, or if the professional engineer chooses to provide their own design, then the anchoring system design must be prepared by the professional engineer.

C. **Identification and data marking:** All tanks and treatment units must be permanently and legibly marked in a location that is readily visible before backfilling. The inscription must include:
   1. Name of manufacturer.
   2. Model or serial number, if available.
   3. Effective volume and unit of measure.
   4. Maximum depth of earth cover and external loads the tanks is designed to resist.
   5. Inlet and outlet identifications, if relevant.

12.2 Septic Tanks

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

B. **Sizing requirements:**
   1. Sizing for residential capacity for new installations must be based upon the number of bedrooms, per Table 9-1:
   2. For multi-family and non-residential applications, the septic tanks must be sized to permit detention of incoming wastewater design flows for a minimum of 48 hours.
   3. For systems that remove toilet waste for separate treatment, tank capacity may be less than 1,000 gallons, as long as there is a minimum of 48 hours detention time.
   4. The minimum tank size for new installations other than for a single-family residence is 400 gallons.

C. **Inspection and testing of septic tank watertightness:**
   1. Testing of septic tanks must be performed and evaluated as specified in Section 9 of American Society for Testing and Materials (ASTM) C1227-13 (Standard Specification for Precast Septic Tanks) for concrete tanks or in Standard International Association of Plumbing and Mechanical Officials (IAPMO)/ American National Standards Institute (ANSI) Z1000-2013 (American Standards for Prefabricated Septic Tanks) for other prefabricated septic tanks.
   2. Each unit must be inspected in the field for conditions that could compromise its watertightness.
   3. The field inspection must be conducted by BCPH and be performed after tank installation but before backfilling.
   4. If the field inspection indicates the tank may be damaged or is not watertight, the BCPH inspector may require the tank be tested for watertightness by the tank manufacturer or the system contractor.

D. **Septic tank design and dimension criteria:**
   1. 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.
   2. Inlet invert must be at least two inches higher than the outlet invert.
   3. Inlet tee or baffle must extend above the surface of the liquid at least 5 inches and must extend a minimum of 8 inches below the liquid surface; however, the inlet tee or baffle must not extend to a depth of more than 40% of the liquid depth measured from the liquid surface.
   4. Outlet tee or baffle must extend at least 14 inches below the outlet invert; however, it must not extend to more than 40% of 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.

5. The distance from the outlet invert to the underside of the tank top must be at least ten inches.
6. Liquid depth must be a minimum of 30 inches, and the maximum depth must not exceed the tank length.
7. The transfer of liquid from the first compartment to the second or successive compartment must be made at a liquid depth of between 35-40% of the liquid depth measured from the liquid surface.
8. At least 1 access opening no less than 20 inches across must be provided in each compartment of a septic tank.
9. A septic tank must have a minimum of 25 square feet of liquid surface area and have at least a 6-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 6 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.

E. **Concrete septic tank structural design:**
   1. Concrete septic tanks must comply with the structural design criteria of ASTM C1227-13 (Standard Specification for Precast Septic Tanks).
   2. 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 these regulations.
   3. Certification by an RPE must be submitted to the Division for acceptance.
   4. Tank slab lids, mid-seam tanks, and the connections between the tank and risers must be designed so they provide a watertight seal.

F. **Fiberglass, fiberglass-reinforced polyester, and plastic tanks:**
   1. All fiberglass, fiberglass-reinforced polyester, and plastic tanks must meet the minimum design and structural criteria of IAPMO/ANSI Z1000-2013 and be certified by a professional engineer that such standards are being met. The professional engineer certifying the criteria must be registered or licensed in the United States but is not required to be registered in Colorado.
   2. All tanks must be sold and delivered by the manufacturer or manufacturer's designated representative, preferably completely assembled. Onsite tank assembly will be allowed on an as-needed basis.
   3. Tanks must be structurally sound and able to 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 5% in shape as a result of loads imposed.
   4. All tanks must be constructed of sound, durable materials and not be subject to excessive corrosion, decay, frost damage, or cracking.
   5. All seams or connections including to risers must be sealed so they are watertight.

G. Metal tanks are prohibited.

12.3 Abandonment of Tank

A. After a tank is pumped, it may be completely removed and the parts disposed of safely.
B. If the tank is to remain in place:
   1. The tank must be pumped to remove as much waste as possible.
   2. The bottom of the tank must be broken so tank neither floats nor fills with water.
   3. The top must be collapsed and the sides may be broken into the void.

4. The remaining void must be filled with gravel, sand, or compacted soil.
5. The filled excavation will be graded to surroundings, allowing for settling.

C. BCPH may require abandonment of a tank that is deemed to be a hazard.

12.4 Pipe Standards and Bedding Requirements

A. **Pipe standards:**

1. All wastewater pipes to be 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 the OWTS intended for gravity flow of wastewater.
2. Where unperforated plastic pipe and fittings are used for gravity flow, the minimum wall thickness of the pipe must conform to ASTM Standard D 3034 or equivalent or greater strength. Schedule 40 pipe is preferred.
3. Perforated distribution pipe that is surrounded by rock within a soil treatment area must have a minimum wall thickness and perforations conforming to ASTM Standard D 2729 or equivalent or greater strength. Corrugated polyethylene pipe with smooth interior that meets ASTM F405 or AASHTO M252 specifications or equivalent may also be used.
4. Schedule 40 or pipe of equivalent or greater strength must be used for the placement of piping under driveways or roadways and in instances where sewer line setback distances were granted a variance for any reason.
5. Tile pipe, open-joint pipe, and cast iron pipe may not be used in an OWTS.
6. Pressure pipe must be rated for the intended use to accommodate pump discharge pressure.

B. **Bedding:** All system piping, except for distribution laterals within the soil treatment area, must be bedded with select material before final inspection by BCPH:

1. Select bedding material must consist of loose, granular material that is free of stones, clods, frozen soil, or other deleterious material.
2. Select material may consist of onsite job-excavated or imported material.
3. Bedding material must be mechanically compacted to support piping.

C. **Excavation:**

1. Excavations for pipelines, fittings, and appurtenances must be open trench to the depth, grade and in the necessary direction.
2. The trench bottom must be graded to provide a smooth, firm and stable foundation at every point throughout the length of the pipe, fitting, or appurtenance. If large gravel, cobbles, rocks, clods, or other unsuitable material are encountered at the trench bottom, they must be removed.
3. Where necessary, approved fill as specified in Section 12.4.B shall be placed to provide uniform support between the pipe, fitting, or appurtenance and undisturbed trench bottom.
4. The area of the trench at pipe joints (bells) shall be overexcavated, as necessary, to provide uniform bearing of the bells on undisturbed ground.
5. Each joint shall be recessed in undisturbed soil or approved fill in such a manner as to relieve the bell of the pipe of all load and to ensure continuous bearing along the pipe barrel upon the pipe subgrade (trench bottom).

D. **Approved fill:**

1. Approved fill must be as specified Section 12.4.B.
2. All voids between the pipe and undisturbed soils must be filled with approved fill.
3. Approved fill must be worked into place or tamped, as necessary, to consolidate the fill material and completely fill all void space between the pipe and undisturbed trench bottom.

4. Alternate fill materials and/or methods may be allowed upon prior approval from BCPH. BCPH may require that an alternate fill material or method be specified and approved by a RPE.

E. **Cleanouts:**
   1. Cleanouts are required between buildings and the septic tank for new construction.
   2. 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.
   3. Cleanouts must be provided within five feet of the outside of the building.
   4. 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 the 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.
   5. 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. **Pipe grade:** The grade of the building sewer must be at least 2% (i.e. 2-foot fall per 100 feet or ¼ inch per foot). Buildings must be planned so a proper slope can be obtained. Where the terrain is extremely flat, BCPH may allow a slope of only 0.5% (i.e. 6-inch fall per 100 feet or 1/16 inch per foot).

G. **Bends:** Bends upstream of the septic tank should be limited to 45 degrees or less whenever possible. If 90 degree bends cannot be avoided, they should be made with two 45 degree ells or a long sweep quarter curve.

12.5 Distribution Box

A. A distribution box, if used, must be of sufficient size to distribute effluent equally to the laterals of a trench or absorption bed system.
B. The distribution box must be constructed with the inlet invert at least one inch above the level of the outlet inverts.
C. Flow equalizers or similar devices must be used to adjust the flow between laterals.
D. Access to the distribution 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.
E. If two or more distribution pipes exit the distribution box in parallel, perforated pipe must be used on only one line and solid pipe on the remaining lines until there is three-foot separation between the lines.

12.6 Drop Box

A. 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 must have a riser at or above final grade if the top of the drop box does not reach final grade.
B. Outlet pipes in sequential distribution must be designed and installed so they can be capped off for resting periods.

12.7 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.

12.8 Wastewater Pumping and Dosing Siphon Systems

A. **Pumps:**

1. Non-clog pump openings must have at least two-inch diameter solids handling capacity where raw wastewater is pumped. A pump opening cannot have more than 3/4-inch diameter solids handling capacity if previously settled effluent is pumped.
2. Pumps must be certified to the applicable Underwriters Laboratories (UL) or Canadian Standards Association (CSA) electrical safety standard, bear the seal of approval of CSA, UL, or an equivalent testing program and be constructed of corrosion resistant materials.
3. Grinder pumps must be certified to National Sanitation Foundation International / American National Standards Institute (NSF/ANSI) Standard 46 and bear the seal of approval of the NSF or equivalent testing and certification program.

B. **Floats and switches:**

1. Automatic liquid level controls must be provided to start and shut off pumps at a frequency or level specified in the design.
2. 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.
3. Float switches must be certified to the applicable UL or CSA electrical safety standard; bear the seal of approval of CSA, UL, or an equivalent certification program; and be constructed of corrosion resistant materials.
4. Dosing siphons for pressure dosing and higher level treatment systems must provide for a means of determining the number of dosing events.

C. **Location of pump or siphon:**

1. A pump or a siphon may be installed in a separate tank following the septic tank, and the tank must be of sufficient volume to allow pump or siphon cycling commensurate with the design capacity.
2. The second compartment of a 2-compartment septic tank may only be used as the pump tank when the tank is specifically designed for this purpose and the 48-hour detention time will not be decreased. The pump must be screened or provided with an approved filtering devise 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 12.2.D. Siphons must not be installed in the second compartment of a two-compartment tank.
3. 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, per Section 12.2.D.

D. **Pump or siphon discharge piping:**

1. 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.
2. The pump discharge piping must have a quick disconnect that is accessible from grade to allow for easy pump access and removal.
3. The pipe must be sized to maintain a velocity of two or more feet per second.
4. Pressure pipes must be designed to prevent air or vacuum locking and allow self-draining pipes.

E. **Access:**
    1. The pump or dosing system tank, chamber, or compartment must have a minimum 24-inch diameter access riser made of corrosion-resistant material extending 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.
    2. 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 the electrical or other component access must also be watertight.

F. **Splice box:**
    1. Any splice box must be located outside the pump system access riser and be accessible from the ground surface.
    2. Wire splices are prohibited inside the tank, dosing chamber, or riser. Wire splicing must be completed with corrosion-resistant, watertight connectors.

G. **Controls:**
    1. Control panels or other electrical boxes used to control the functions of an OWTS must comply with the following, as appropriate:
        a) The pump system must have an audible and visual alarm notification in the event an excessively high water condition occurs.
        b) The pump must be connected to a control breaker separate from the alarm breaker and any other control system circuits.
        c) An electrical disconnect must be provided within the line of sight of the pump chamber.
        d) The pump system must be provided with a means that will allow the pump to be manually operated; such as an HOA (Hand/Off/Auto) switch.
        e) 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.
        f) They must bear the seal of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL.

12.9 Effluent Screens

A. effluent screens must be installed in all septic tanks in new installations and repairs where the septic tank is replaced. This provision may be waived by BCPH for advanced treatment tanks that provide higher-level solid removal.
B. 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 are all acceptable.
C. The effluent screen must be cleaned at manufacturer-recommended intervals, or more often, if use patterns so indicate.
D. An alarm may be installed on an effluent screen indicating need for maintenance. BCPH may require effluent screens to be equipped with alarms.
E. 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.
F. The handle of the effluent screen must extend within 12 inches of grade.

12.9 Grease Interceptor Tanks

A. All commercial food service facilities and other facilities generating fats, oils, and greases in their waste must install a grease interceptor tank.

B. Grease interceptor tanks must only treat those portions of the total wastewater flow in which grease and oils are generated.
C. 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.
D. 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.
E. The inlet and outlet tees or baffles must extend at least five inches above the liquid level and must provide for a free vent area across the liquid surface.

Section 13. Design Criteria: Soil Treatment Area

13.1 Size and Design

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.

13.2 Engineered Systems

A. 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 BCPH:
    1. For types 3A, 4, 4A, 5,R-0, R-1 and R-2 and Treatment Levels TL2, TL2N, TL3, and TL3N, as specified in Tables 10-1 and 10-1A of these regulations.
    2. The maximum seasonal level of the groundwater surface is less than four feet below the bottom of the proposed infiltrative surface.
    3. There is a limiting layer less than four feet below the bottom of the proposed infiltrative surface.
    4. The ground slope is more than 30%.
    5. There is any part of the existing distribution system that is raised above existing grade.
    6. The system will serve commercial, business, institutional, or industrial properties or multi-family dwellings that are more than a single-family dwelling.
    7. The system requires a lift station or sewage pumping system.
    8. The system requires an open hole inspection or replacement of fill soils.
    9. Pressure distribution is used.

13.3 Calculation of Infiltrative Surface of Soil Treatment Area

A. 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, where the trenches utilize a depth of gravel greater than six inches below the distribution line and seepage pits that are permissible in repairs.
B. Long-term acceptance rates (LTARs) are shown in Table 10-1 and 10-1A.
C. Factors for adjusting the size of the soil treatment area are in Tables 10-2 and 10-3.
D. The required area for a soil treatment area is determined by the following formula:

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

    1. Adjusted Soil Treatment Area = Required Soil Treatment Area x Size Adjustment Factor(s).
    2. Size adjustment factors for methods of application are in Table 10-2.
    3. Size adjustment factors for types of distribution media are in Table 10-3.
    4. 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.

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

a) 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.

b) 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.

c) 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, as provided in Table 10-1.

13.4 Allowable Soil Treatment Area Sizing Adjustments

A. The soil treatment area size determined by dividing the design flow rate by the LTAR may be adjusted by factors for method of treatment, soil treatment area design, and type of distribution media.

B. 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.

C. Sizing adjustments for use of the higher-level treatment categories listed in Tables 10-1 and 10-1A will only apply if the system is inspected and maintained as specified in the requirements of Section 17.4, *Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher-Level Treatment*.

13.5 Design of Distribution Systems

A. **General:**

1. The infiltrative surface and distribution lines must be level.
2. 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 Section 14.4. The depth of the infiltrative surface will be measured on the upslope side of the trench or bed.
3. 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.
4. The pipe for gravity distribution must be at least three inches in diameter.
5. 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.
6. 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.
7. 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.

B. **Distribution laterals:**

Must meet the requirements of Section 12.4, as applicable.

1. 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.

2. The maximum length of distribution lateral must not exceed 150 feet.
3. 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.
4. For absorption beds, the separating distance between parallel gravity distribution laterals must be a minimum of three feet but not exceed six feet (center-to-center), and a distribution lateral must be located within three feet of each sidewall and endwall.
5. The end of a distribution lateral must be capped unless it is in a bed or trenches in a level soil treatment area, where the ends of the lines may be looped.
6. 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.
7. Orifices must be oriented downward unless pressure distribution is used and provision for pipe drainage is included.

C. **Pressure distribution:**

1. The design of pressure distribution systems must include:
    a) Dose size and frequency for either proposed flows and soil type, or media long-term acceptance rate.
    b) Pipe diameter and strength requirements.
    c) Orifice size and spacing.
    d) A 30-72 inch operating head at the distal end orifice.
    e) Pump/siphon information; Total Dynamic Head; gallons/minute.
    f) Drain-back volume from forcemain.
    g) 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.
2. The separating distance between parallel distribution pipes in a pressure distribution absorption bed must be a minimum of two feet but cannot 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 14.3.B.
3. 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.
4. An effluent screen must be located in the septic tank or pump chamber or a filter placed on the discharge pipe from the pump or siphon.

13.6 Soil Treatment Area Requirements

A. **Trenches:**

1. Trenches must be no more than three feet wide.
2. The separating distance between trenches must be at least four feet sidewall to sidewall.
3. Distribution laterals used in a trench must be as close to the center of the trench as possible.

B. **Beds:**

1. The maximum width for a bed is 12 feet unless the bed receives effluent meeting Treatment Level 2 quality or better.
2. The separating distance between beds must be at least six feet sidewall to sidewall.
3. Evapotranspiration beds and evapotranspiration-absorption beds may be wider than 12 feet. OWTS utilizing non-pressurized drip dispersal systems (NDDS) may also be wider than 12 feet and must be designed following the Colorado Professionals in Onsite Wastewater (CPOW) Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (February 24, 2014).

C. **Serial and sequential distribution:**
    1. 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.
    2. 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.
    3. Adjacent trenches or beds must be connected with a stepdown/relief pipe or a dropbox arrangement so that each trench fills with effluent to the top of the gravel or chamber outlet before flowing to succeeding treatment areas.

D. **Alternating systems:**
    1. An alternating system must have two or more zones that must be alternated on an annual or more frequent basis, or as required by the BCPH permit.
    2. For repairs, each section must be a minimum of 50% of the total required soil treatment area. For new installations, each separate soil treatment area must meet the minimum sizing requirements outlined in Section 13, 14 and 15, as applicable.
    3. 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.
    4. The diversion mechanism must be readily accessible from the finished grade.

E. **Sequencing zone systems:**
    1. Sequencing zone systems have two or more soil treatment area sections that are dosed on a frequent rotating basis.
    2. 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.
    3. An automatic distribution valve must be used.
    4. Dosing of each system must be evaluated by the design engineer based on projected daily flow rates, number of zones, and soil types.

F. **Inspection ports:**
    1. A four-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 the distribution lateral.
    2. Inspection ports in chambers may be installed according to manufacturers' instructions if the infiltrative surface is visible or can be observed from the inspection port.
    3. Additional inspection ports connected to distribution laterals may be installed.
    4. In addition, BCPH may require an inspection port at the initial end of each lateral in the system.
    5. 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.

13.7 Storage/Distribution Media

A. **Rock and pipe:**
    1. The perforated pipe must be surrounded by clean, graded gravel, rock, or other material of equal efficiency that may range in size from ½-2½ inches. AASHTO M 43 size No. 3 coarse aggregate meets this specification.

2. 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.
3. The top of the placed gravel or other 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 cannot be used.

B. **Chambers:**
1. 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 in order to prevent chambers from settling into the media.
2. Installation must be done according to manufacturer's instructions.
3. Effluent may be distributed by gravity, pump, or siphon.
4. The chamber must provide for at least 90% coverage of the excavated area in order to receive the sizing adjustments provided in Table 10-3. Documentation must be provided that demonstrates distribution over full width of excavation.
5. For width and square footage requirements, refer to State acceptance letters, as required per Section 5 CCR-1002-43.13.E.1.d in Regulation 43.

C. **Media, enhanced, or other manufactured:**
1. 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.
2. Installation must be done according to manufacturer's instructions.
3. Pressure distribution is required for TL2-TL3N effluent, unless otherwise noted in these regulations.

D. **Driplines:**
1. The infiltrative surface area must be calculated using the LTAR for the site or a more conservative value if recommended by the manufacturer.
2. Driplines must be installed per the manufacturer's spacing recommendations.
3. Drainback must be provided for all drip lines, pipes, and pumps.
4. Provisions must be made to minimize freezing in the distribution pipes, driplines, relief valves, and control systems.
5. Provisions must be made for filtering, back-flushing, or other cleaning.

E. **Tire chips:**
1. The pipe may be surrounded with clean, uniformly-sized tire chips.
2. Tire chips must be nominally two inches in size and may range from ½ inch to a maximum of four inches in any one direction.
3. Wire strands must not protrude from the tire chips more than ¾ inches.
4. Tire chips must be free from balls of wire and fine particles less than two mm across.
5. 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 may not be used.

13.8 Soil Replacement Systems

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

A. When a soil type "R" is removed, the following requirements must be met:
1. All added soil must comply with the following specifications:
a) Added soil must meet the specifications of either "preferred" or "secondary" sand filter media, as specified in Section 14.3.B.2.c.

b) The LTAR specified in Table 10-1A must be used. No additional sizing adjustments are allowed.
c) The depth of the added media must comply with the requirements in Table 10-1A.
d) 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.
e) All added soil must be completely settled prior to installation of components as specified and approved by the design engineer.
f) Pressure distribution must be used.

B. 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).

C. When a sand media is added to soil treatment area or to an excavation where a soil type 1-3 (Table 10-1) is the underlying soil, the following requirements must be met:
1. Added soil must meet the specifications of either "preferred" or "secondary" sand filter media, as specified in Section 14.3.B.2.c.
2. Unless the design follows the criteria for a sand filter or mound system design as required in Section 14.3, the TL1 long-term acceptance rate for the receiving soil must be used.
3. 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.
4. All added soil must be completely settled prior to installation of components.

13.9 OWTS Repairs

A. 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.

B. 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 13.9 must be utilized including but not limited to the use of Higher Level Treatment, wide beds, seepage pits, etc., where allowed. Any setback reduction beyond what the existing failing system presents must be approved by the Board, as outlined in Section 4.14.

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

D. **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.

E. **Deep gravel trenches:**
1. The length of an absorption trench or bed 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

2. Maximum allowable additional depth is five feet.
3. Percolation tests or soil profile test pit excavation must be performed at the proposed infiltrative surface depth.
4. Size adjustments as provided for in Tables 10-2 and 10-3 must not be applied to deep gravel trenches.

F. **Seepage pits:**
1. For repairs, potential for risk to public health and water quality may be evaluated by BCPH. If risk is low, in the determination of BCPH, a seepage pit without higher level treatment may be used.
2. 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.
3. A seepage pit must consist of a buried structure of precast perforated concrete, cinder or concrete block laid dry with open joints.
    a) Pits must be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity.
    b) 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.
    c) The over-excavated volume must be filled with clean, graded gravel or rock, which may range in size from ½ inch to 2½ inches. AASHTO M 43 size No. 3 coarse aggregate meets this specification.
    d) 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.
    e) 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.
    f) 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.
    g) The bottom of the pit excavation must be greater than four feet above a limiting layer.
4. 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.
5. The requirements for the design and construction of seepage pits for the treatment and dispersal of onsite wastewater on new sites is defined in 15.2. unless:

G. **Vaults:**
1. Criteria for vaults are in Section 12.D of these regulations.

H. **Higher-level treatment options:**
1. Reduction in required soil treatment area for repairs is possible with higher level treatment.
2. Design criteria for higher level treatment systems are in Section 14 of these regulations.

I. **Remediation systems:**
1. 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.
2. BCPH may permit the use of remediation technologies or processes to address an existing failure or malfunction within a soil treatment area.
3. 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 BCPH.

4. Upon approval of BCPH, 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.
5. 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.
6. 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 BCPH.
7. BCPH may require monitoring and/or maintenance of the remediation technology or process as a stipulation of permit issuance.

Section 14. Design Criteria: Higher-Level Treatment Systems

14.1 General

A. Higher-level treatment systems must be designed by an RPE.
B. Higher-level treatment systems may be public domain technology systems or proprietary systems.
    1. Public domain technology systems must be designed, installed, and maintained according to established criteria and additional criteria established by BCPH. 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.
    2. Proprietary systems must be designed, installed, and maintained according to manufacturers' instructions and additional criteria identified in the technology review and acceptance process (see Section 13).
C. Soil treatment areas for higher-level treatment systems must be pressure-dosed.
D. Systems must be capable of accommodating all anticipated flows and organic loads.
E. **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.
F. **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.

14.2 Treatment Levels

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 13. Adequate maintenance for each must be required and documented as in Section 14.

14.3 Sand Filters

A. 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
B. **Intermittent (single pass) sand filters; general requirements:**
    1. The treatment level for intermittent sand filters is considered TL3.
    2. **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.
        a) Distribution pipe size: ¾-1½ inches (PVC Class 200, min.):

1) 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: 18-48 inches.
3) Orifice size: 1/8-3/8 inches (also see Section 14.3.B.2.c).
4) Orifice spacing: 18-48 inches.
5) Operating head at the distal end of distribution pipes: 30-72 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.

b) **Dosing:**
1) Pressure distribution is required. The design of the distribution system must also comply with the requirements of Section 13.5.C.
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.

c) **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:
   a) Effective size: 0.25-0.60 mm.
   b) Uniformity coefficient: ≤ 4.0.
   c) Percent fines passing #200 sieve: ≤ 3.0.
3) "Secondary" sand media requirements:
   a) Effective size: 0.15-0.60 mm.
   b) Uniformity coefficient: ≤7.0.
   c) 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 one month prior to the installation date; however, a gradation of the actual material placed in the excavation is recommended.

d) **Gravel requirements:**
1) Clean, graded gravel or rock must range in size from ½-2½ inches. AASHTO M 43 size No.3 coarse aggregate meets this specification.
2) The gravel must surround the distribution pipes used to disperse the effluent and must be at least 6 inches below and 2 inches above the pipes.
3) Division accepted manufactured media may be used as an alternative to specified gravel.
4) Filter fabric requirements:
   a) 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.

e) **Final Cover Material:**
1) 8-10 inches of Type 1 or 2 soil with an additional 2 inches top soil.

f) Size adjustment factors provided in Table 10-2 and 10-3 are not applicable for sand filters.

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

h) **Application Rates:**
    1) When receiving wastewater that meets TL1 treatment level, a maximum sand filter application rate of 1.0 gpd/ft^2 must be used.
    2) When receiving wastewater that meets TL2, TL2N, TL3, or TL3N treatment levels, the sand filter must be sized based on the long-term acceptance rate for Soil Type 1.
    3) An intermittent sand filter must not be used to treat wastewater that does not conform to TL1 treatment level or better.

C. **Unlined (open bottom) sand filters:**
1. All requirements of 14.3.B.2.a-h of this regualtion will apply to unlined sand filters.
2. **Application rates:**
    a) 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.
    b) 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.
    c) 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).
3. The upper infiltrative surface of an unlined sand filter receiving TL1-TL2 effluent must be at least three feet above a limiting layer.
4. The upper infiltrative surface of an unlined sand filter receiving TL2N –TL3 effluent must be at least 2½ feet above a limiting layer.
5. The upper infiltrative surface of an unlined sand filter receiving TL3N effluent must be at least two feet above a limiting layer.

D. **Lined sand filters:**
1. All requirements of Section14.3.B.2.a-h of this regualtion will apply to lined sand filters.
2. **Application rates:**
    a) Hydraulic loading rate for TL1 effluent applied to "Preferred Sand Media" in a lined sand filter is 1.0 gal./sq. ft./day.
    b) Hydraulic loading rate for TL1 effluent applied to "Secondary Sand Media" in a lined sand filter is 0.8 gal./sq. ft./day.
3. The minimum depth of the sand media in a lined sand filter must be two feet.
4. An intermediate layer of pea gravel, two inches in thickness, must be placed between the sand filter media and the course under-drain media to prevent the migration of sand into the lower layer of under-drain gravel. ASTM C 33, No. 8, coarse aggregate meets this specification.
5. A minimum four-inch diameter slotted SCH40 PVC under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a five inches thick bed of washed, graded gravel or rock ranging in size from ½-2½ inches. AASHTO M 43, No.3 coarse aggregate meets this specification.
6. 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.
7. 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.

E. **Recirculating sand filters:**
1. **Treatment level:**

a) Treatment level provided within recirculating sand filters is TL3.

2. **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.
    a) Distribution pipe size: ¾-2 inches (PVC Class 200, min.).
    b) Distribution pipe spacing: 18-36 inches (24 inches typ.).
    c) Orifice size: 1/8-1/4 inch.
    d) Orifice spacing: 18-36 inches (24 inches typ.).
    e) Pressure head at end of distribution pipe: 24-72 inches (60 inches typ.)
3. **Dosing:**
    a) Timed dosed, pressure distribution is required. The design of the distribution system must comply with the requirements of Section 10.E.3.a of these regualtions.
    b) Recirculation ratio: 3:1-5:1.
    c) Gallons/orifice/dose: 1-3 (2.0 typ.).
    d) Hydraulic loading: 3-5 gal./sq. ft./day (4-5 typ.).
    e) Dosing time “ON”; <2.5 min. (<2.0 typ.).
    f) Number of cycles/day: 48-120.
4. **Top gravel requirements:**
    a) Washed, graded gravel or rock must range in size from ½-2½ inches. AASHTO M 43, No.3 coarse aggregate meets this specification.
    b) 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.
    c) State accepted manufactured media may be used as an alternative to specified gravel.
    d) Soil cover is prohibited. The upper gravel layer must be open to the atmosphere.
5. **Filter media requirements:**
    a) Effective size: 1.5-2.5 mm
    b) Uniformity coefficient: ≤ 3
    c) Fines passing #200 sieve: ≤ 1.0
    d) Media depth (min.): ≥24 inches
6. **Intermediate gravel layer:**
    a) An intermediate layer of pea gravel, two inches in thickness, must be placed between the coarse underdrain media and the sand filter media to prevent the migration of sand into the lower layer of under-drain gravel (ASTM C 33, No. 8, coarse aggregate).
7. **Under-drain requirements:**
    a) A minimum four-inch diameter slotted SCH40 PVC under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a 5 inches thick bed of washed, graded gravel or rock ranging in size from ½-2½ inches. AASHTO M 43, No.3 coarse aggregate meets this specification.
8. **PVC liner requirements:**
    a) 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.
9. 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.

14.4 Mound Systems

A. 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.

B. 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.

C. Mound systems must conform to the design requirements of Sections 14.3.1 through 5 for unlined (open bottom) sand filters, with the following exceptions.
    1. 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.
    2. 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.

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

E. 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 percentage 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.
    1. 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.
    2. 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.
    3. When TL1 through TL3N effluent is applied to mound systems installed above insitu 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.

F. 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.

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

H. *The Wisconsin Mound Soil Absorption System: Siting, Design, and Construction Manual*, *January 2000* is the procedural guideline in the design of elevated sand mounds. Design criteria for sand media loading rates, basal area loading rates, and linear loading rates must all be addressed. Where the requirements of this regulation are different from those in the referenced mound document, the requirements of this regulation will govern in those cases. Mounded systems that provide a minuimum of 24 inches of sand treatment media may use application rates for in-situ receiving soils for

TL3 (Table 10-1). Sizing adjustment factors (Table 10-3) may not be applied if TL3 is used but may be applied if TL1 is used.

1. If less than two feet of sand is used in the mound, application rates for in-situ receiving soils for TL1 must be used. Adjustment factors may be used in Table 10-3.

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

A. A rock plant filter system must be designed by a professional engineer.
B. 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.
C. The treated effluent from a rock plant filter must be distributed to a soil treatment area.
D. Although producing higher level treatment, rock plant filters must not be assigned a treatment level higher than TL1 because of system and seasonal variability.

Section 15. Design Criteria: Other Facilities

15.1 Evapotranspiration and Evapotranspiration/Absorption Systems

A. The following section provides general criteria which must be followed when an evapotranspiration or evapotranspiration/absorption bed is proposed.
    1. The design may only be permitted in arid climates where the annual evaporation rate exceeds the annual precipitation rate by more than 20%, and where site characteristics dictate that conventional methods of effluent dispersal are not appropriate.
        a) The design may be permitted in soil types, 4, 4A, and 5.
        b) The system must be designed by a professional engineer.
        c) 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.
        d) The width of the bed may be wider than 12 feet.
        e) The required capillary or wicking sand must meet the gradation requirements in Table 12-1 and be approved by the design engineer. This sand must be covered by a crowned, thin layer of loamy-sand mix and appropriate vegetation that will assist in drawing the water to the surface.
        f) Adjustment factors provided in Tables 10-2 and 10-3 may not be used.
    2. 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 15.1.A.1, 3, and 4.
        b) The Colorado Professionals in Onsite Wastewater Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (NDDS), September 2016, is the procedural guideline in the design of an NDDS and must be followed when an NDDS is proposed.
        c) The width of an NDDS system may be wider than 12 feet.
    3. For systems designed strictly as an evapotranspiration bed, the following criteria must be met:
        a) Design data to be furnished must include, but is not 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; a 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 as a guide 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.

Designs will include a rock and pipe or other Division-approved proprietary distribution product, with the centerline of the distribution system 6-8 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. Capillary wicks that penetrate between the distribution system to the bottom of the bed must be at least 15% of the bed surface area. The wicks must be uniformly spaced throughout the system.

c) Except for dwellings, if the system is designed for summer use only, as determined by BCPH, 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 6-8 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 that penetrate between the distribution system to the bottom of the bed must be at least 15% 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 LTAR for that soil type and the formulas provided in Section 15.1.A.4.e below.
    e) The following formula must be used for determining the minimum area necessary for evapotranspiration/absorption of septic tank effluent:
        a. $\text{Area (sq. ft.)}^* = \frac{\text{Flow (gpd)}}{(\text{LTAR} + \text{ETR})}$
            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:
        b. $\text{ETR (gal./day sq. ft.)} = \frac{\text{Lake Evaporation Rate at the Site (inches per year)}}{586}$

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

15.2 Seepage Pits

A. The construction of new seepage pits for the treatment and dispersal of onsite wastewater on new sites is prohibited unless:
    1. A trench or bed system will not meet the design, sizing, or setback requirements of this regulation on the proposed site.
    2. The seepage pit is designed by a professional engineer.
    3. The design includes higher level treatment of at least TL2.
B. The design requirements for new seepage pits must also comply with the requirements defined in Section 13.9.F.
C. Pressure distribution is not required for dispersal into a seepage pit.

15.3 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 BCPH. If risk is low in the determination of BCPH, 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. The wastewater pond must have two feet of free board above the design volume of the pond.
    4. The wastewater pond must be fenced to keep out livestock, pets, vermin, and unauthorized people.
    5. The wastewater pond must be designed on the basis of monthly water balance, including design flow, precipitation, evaporation, and seepage.
    6. The wastewater pond must be constructed so the seepage out of the bottom or sides does not exceed 1/32 of one 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. 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.
    8. The wastewater pond must be designed by a professional engineer.

15.4 Vaults Other Than Vault Privies

A. Vaults for full-time use in new construction are prohibited where a property can accommodate an OWTS with a soil treatment area.
B. The Board may allow vaults for use at a permanent facility, except where Section 15.5 of this regulation applies.
C. Vaults for full-time use may be permitted when a failing OWTS cannot be replaced.
D. Vaults may be permitted for limited use occupancy on a property that cannot accommodate an OWTS with soil treatment area or if the dwelling does not have running water.
E. A vault may be permitted if the facility is on land where the installation of an OWTS with soil treatment area is not permitted.
F. Vaults may be permitted for systems where some of the wastewater flows are separated (e.g. toilet wastes only) into a vault. The portion not retained in the vault must be treated in an OWTS that is sized per the requirements of these regulations.
G. Variances may be granted for specialized commercial uses.
H. A vault, if permitted by BCPH, 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.

I. A visual, an audible signal device, or both indicating filling to a maximum of 75% capacity must be installed to indicate when pumping is necessary.
J. 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 such use.

15.5 Privies

A. **Vault Privy:**
    1. The Board may prohibit the new construction of vault privies, depending on the site and intended use of the property. Vault privies that serve structures or dwellings without running water (e.g. bathroom facilities located at trailheads) will be allowed.
    2. The Board may prohibit the continued use of existing vault privies depending on the site and intended use of the property.
    3. Effective volume of the vault must be no less than 400 gallons, and it must be constructed of concrete or plastic. Vaults for privies must meet the structural and watertightness standards of vaults.
    4. 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.
B. **Pit Privy:** New construction of pit privies and continued use of existing pit privies is prohibited.

15.6 Incinerating, Composting, and Chemical Toilets

A. The Board 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 9
B. 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.
C. 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 Board 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 as long as the unit complies with the applicable requirements of these regulations, and provided that the installation will not result in conditions considered to be a health hazard, as determined by BCPH. Compartment and appurtenances related to the unit must include fly-tight and vectorproof construction and exterior ventilation.
D. **Incinerating toilets:** An approved incinerating toilet must be designed and installed in accordance with all applicable federal, state, and local air pollution requirements and manufacturers' instructions.
E. **Composting toilets:**
    1. Composting toilets must meet the requirements of NSF/ANSI Standard 41 and bear the seal of approval of the NSF or an equivalent testing and certification program.
    2. 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.
    3. 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.

4. Residue from the composting toilet must be removed when it is filled to 75% of capacity. Residue from the unit must be properly disposed of by methods recommended by the manufacturer and acceptable to BCPH. Disposal methods must prevent contamination of water and not cause a public health nuisance. Disposal using solid waste practices is recommended.
5. If a system will be installed where low temperature may be a factor, design and installation must address the effects of low temperatures.
6. Composting toilets must be operated according to the manufacturer's specifications.

F. **Incinerating toilets acceptance requirements:**
   1. Incinerating toilets must meet the requirements of the NSF Protocol P157 and bear the seal of approval of the NSF or an equivalent testing and certification program.
   2. Incinerating toilets must be operated according to the manufacturer's specifications.

G. **Portable chemical toilets:**
   1. The use of portable chemical toilets in permanently occupied buildings is prohibited except during construction or under emergency circumstances, as determined by BCPH. Proper ventilation of a chemical toilet used inside must be required.
   2. Portable chemical toilets are not required to obtain a permit from BCPH.
   3. Portable chemical toilets must be maintained in good physical condition and in sanitary condition to reduce the potential for disease transmission or nuisance conditions.
   4. Contents must be held within the unit and disposed of at a facility approved by BCPH.

15.6 Slit Trench Latrines

Slit trench latrines are prohibited.

15.7 Treatment Systems Other Than Those Discharging Through a Soil Treatment Area or Sand Filter System

A. For systems discharging to state waters, see Section 2.4.

B. Systems that discharge other than through a soil treatment area or sand filter system must:
   1. Be designed by a professional engineer.
   2. Be reviewed by the Board.
   3. Not pose a potential health hazard or private or public nuisance or undue risk of contamination.
   4. Not allow drainage of effluent off the property of origin.

C. The following minimum performance criteria must be required for all permitted systems pursuant to this section:
   1. 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:
      a) The geometric mean of the *E. coli* density must not exceed 15 per 100 milliliters when averaged over any 5 consecutive samples, and no single sample result for *E. coli* can exceed 126 per 100 milliliters.
      b) The arithmetic mean of the standard five-day carbonaceous biochemical oxygen demand ($CBOD_5$) cannot exceed ten milligrams per liter when averaged over any three consecutive samples.
      c) The arithmetic mean of the total suspended solids cannot exceed ten milligrams per liter when averaged over any three consecutive samples.

2. 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:
    a) The geometric mean of the *E. coli* density must not exceed 126 per 100 milliliters when averaged over any 5 consecutive samples, and no single sample can exceed 325 *E. coli* per 100 milliliters.
    b) The arithmetic mean of the $CBOD_5$ cannot exceed 25 milligrams per liter when averaged over any 3 consecutive samples.
    c) The arithmetic mean of the total suspended solids cannot exceed 30 milligrams per liter when averaged over any 3 consecutive samples.

D. 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 that the system is operational, and the results must be submitted to BCPH for compliance with the permit requirements.

E. Methods of analysis – sampling points:
    1. 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: *Standard Methods for the Examination of Water and Wastewater, 21st Edition*.
    2. The sampling point must be a location that is representative of final discharge from the system.

Section 16. Technology Review and Acceptance

OWTS technologies must either be public domain, including but not limited to rock and pipe distribution media, sand filters with pressure distribution and mound systems, with criteria for design, installation, maintenance and use as described in this regulation or properitary products that have received approval and acceptance by the Division pursuant to CDPHE OWTS Regulation Section 43.13 before BCPH can permit them for use.

Section 17. Operation and Maintenance

17.1 Responsibility

The owner must be responsible for maintenance of an OWTS unless the responsibility has been contractually assigned to a tenant or third party or a public, quasi-public, or political subdivision.

17.2 Service Label

For higher-level treatment systems, vaults, vault privies, or other components under a service contract, a clearly visible, permanently attached label or plate giving instructions for obtaining service must be placed in a conspicuous location.

17.3 Inspection, Maintenance and Cleaning

A. For proprietary systems, inspection and maintenance of the system must be performed by a service provider in accordance with the manufacturer's recommendations or Section 17.3.B, whichever is more stringent. For older proprietary systems where manufacturer recommendations are unavailable, inspection and maintenance must be performed in accordance with Section 17.3.B.

B. For public domain systems, inspection and maintenance must be as determined by the professional engineer or the following requirements, whichever is more stringent. Not all requirements will apply to all types of systems.

1. Tanks must be inspected to assure that they are structurally sound and that all components such as lids, baffles, tees, vents, etc. are present and in good condition. The scum and sludge level in the tanks must be measured and tanks must be pumped if the scum or sludge depth exceeds 25% of the operating volume of the treatment tank or is less than four (4) inches from the bottom of the treatment unit. The liquid level in the tank must not be lower than the outlet invert.
2. Effluent screens must be inspected and cleaned at an appropriate interval to assure proper function.
3. Each motor, pump and all associated appurtenances must be inspected to assure that they are operating properly.
4. Internal electrical connections must be inspected to assure that they are not damaged or otherwise subject to corrosion or damage that could cause a failure or electrical short circuit.
5. The control panel and its appurtenances must be inspected to assure that all components such as timers, event recorders or counters, audible and visual alarms, auto-dialers, etc. are functioning properly. Batteries must be checked and replaced as needed.
6. The STA must be inspected to verify that no wastewater is being discharged onto the surface of the ground and that it is not being impacted by erosion, runoff, excess or improper vegetation, or compaction.
7. The service provider must also note any unusual or abnormal conditions such as excessive or strong odors, noise, improper wastewater color and odor, etc. that may indicate an operational problem with the system.
8. Upon completion of the service inspection the service provider must close and secure all inspection or access ports, reset the control panel and restore the system for normal operation.

17.4 Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher-Level Treatment

A. **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.

B. Before permitting systems with a reduced soil treatment area as a result of higher-level treatment, vaults, or vault privies, BCPH requires inspections, maintenance, recordkeeping, and enforcement to ensure and document that the systems are meeting the designed higher-level treatment standards. At a minimum, this includes:
    1. Maintaining accessible records that indicate:
        a) Owner and contact information.
        b) Address and legal description of property.
        c) Location of OWTS specifying location of septic tank, higher-level treatment system, soil treatment area, and other components.
        d) Description of installed OWTS.
        e) Level of treatment to be provided.
        f) Copy of current contract with service provider.
        g) Inspection and maintenance performed, including:
            1) Dates the system has been inspected and/or maintained.
            2) Name and contact information of inspector and/or maintenance provider.
            3) Condition of system at inspection.

4) Maintenance tasks performed.
5) Service provider.
6) Permits, if required by BCPH for the work performed.
7) Condition of system at completion of any maintenance activity.

h) Frequency of inspection and maintenance must be the most frequent of:
1) Manufacturer's recommendations for proprietary systems or design criteria requirements for public domain technology.
2) BCPH 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.
4) Only a service provider meeting all manufacturer's requirements may be utilized for providing operation and maintenance of any higher-level treatment systems.

2. **Owner responsibilities:**
a) Ensure that 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.
c) Each time the current contract with the maintenance provider is renewed or replaced, a copy must be sent to BCPH within 30 days of signature.

3. **Maintenance provider responsibilities:**
a) Must notify BCPH 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.

17.5 Monitoring and Sampling

A. For an OWTS for which monitoring of effluent is required, BCPH or delegated third party must collect and test effluent samples to ensure compliance with the provisions of this regulation.
B. Sampling may be required by BCPH in conjunction with an enforcement action.
C. Any owner or occupant of property on which an OWTS is located may request BCPH to collect and test an effluent sample from the system. BCPH may perform such collection and testing services, but it shall be at the expense of the owner or occupant.
1. If BCPH or a delegated third party collects and tests effluent samples, a fee not to exceed that as 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.
2. Conditions when BCPH can require routine monitoring include:
c) Indications of inadequate performance.
d) Location in sensitive areas.
e) Experimental systems.
f) Systems under product development permits.
3. Sampling and analysis must be performed according to American Public Health Association, American Water Works Association, and Water Environment Federation: *Standard Methods for the Examination of Water and Wastewater, 21st Edition.*

Section 18. 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 these regulations will not be affected thereby.

Section 19. 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 June 30, 2017, and not later amendments to the incorporated material.

Materials incorporated by reference are available for public inspection during normal business hours from the Colorado Water Quality Control Division, 4300 Cherry Creek Drive South, Denver, Colorado 80246. Copies may be purchased from the source organizations.

APPENDIX A: Tables

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
BCPH	Boulder County Public Health
Board	Boulder County Board of Health
BOD	Biochemical Oxygen Demand
CCR	Code of Colorado Regulations
CIOWTS	Certified Installers of Onsite Wastewater Treatment Systems
C.R.S.	Colorado Revised Statutes
CBOD	Carbonaceous Biochemical Oxygen Demand
CDPHE	Colorado Department of Public Health and Environment
CSA	Canadian Standards Association
FEMA	Federal Emergency Management Administration
$g/ft^2/day$	Gallons Per Square Foot Per Day
Gpd	Gallons Per Day
IAPMO	International Association of Plumbing and Mechanical Officials
ISDS	Individual Sewage Disposal System
LPHA	Local Public Health Agency
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
NEHA	National Environmental Health Association
NFIP	National Flood Insurance Program
NPCA	National Precast Concrete Association
NRCS	Natural Resources Conservation Service
NRTL	Nationally Recognized Testing Laboratory
NSF	National Sanitation Foundation
OWTS	Onsite Wastewater Treatment System(s)
RPE	Registered Professional Engineer
STA	Soil Treatment Area
TL	Treatment Level
TN	Total Nitrogen
TSS	Total Suspended Solids
UL	Underwriters Laboratories
USDA	United States Department of Agriculture

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

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		
Baths/showers	14.7	.014
Dishwashers	1.8	.002
Kitchen sinks with garbage grinders	5.8	.052
Laundry washers	19.5	.037
Lavatories	8.4	.021
Water closets (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 homes	75	.20
Mobile home parks; per space	300	.80

COMMERCIAL WASTEWATER	GPD	BOD_5 IN POUNDS PER DAY
Facilities with short-term or transient visitors (e.g. airports or bus stations, per passenger; fairgrounds, per person attending; ballparks, racetracks, stadiums, theaters, or auditoriums, per seat)	5	.02
Airports; per employee	10	.06
Barber and beauty shops; per chair	100	.70
Bowling alleys; per lane - toilet wastes only	5	.03[1]
Country clubs; per member	30	.02
County clubs; 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 showers	20	.05
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	BOD5 IN POUNDS PER DAY
Restaurants open 1 or 2 meals; per seat	50	.06/meal
24-hour restaurants; per seat	75	.07/meal served
Restaurants with paper service only; per seat	25	.01/meal served
Additional for bars and cocktail lounges; per seat	30	.02
Drive-in restaurants; 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 resorts	125	.17
Resorts; night and day	50	.12
Campgrounds; per campsite[2]	50	.12
Public parks; flush toilets per fixture, per hour when park is open	36	.04 lbs./ fixture
Public parks; urinals per fixture, per hour when park is open	10	.01 lbs./fixture
Public parks; showers per fixture, per hour when park is open	100	.10 lbs./ fixture
Public parks; faucets 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]	50	.12
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 purpose 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 the projected design flow.

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
TL 2	-	25	30	N/A[3]
TL 2N	-	25	30	>50% reduction[4]
TL 3	-	10	10	N/A[3]
TL 3N	-	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% rather than an absolute value.

Table 6-4: High Strength Wastewater[1]

	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

1. High-strength effluent prior to a septic tank has a wide range of concentrations. These values are typical, but values used for design purposes must account for site-specific information.

Table 7-1: Minimum Horizontal Distances in Feet Between Components of OWTS 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 with 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, Subsurface 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 Evapotranspiration Field or Outside of Berm of Lined Wastewater Pond	60	10[2]	15	15	10	10	25	10	5

	Spring, well[1], suction line, potable water supply cistern	Potable water supply line	Structure with 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
Unlined Sand Filter in Soil With a Percolation Rate Slower than 60 Minutes per Inch, Unlined or Partially Lined Evapotranspiration System, Outside of Berm of Unlined Wastewater Pond, or System Not Relying on STA for Treatment Other than Aerosol	100	25[2]	15	15	10	25	25	15	10
Slit Trench Latrine, Pit Privy	100	50[2]	25	25	25	25	100	25	N/A
System Not Relying on STA for Treatment and Utilizing Aerosol Methods	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 Board or Water Quality Control Commission pursuant to C.R.S. §25-8-206 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 BCPH. 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 Colorado 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 must be used with a minimum Schedule 40 rating of sufficient diameter to easily slide over and completely encase the conveyance. Rigid end caps of at least Schedule 40 rating must be glued or secured in a watertight fashion to the

ends of the encasement pipe. A hole of sufficient size to accommodate the pipe must be drilled in the lowest section of the rigid cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area in which the pipe passes through the end caps must be sealed with an approved underground sealant compatible with the piping used. Other methods of encasement that provide equal protection are allowed. These methods must be reviewed and approved by BCPH.

3. Add 8 feet additional distance for each 100 gallons per day of design flows between 1,000-2,000 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 BCPH has a maintenance oversight program in accordance with Section 17.4 of this regulation, the distance addition is not required. Flows equal to or 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 Colorado 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 Board to no less than 50 feet.
6. Building sewer installations must meet the design requirements of the Colorado Plumbing Code.

Table 7-2: OWTS Design Consideration and Treatment Requirements – Separation Distances from Soil Treatment Area

			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 onsite well	≥* 100 feet	≥ 100 feet	≥ 100 feet	≥ 100 feet[1]
2	Distance from soil treatment area to pond, creek, lake, or other surface water feature	≥ 50 feet	≥ 25 feet	≥ 25 feet	≥ 25 feet
3	Distance from soil treatment area to dry gulch or cut bank	≥ 25 feet	≥ 10 feet	≥ 10 feet	≥ 10 feet
	Vertical Separation Distances				
4	Treatment depth in feet from infiltrative surface to limiting layer	4 feet[2] (3 feet with pressure dosing)	≥ 2.5 feet	≥ 2.5 feet	≥ 2 feet

* ≥ - "greater than or equal to"

NOTE: Treatment levels are defined in Table 6-3. Reductions in separation distances with higher-level treatment may be granted only if BCPH regulations have included provisions for operation and maintenance.

1. Prior to approval, all setback distance reductions to the 100-foot requirement for wells and soil treatment areas must be in full compliance with the minimum standards and variance requirements of the State of Colorado Division of Water Resources: Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction. For TL 3N effluent, a reduction to 75 feet is allowed if a variance from the Water Well Construction Regulations is obtained.
2. Reductions in the vertical separation requirements for the use of higher-level treatment systems with seepage pits are not allowed. The bottom of the excavation of a seepage pit must be a minimum of four feet above a limiting layer.

Table 9-1: Minimum Septic Tank Size Based on Number of Bedrooms

Number of Bedrooms	Tank Capacity (gallons)
2 or 3	1,000
4	1,250
Each Additional	250

Table 10-1: Soil Treatment Area Long-term Acceptance Rates by Soil Texture, Soil Structure, Percolation Rate and Treatment Level

Soil Type, Texture, Structure, and Percolation Rate Range					Long-term Acceptance Rate (LTAR); Gallons Per Day Per Square Foot				
Soil Type	**USDA Soil Tex-ture**	**USDA Soil Structure-Type**	**USDA Soil Structure-Grade**	**Percola-tion Rate (MPI)**	**Treatment Level 1[1]**	**Treatment Level 2[1]**	**Treatment Level 2N[1]**	**Treatment Level 3[1]**	**Treatment Level 3N[1,2]**
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.

2. Higher LTAR 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 LTAR 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 LTARs are provided in this table.
3. The design of type "R" soil treatment systems must conform to Sections 14.3.B. and C of this regulation.
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 standards, or an appropriate field evaluation by volume.
6. Type "R" soil treatment systems that are designed per the criteria noted in the Treatment Level 1 column of this table do not require O/M oversight by BCPH.
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 14.3 of this regulation.

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 of Regulation 43.

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

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