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Local Government Interim Committee

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MULTI-STATE COMPARISON: Onsite Wastewater Treatment System Regulations

OVERVIEW

Regulations regarding the specific design, installation, and permitting of onsite wastewater treatment systems are found in rule rather than statute in all 50 states. Many states also allow local governing units, such as local boards of health, to enact additional rules related to private systems.

Most states surveyed function similar to Montana, with comparable processes such as allowing specific types of systems in rule but also providing a process to file a variance or deviance for system configurations that may function effectively in certain circumstances that are not specifically allowed in rule.

The following includes a comparison of the administrative rules of ten states: Arizona, Colorado, Florida, Massachusetts, Minnesota, Nebraska, New York, Oregon, South Dakota, and Wyoming. These states provide a general picture of the country's varied geography to determine what differences in regulations, if any, exist in areas whose landscapes offer various challenges. The states chosen experience diverse climate patterns, primarily different levels of precipitation, and offer a range of geographic diversity including mountain ranges, high plains, sea-level wetlands, ocean beaches, and deserts.

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SYSTEM LOCATION

One of the primary areas of interest when reviewing other states' regulations is system location. While many variables are considered when determining the location of an onsite wastewater system, two of the most important variables are the distances of vertical and horizontal separation. Generally, vertical separation is the depth between the lowest point of an absorption bed system and the groundwater table, and horizontal separation is the distance required between a system and other items such as buildings, structures, wells, and surface waters.

VERTICAL SEPARATION REGULATIONS

All states reviewed offer regulations for vertical separation, as noted in Table 1. Pertinent definitions are included in Table 2 on page 6 and should be used in conjunction with the vertical separation language since many states define terms differently.

TABLE 1: VERTICAL SEPARATION COMPARISON – ALL STATES

State	Vertical Separation	Additional Details
Montana ***AR 17.36.320***	A minimum of at least four feet of natural soil must exist between the infiltrative surface or the liner of a lined system to a limiting layer except that at least six feet of natural soil must exist on a slope greater than 15 percent.	
Arizona *AR 18-9-A310 & 18-9-A312*	Dependent on soil absorption rate (SAR); ranges from 10 ft to 5 ft for most soils, but conditions may exist where 2 feet or less may be allowed. *See Appendix 1 for further information.*	If "subsurface limiting conditions"[1] exist, certain allowances in vertical separation are granted, allowing for less separation if effluent is treated to a high enough degree to ensure low total coliform concentrations.
Colorado *AR 5.1002-43.7*	4 feet of separation is required between the infiltrative surface and a limiting layer for systems with Level 1 or Level 2 treatment. If the system is pressure dosed, 3 feet may be allowed.	Pressure dosed higher level treatment systems (Level 2N & 3) may be allowed 2.5 feet separation. Pressure dosed Level 3N treatment systems may be allowed 2 feet separation. *See Appendix 2 for further information regarding the levels of treatment.*

[1] "Subsurface limiting conditions" may include:
1. An impervious soil or rock layer,
2. A zone of saturation that substantially limits downward percolation from the disposal works,
3. Soil with more than 50 percent rock fragments.

Florida *AR 64E-6.006*	42 inches of effective soil; 24 inches to water table during the wettest season of the year "Effective soil depth" is defined as the depth of slightly or moderately limited soil material at an onsite sewage treatment and disposal system drainfield site.	Types of soil impact separation requirements: 1. Coarse sand not associated with an estimated wet season high water table within 48 inches below the absorption surface, sand, fine sand, loamy coarse sand, coarse sandy loam, loamy sand, and sandy loam are considered to be slightly limited soil materials. 2. Very fine sand, loamy fine sand, loamy very fine sand, silt loam, silt, loam, fine sandy loam, very fine sandy loam, sandy clay loam, clay loam, silty clay loam, sandy clay and silty clay soil are considered to be moderately limited soil materials and are subject to evaluation with other influencing factors and local conditions. 3. Clay, bedrock, oolitic limestone, fractured rock, hardpan, organic soil, gravel and coarse sand, when coarse sand is associated with an estimated wet season high water table within 48 inches of the absorption surface are severely limited soil materials.
Massachusetts *AR 310.12.212*	The minimum vertical separation distance between the bottom of the stone underlying the soil absorption system above the high ground-water elevation shall be: (a) four feet in soils with a recorded percolation rate of more than two minutes per inch; (b) five feet in soils with a recorded percolation rate of two minutes or less per inch.	For systems with a design flow of 2,000 gpd or greater, the separation from high groundwater as required by 310.15.212(1) shall be calculated after adding the effect of groundwater mounding to the high groundwater elevation as determined pursuant to 310.15.103(3).
Minnesota *AR 7080.2150*	A minimum 3-foot vertical soil treatment and dispersal zone must be designed below the distribution media. *Less separation may be allowed for higher-level systems. See Appendix 3 for additional information.*	1. The zone must be above the periodically saturated soil and bedrock. The zone must be continuous and not be interrupted by seasonal zones of saturation; 2. any soil layers that are any of the United States Department of Agriculture (USDA) soil textures classified as sand with 35 to 50 percent rock fragments or loamy sand with 35 to 50 percent rock fragments must be credited at only one-half their thickness as part of the necessary treatment zone. Soil layers, regardless of soil texture, with greater than 50 percent rock fragments

		must not be credited as part of the necessary treatment zone. Layers that are given full, partial, or no credit must, in any layering arrangement in the soil profile, be cumulatively added to determine the amount of soil treatment zone in accordance with other soil treatment zone provisions; and 3. the entire treatment zone depth must be within seven feet from final grade.
Nebraska *AR 124.4.002*	At least 4 feet between the seasonal high-water elevation of the ground water and the bottom of the absorption system.	
New York *AR 75-A.4(a) & 75-A.9*	At least 4 feet of useable soil must be available above rock, unsuitable soil, and high seasonal groundwater for the installation of a conventional absorption field system. Highest groundwater level shall be at least two feet below the proposed trench bottom. Where systems are to be installed above drinking water aquifers, a greater separation distance to bedrock may be required by the local health department having jurisdiction.	Soils with very rapid percolation rates, (faster than one minute per inch) are not suitable for subsurface absorption systems unless the site is modified by blending with a less permeable soil to reduce the infiltration rate throughout the area to be used. Alternative systems may allow less distance between the bottom of the absorption system and the limiting layer if the soil percolation rates allow: 1. Raised system – at least 1 foot of original soil with a faster than 60-minute perc rate and 1 ft above the maximum high groundwater level. 2. Mounds – maximum high groundwater level must be at least 1 ft. below ground surface, bedrock at least 2 feet, and soil perc rate must be faster than 120 minutes/inch.
Oregon *AR 340-071-0220*	4 feet, except in areas where the department determines less separation will not degrade groundwater. No exception less than 24 inches of separation may be granted.	Sites may be approved with no separation between the bottom of absorption trenches and soil with rapid or very rapid permeability if: 1. a confining layer occurs between the bottom of absorption trenches and the groundwater table and a minimum 6-inch separation is maintained between the bottom of absorption trenches and the top of a confining layer; 2. a layer of nongravelly (less than 15 percent gravel) soil with sandy loam or finer texture at least 18 inches thick occurs between the bottom of the absorption trenches and the groundwater table; and

		3. the projected daily sewage flow does not exceed a loading rate of 450 gallons per acre per day.
South Dakota *AR 74:53:01:15*	4 feet	Separation must be present between the absorption system and the seasonal high groundwater table, groundwater table rock formations, or impervious soil strata. Absorption systems shall not be constructed in soil rates as having severe or very severe limitations for underground dispersal by the soil conservation service, U.S. department of agriculture, unless that limitation is not present as shown by field investigation or unless prior written approval is granted by the secretary.
Wyoming *AR 25.7*	4 feet for standard systems; 3 feet for pressure dosed systems[2]	Separation must extend from the bottom of absorption system to any restrictive layer, fractured rock, highly permeable material, or high groundwater table.

[2] In Wyoming, a pressure dosed system may be installed at least three feet below the bottom of the absorption surface if the percolation rate of the soil is five minutes per inch or greater (5-60 mpi).

TABLE 2: DEFINITIONS RELATED TO WATERTABLE AND VERTICAL SEPARATION

State	
Montana ***DEQ-4 1.2***	"Fill" means artificially placed soil. "Infiltrative surface" means the soil interface that receives the effluent wastewater below the drain rock or sand. "Limiting layer" means bedrock, an impervious layer, or seasonally high ground water. "Natural soil" means soil that has developed in place through natural processes and to which no fill material has been added. **"**Seasonally high ground water**"** means the depth from the natural ground surface to the upper surface of the zone of saturation, as measured in an unlined hole or perforated observation well during the time of the year when the water table is the highest. The term also means the upper surface of a perched water table.
Arizona *AR 18-9-101*	"Seasonal high water table" means the free surface representing the highest point of groundwater rise within an aquifer due to seasonal water table changes over the course of a year.
Colorado *AR 5.1002-43.3*	"Ground water surface" means the uppermost limit of an unconfined aquifer at atmospheric pressure. "Infiltrative surface" means designated interface where effluent moves from distribution media or a distribution product into treatment media or original soil. In standard trench or bed systems this will be the interface of the distribution media or product and in-situ soil. Two separate infiltrative surfaces will exist in a mound system and an unlined sand filter, one at the interface of the distribution media and fill sand, the other at the interface of the fill sand and in-situ soil. "Limiting layer" means a horizon or condition in the soil profile or underlying strata that limits the treatment capability of the soil or severely restricts the movement of fluids. This may include soils with low or high permeability, impervious or fractured bedrock, or a seasonal or current ground water surface.
Florida *AR 64E-6.002 & 64E-6.004*	"Water table elevation" means the upper surface of the groundwater or that level below which the soil or underlying rock material is wholly saturated with water. Water table elevation is measured from the soil surface downward to the upper level of saturated soil or up to the free water level. Water table elevations shall be established from a benchmark or other fixed point of reference located on the property or within reasonable proximity to it. The existing property elevation at the site of each soil profile must also be recorded relative to the benchmark or fixed point of reference. "Wettest season" means that period of time each year in which the ground water table elevation can normally be expected to be at its highest elevation.
Massachusetts *AR 310.15.103*	"High ground-water elevation" shall be determined by: (a) soil color using the Munsell system, the abundance, size and contrast of redoximorphic features, if present; (b) one or more of the following methods may be used to supplement the method in (a) and shall be used when no redoximorphic features are present: 1. observation of actual water table during times of annual high water table; 2. the use of USGS wells for correlating comparisons in water tables during times when

	the water table is not at the annual high range; 3. a Department-approved method for determining inland high ground-water elevation as contained in Frimpter, M.H. "Probable High Groundwater Levels in Massachusetts," Open File Report 80-1205, USGS or Frimpter, M.H. and G.C. Belfit, 1992, "Estimating highest ground-water levels for construction and land use planning, Cape Cod, Massachusetts," updated, Barnstable, MA Cape Cod Commission Technical Bulletin 92-001"; or 4. a Department-approved method for determining coastal high groundwater elevation which incorporates tidal fluctuation information into the use of historical high groundwater data as contained in Frimpter, M.H. and G.C. Belfit, 1992, "Estimating highest ground-water levels for construction and land use planning, Cape Cod, Massachusetts," updated, Barnstable, MA, Cape Cod Commission Technical Bulletin 92-001 or, if the location of the system is affected by tidal cycle typically within 300 feet of mean high water of the ocean, monitoring the high groundwater elevation over a tidal cycle during a full moon high tide.
Minnesota *AR 7080.1100*	"Distribution medium" means the material used to provide void space in a dispersal component, through which effluent flows and is stored prior to infiltration. Distribution media includes, but is not limited to, drainfield rock, polystyrene beads, chambers, and gravelless pipe. "Periodically saturated soil" means the highest elevation in the soil that is in a reduced chemical state due to soil pores filled or nearly filled with water causing anaerobic conditions. Periodically saturated soil is determined by the presence of redoximorphic features in conjunction with other established indicators as specified in part 7080.1720, subpart 5, items E and F, or determined by other scientifically established technical methods or empirical field measurements acceptable to the permitting authority in consultation with the commissioner.
Nebraska *AR124.4.002*	Seasonal high-water elevation of groundwater shall be determined by using one or more other following types of information: 1. U.S. Department of Agriculture Natural Recourses Conservation Service soils maps and soil interpretations records; 2. Evaluation of soil color and the presence or absence of mottling; 3. Evaluation of impermeable or semi-permeable soil layers; or 4. Measured water levels from nearby test holes, observation wells, or water wells.
New York *AR 75-A.1 & 75-A.4(c)*	"Useable Soil" means, unless otherwise stated, a soil with a percolation rate from one (1) to sixty (60) min/in with a compatible soil classification. The highest groundwater level shall be determined and shall include the depth to the seasonal high groundwater level and the type of water table - perched, apparent, or artesian.
Oregon *AR 340-071-0100*	"Confining Layer" means a layer associated with an aquifer that, because of low permeability, does not allow water to move through it perceptibly under head differences occurring in the groundwater system. "Permanent Groundwater Table" means the upper surface of a saturated zone that exists year-round. The thickness of the saturated zone and resulting elevation of the permanent groundwater table may fluctuate as much as 20 feet or more annually, but the saturated zone and associated permanent groundwater table is present at some depth beneath land surface throughout the year. "Temporary Groundwater Table" means the upper surface of a saturated zone that exists only on a seasonal or periodic basis. Like a permanent groundwater table, the elevation of a temporary groundwater

	table may fluctuate, but a temporary groundwater table and associated saturated zone will dry up for a period of time each year.
South Dakota *AR74:53:01:01*	"Groundwater table" means the upper surface of a groundwater aquifer in the zone of saturation of a geologic formation. "Seasonal high groundwater table" means the highest elevation or level to which a soil is saturated for a week or more as observed as a free water surface in an unlined hole or to which it has been previously saturated as indicated by mottling, whichever is higher.
Wyoming *AR 25.4*	"Groundwater" means subsurface water that fills available openings in rock or soil materials such that they may be considered water saturated under hydrostatic pressure. "High groundwater" means seasonally or periodically elevated levels of groundwater.

HORIZONTAL SEPARATION REQUIREMENTS

Horizontal separation, generally, is the distance required between a system and items on the surface or below the surface, such as other buildings, structures, wells, waterlines, and surface water. Horizontal separation is also commonly referred to the "setback" required of a system. Regulations regarding horizontal separation requirements are organized into individual tables by state.

MONTANA HORIZONAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 17.36.918

From	To Sealed components (1) and other components (2)	To absorption systems (3)
Public or multiple-user drinking water wells/springs	100	100
Individual and shared drinking water supply wells	50	100
Other wells (4)	50	100
Suction lines	50	100
Cisterns	25	50
Roadcuts, escarpments	10 (5)	25
Slopes > 35 percent (6)	10 (5)	25
Property boundaries (7)	10	10
Subsurface drains	10	10
Water mains (8)	10	10
Drainfields/sand mounds (3)	10	--
Foundation walls	10	10
Surface water, springs	50	100
Floodplains	Sealed components – no setbacks (1) Other Components – 100 (2)	100

(1) Sealed components include holding tanks, sealed pit privies, and the components addressed in Department Circular DEQ-4, Chapters 4 and 5. Holding tanks and sealed pit privies must be located at least ten feet outside the floodplain or any openings must be at least two feet above the floodplain elevation.
(2) Other components include the components addressed in Department Circular DEQ-4, Chapter 7.
(3) Absorption systems include the systems addressed in Department Circular DEQ-4, Chapters 6 and 8 subject to the limitations in ARM 17.36.916.
(4) Other wells include, but are not limited to, irrigation and stock watering, but do not include observation wells as addressed in Department Circular DEQ-4.
(5) Sewer lines and sewer mains may be located in roadways and on steep slopes if the lines and mains are safeguarded against damage.
(6) Down-gradient of the sealed component, other component, or drainfield/sand mound.
(7) Easements may be used to satisfy the setback to property boundaries.
(8) Sewer mains that cross water mains must be laid with a minimum vertical separation distance of 18 inches between the mains.

ARIZONA HORIZONAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: R18-9-A312

Features Requiring Setbacks	System Setback (in ft)	Special Provisions
Building	10	Includes porches, decks, and steps (covered or uncovered), breezeways, roofed patios, carports, covered walks, and similar structures and appurtenances.
Property line shared with any adjoining lot or parcel not served by a common drinking water system[3] or an existing water well	50	A person may reduce the setback to a minimum of 5 feet from the property line if: a. The owners of any affected undeveloped adjacent properties agree, as evidenced by an appropriately recorded document, to limit the location of any new well on their property to at least 100 feet from the proposed treatment works and primary and reserve disposal works; and b. The arrangements and documentation are approved by the Department.
All other property lines	5	None.
Public or private water supply well	100	None.
Perennial or intermittent stream	100	Measured horizontally from the high-water line of the peak streamflow from a 10-year, 24-hour rainfall event.
Lake, reservoir, or canal	100	Measured horizontally from the high-water line from a 10-year, 24-hour rainfall event at the lake or reservoir.
Drinking water intake from a surface water source (includes an open water body, downslope spring or a well tapping streamside saturated alluvium)	200	Measured horizontally from the on-site wastewater treatment facility to the structure or mechanism for withdrawing raw water such as a pipe inlet, grate, pump, intake or diversion box, spring box, well, or similar structure.
Wash or drainage easement with a drainage area of more than 20 acres	50	Measured horizontally from the nearest edge of the defined natural channel bank or drainage easement boundary. A person may reduce the setback to 25 feet if natural or constructed erosion protection is approved by the appropriate flood plain administrator.
Water main or branch water line	10	None.
Domestic service water line	5	Measured horizontally between the water line and the wastewater pipe, except that the following are allowed: a. A water line may cross above a wastewater pipe if the crossing angle is between 45 and 90 degrees and the vertical separation distance is 1 foot or more. b. A water line may parallel a wastewater pipe with a horizontal separation distance of 1 foot to 5 feet if the bottom of the water line is 1 foot or more above the top of the wastewater pipe and is in a separate trench or on a bench in the same trench.

[3] A "common drinking water system" means a system that currently serves or is under legal obligation to serve the property and may include a drinking water utility, a well-sharing agreement, or other viable water supply agreement.

Features Requiring Setbacks	System Setback (in ft)	Special Provisions
Downslopes or cut banks greater than 15 percent, culverts, and ditches from: a. Treatment works components b. Trench, bed, chamber technology, or gravelless trench with: i. No limiting subsurface condition specified in R18-9-A310(D)(2), ii. A limiting subsurface condition. c. Subsurface drip lines.	10 20 50 3	Measured horizontally from the bottom of the treatment works component to the closest point of daylighting on the surface. Measured horizontally from the bottom of the lowest point of the disposal pipe or drip lines, as applicable, to the closest point of daylighting on the surface. Measured horizontally from the bottom of the lowest point of the disposal pipe or drip lines, as applicable, to the closest point of daylighting on the surface.
Driveway	5	Measured horizontally to the nearest edge of an on-site wastewater treatment facility excavation. A person may place a properly reinforced and protected wastewater treatment facility, except for disposal works, at any location relative to a driveway if access openings, risers, and covers carry the design load and are protected from inflow.
Swimming pool excavation	5	Except if soil loading or stability concerns indicate the need for a greater separation distance.
Easement (except drainage easement)	5	None.
Earth fissures	100	None.

COLORADO HORIZONAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 5.1002-43.7

System Component	Ground/Terrain/Structure Features								
	Spring, Well (1), Suction Line, Potable Water Supply Cistern (4)	Potable Water Supply Line (2)	Structure w/basement, crawl space or footing drains	Structure without basement, crawl space or footing drains	Property Lines, Piped or Lined Irrigation Ditch, upslope curtain drain	Subsurface Drain, Intermittent Irrigation Lateral, Drywell, Stormwater Structure	Lake, Water Course, Irrigation Ditch, Stream, Wetland	Dry Gulch, Cut Bank, Fill Area (from Crest)	Septic Tank, Higher level treatment Unit, Dosing Tank, Vault or Privy
Septic Tank, Higher Level Treatment Unit, Dosing Tank, Vault or Vault Privy	50 (2)	10 (2)	5	5	10	10	50	10	--
Building Sewer or Effluent Lines	50 (2)	5 (6)	0	0	10 (2)	10 (2)	50 (2)	10 (2)	--
STA Trench, STA Bed, Unlined Sand Filter, Subsurface Dispersal System, Seepage Pit	100 (3)	25 (2)	20	10	10	25	50 (3)	25	5
Lined Sand Filter	50	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
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 Dispersal	100 (3)	10 (2)	125	125 (5)	10	0	25 (3)	10	10

(1) Includes potable wells, irrigation wells and monitoring wells set within a potable aquifer and infiltration galleries permitted as wells by the Division of Water Resources.
(2) Crossings or encroachments may be permitted at the points as noted above provided that the water or wastewater conveyance pipe is encased for the minimum setback distance on each side of the crossing. A length of pipe with a minimum Schedule 40 rating [ASTM Standard D 3034-16 (2016 version)] of sufficient diameter to easily slide over and completely encase the conveyance must be used. Rigid end caps of at least Schedule 40 rating [ASTM Standard D 3034-16 (2016 version)] must be glued or secured in a watertight fashion to the ends of the encasement pipe. A hole of sufficient size to accommodate the pipe must be drilled in the lowest section of the rigid cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area in which the pipe passes through the end caps must be sealed with an approved underground sealant compatible with the piping used. Other methods of encasement that provide equal protection are allowed. These methods must be reviewed and approved by the local public health agency.
(3) Add eight feet additional distance for each 100 gallons per day of design flows between 1,000 and 2,000 gallons per day, unless it can be demonstrated by a professional engineer or geologist by a hydrologic analysis or the use of a barrier, consisting of a minimum 30 mil PVC liner or equivalent, that contamination will be minimized. If effluent meets Treatment Level 3N and the local public health agency has a maintenance oversight program in accordance with section 14.D. of this regulation, the distance addition is not required. Flows greater than 2,000 gallons per day must be hydrologically analyzed for flow, velocity, hydraulic head, and other pertinent characteristics as means of estimating distances required to minimize contamination as part of the Division site application and permitting process.
(4) All horizontal setbacks to a potable water supply cistern must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2 of the Water Well Construction Rules, 2 CCR 402-2. Setback requirements which may necessitate a variance are found within section.10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted through a variance is to 25 feet.
(5) If the structure is not used as a habitable unit, the isolation may be reduced by the local board of health to no less than 50 feet. (6) Building sewer installations shall meet the design requirements of the Colorado Plumbing Code.

FLORIDA HORIZONAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 64E-6.005

Features Requiring Setbacks	System Setback (in feet)	Additional Details
Private potable well or multi-family water well	75	
Public drinking water well if the well serves a facility with an estimated sewage flow of 2,000 gallons or less per day	100	
Public drinking well if the well serves a facility with an estimated sewage flow of more than 2,000 gallons per day.	200	
Non-potable water well	50	A non-potable water well is intended exclusively for irrigation purposes, or for supplying water to a heat pump system or a well for receiving discharge water from a heat pump system.
Storm sewer pipe	10	Or to the maximum extent possible, but in no instance shall the setback be less than 5 feet.
Design high-water line of retention areas, detention areas, or swales	15	Areas designed to contain standing or flowing water for less than 72 hours after a rainfall or the design high water level of normally dry drainage ditches or normally dry individual-lot storm water retention areas.
Building foundations, pilings for elevated structures, mobile home walls, or swimming pool walls	5	Systems may not be placed under buildings.
Property lines	5	Except where property lines abut utility easements which do not contain underground utilities, or where recorded easements are specifically provided for the installation of systems for service to more than one lot or property owner.
Sidewalks, decks, patios	5	Drainfields may not be installed beneath such structures. Any tank located beneath a driveway shall have traffic lids.
Water storage tanks and potable water lines	10	If the tank or water line is in contact with the ground, unless such lines are sealed with a water proof sealant within a sleeve of similar material pipe to a distance of at least 10 feet from the nearest portion of the system or the water lines themselves consist of schedule 40 PVC or stronger. In no case shall the water line be located within 24 inches of the onsite sewage treatment and disposal system.
Potable water line	5	Water line shall not be located at an elevation lower than the drainfield absorption surface.
Non-potable water line	24 in.	Water line must have backflow devices.
Groundwater inceptor drains	15	
Surface water bodies	75	Systems must be located a minimum of 15 feet from the design high water line of a swale, retention or detention area designed to contain standing or flowing water for less than 72 hours after a rainfall, or the design high water level of normally dry drainage ditches or normally dry individual lot storm water retention areas.

MASSACHUSETTS HORIZONTAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 310.15.211

	Septic tank; Holding tank; Pump chamber; Treatment Unit; Grease traps (in ft)	Soil Absorption System (in ft)
Property Line	10 (5)	10 (5)
Cellar or Crawl Space Wall, Swimming Pool (inground), foundation drain	10	20
Slab Foundation	10	10
Water Supply Line (pressure)	10 (1)	10 (1)
Surface Waters (except wetlands)	25	50
Bordering Vegetated Wetland (BVW), Salt Marshes, Inland and Coastal Banks	25	50
Surface Water Supply - Reservoirs and Impoundments	400	400
Tributaries to Surface Water Supplies	200	200
Wetlands bordering Surface Water Supply or Tributary thereto	100	100
Certified Vernal Pools	50	100 (2)
Private Water Supply Well or Suction Line	50	100
Public Water Supply Well	(2)	(2)
Irrigation Well	10	25
Open, Surface or Subsurface Drains which discharge to Surface Water Supplies or tributaries thereto	50	100
Other Open, Surface or Subsurface Drains (excluding foundation drains) which intercept seasonal high groundwater table [3]	25	50
Other Open, Surface or Subsurface Drains (excluding foundation drains)	5	10
Leaching Catch Basins & Dry Wells	10	25
Downhill Slope	Not applicable	15 (4)

(1) Disposal facilities shall be at least 18 inches below water supply lines. Wherever sewer lines must cross water supply lines, both pipes shall be constructed of class 150 pressure pipe and shall be pressure tested to assure water tightness.
(2) The required setback shall be 50 feet where the applicant has provided hydrogeologic data acceptable to the Approving Authority demonstrating that the location of the soil absorption system is hydraulically downgradient of the vernal pool. Surface topography alone is not determinative.
(3) Surface or subsurface drains which will regularly or periodically intercept the seasonal high groundwater table and carry that groundwater away from an area must meet the specified setbacks.
(4) The setback distance shall be measured from a naturally-occurring downhill slope which is not steeper than 3:1 (horizontal:vertical). A minimum 15-foot horizontal separation distance shall be provided between the top of the two inch layer of c to ½ inch washed stone above the pipe, or the geotextile material above the pipe or the top of the chamber and the adjacent downhill slope. For a system located in an area with any adjacent naturally occurring downhill slope steeper

than 3:1, slope stabilization shall be provided in accordance with best engineering practice which may include construction of a retaining wall designed by a Massachusetts Registered Professional Engineer.
(5) Locating a system component or any part thereof beyond a property line of the facility, whether pursuant to an easement or otherwise, requires a variance issued in accordance with 310 CMR 15.410, except that the placement of fill or grading material beyond the property line of the facility, pursuant to an easement or otherwise, shall not require a variance under 310 CMR 15.410.

MINNESOTA HORIZONTAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 7080.2150, 4715, 4725, 6105, and 6120

Feature	Sewage tank, holding tank, or sealed privy	Absorption area or unsealed privy
Water supply wells	50	50
Buried water lines	10	10
Structures	10	20
Property lines	10	10
Ordinary high-water level of public waters:		
Wild river	150	150
Scenic river	100	100
Recreational river	75	75
Tributaries	75	75

NEBRASKA HORIZONTAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: R124.5.001

Features Requiring Setbacks	Tank Setback (in feet)	Absorption, Infiltrative, and Evaporative Systems Setback (in feet)
Surface water	50	50
Private drinking water well	50	100
Public drinking water supply wells: Non-community system Community system Community system when a septic system or soil absorption system of > 1000 gpd is proposed	 50 500 500	 100 500 Evaluated by professional engineer for potential impact on the well and submitted to the department for approval if less than 1000 ft.
All other wells	50	100
Water lines: Pressure-Main Pressure-service connection Suction lines	 10 10 50	 25 25 100
Property lines	5	5
Parking area, driveway, sidewalk, or other impermeable surface or cover	5	5
Foundations: Class 1 – basement, a non-basement footing, or slab-on-grade living quarters where any portion of the living quarters basement, footing or slab is lower in elevation than the onsite wastewater treatment system component Class 2 – non-basement footing foundation, trailer house, or slab-on-grade living quarters higher in elevation than the on-site wastewater treatment system. Class 3 – slab-on-grade construction that is not used as living quarters	Own property/neighbor's property 15/25 10/20 7/15	Own property/neighbor's property 30/40 20/30 10/20

NEW YORK HORIZONTAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 75-A.4(b)

System Components	Well or Suction Line (e)(g)	To Stream, Lake, watercourse (b), or Wetland	Dwelling	Property Line
House sewer (watertight joints)	25 if cast iron sewer pipe, 50 otherwise	25	3	10
Septic tank or watertight ETU	50	50	10	10
Effluent line to distribution box	50	50	10	10
Distribution box	100	100	20	10
Absorption field (c)(d)	100	100	20	10
Seepage pit (d)	150	100	20	10
Raised or mound system (c)(d)	100	100	20	10
Intermittent sand filter (d)	100	100	20	10
Non-waterborne systems with offsite residual disposal	50	50	20	10
Non-Waterborne systems with onsite discharge	100	50	20	10

NOTES:
(a) When wastewater treatment systems are located upgrade and in the direct path of surface water drainage to a well, the closest part of the treatment system shall be at least 200 feet away from the well.
(b) Mean high water mark.
(c) For all systems involving the placement of fill material, separation distances are measured from the toe of the slope of the fill.
(d) Separation distances shall also be measured from the edge of the designated additional usable area as described in Section 75-A.4 (a)(5).
(e) The closest part of the wastewater treatment system shall be located at least 10 feet from any water service line (e.g. public water supply main, public water service line or residential well water service line).
(f) When sand filters are designed to be watertight and collect all effluent, the separation distance can be reduced to 50 feet.
(g) The listed water well separation distances from contaminant sources shall be increased by 50% whenever aquifer water enters the water well at less than 50-feet below grade. If a 50% increase cannot be achieved, then the greatest possible increase in separation distance shall be provided with such additional measures as needed to prevent contamination.

OREGON HORIZONTAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 340-071-0220

Features Requiring Setbacks		From Septic Tank and other treatment unites, effluent sewer and distribution units (in ft)	From subsurface absorption area including replacement area (in ft)
Groundwater supplies and wells		50	100[4]
Springs	Upgradient	50	50
	Downgradient	50	100
Surface public waters[5]	Year round	50	100
	Seasonal	50	50
Intermittent streams	Piped (watertight not less that 20' from any part of the system)	20	20
	Unpiped	50	50
Groundwater interceptors	On a slope of 3% or less	10	20
	On a slope greater than 3%: Upgradient	5	10
	On a slope greater than 3%: Downgradient	10	50
Irrigation canals	Lined (watertight canal): Downgradient	25	25
	Unlined: Upgradient	25	25
	Unlined: Downgradient	50	50
Manmade cuts downgradient in excess of 30 inches (top of downslope cut)	Which intersect layers that limit effective soil depth within 48 inches of surface	25	50
	Which do not intersect layers that limit effective soil depth	10	25
Downgradient escarpments	Which intersect layers that limit effective soil depth	10	50
	Which do not intersect layers that limit effective soil depth	10	25
Property lines		5	10
Water lines		10	10

[4] 50-foot setback for wells constructed with special standards granted by the Water Resources Department.
[5] This does not prevent stream crossings of pressure effluent sewers.

Features Requiring Setbacks		From Septic Tank and other treatment unites, effluent sewer and distribution units (in ft)	From subsurface absorption area including replacement area (in ft)
Foundation lines of any building, including garages and out buildings		5	10
Underground utilities		--	10

SOUTH DAKOTA HORIZONTAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 75:53:01:19

System Component	Ground and Terrain Features						
	Wells over 100 ft deep	Wells less than 100 ft deep, springs, or water suction lines	Cisterns or reservoirs	High-water of lakes, streams, or impoundments (meandered or ordinary, whichever is greater)	Pressurized water lines	Dwelling or occupied building	Property line – all sides
Septic tank, aerobic system, or holding tank	50	75	50	50	25	10	10
Absorption field, mound, evapotranspiration, seepage pit, or graywater system	100	150	100	100	25	20	10
Sewer lines of tightly-jointed tile or equivalent material	50	75	50	50	10	0	0
Sewer lines – materials, construction and testing comply with AWWA standards for water mains	30	30	25	3	10	0	0
Unconventional systems	50	75	50	50	25	0	10

WYOMING HORIZONTAL SEPARATION (SETBACK) REQUIREMENTS

Rule Authority: 25.7

Features Requiring Setbacks	Tank Setback (in feet)	Absorption, Infiltrative, and Evaporative Systems Setback (in feet)
Wells (including neighboring wells)	50	100
Public water supply well	100	200[6]
Property lines	10	10
Foundation wall (w/o drains)	5	10
Foundation wall (with drains)	5	25
Potable water pipes	25	25
Septic tank	N/A	10
Surface water, spring (including seasonal and intermittent)	50	50
Cisterns	25	25

[6] Small wastewater systems that discharge to the same aquifer that supplies a public water supply well and are located within Zone 1 or 2 (Attenuation) of the public water supply well, as determined by *Wyoming Department of Environmental Quality Source Water Assessment Project (2004)* or as established in Section 2 of the *Wyoming Wellhead Protection Guidance Document (1997)*, shall provide additional treatment. These systems will be required to obtain an individual permit to construct and will require that a PE sign, stamp, and date the application, as stated in Section 2 of this chapter. The additional treatment shall be in accordance with Chapter 3 Section 2(b)(ii). The treatment system shall be designed to reduce the nitrates to less than 10 mg/L of NO3- as N and provide 4-log removal of pathogens before the discharge leaves the property boundary of each small wastewater system.

TYPES OF SYSTEMS ALLOWED

The following table compares the types of onsite wastewater treatment systems that are considered allowable systems, granted that situational variables such as location and soil type are compatible. Types of systems that are less popular or very limited in applicability, such as holding tanks, seepage pits[7], and pit privies, are not included in this system comparison.

Type of System	MT	AZ	CO	FL	MA	MN	NE	NY	OR	SD	WY
Septic Tank	X	X	X	X	X	X	X	X	X	X	X
Pressure distribution system	X	X	X	X	X	X	X	X	X	X	X
Absorption Trench	X	X	X	X	X	X	X	X	X	X	X
Absorption bed	X	X	X	X	X	X	X	X	X	X	X
Sand Mound	X	X	X	X		X	X	X	X	X	X
Gray water irrigation	X	X		X	X	X		X		X	X
Composting Toilet	X	X	X	X		X		X		X	
Incinerating Toilet	X	X	X			X		X		X	
Evapotranspiration System	X	X	X							X	
Chamber technology	X	X	X		X						X
Subsurface drip	X	X	X	X							
Recirculating Media Trickling filter	X	X	X		X				X		
Intermittent sand filter	X		X					X	X		
Recirculating sand filter	X		X								
Aerobic Wastewater Treatment unit	X	X		X			X				
Chemical Nutrient reduction system	X										
Gravelless trench	X	X					X				
Engineered pad	X	X									
Peat Filter		X									

[7] The Environmental Protection Agency (EPA) prohibited the installation or new and required the closure of all existing large capacity cesspools (seepage pits) by 2005 through 40C.F.R144.88. Seepage pits that service multiple dwellings (more than 2) are considered large capacity cesspools and are prohibited. While some states' regulations do address seepage pits, the situations when a seepage pit can be installed is very limited, and, for the purposes of this study, will not be considered a viable option for a new or replacement onsite wastewater treatment system.

Type of System	MT	AZ	CO	FL	MA	MN	NE	NY	OR	SD	WY
Surface disposal		X[8]									
Tire chip aggregate			X	X[9]				X			
In-ground Nitrogen-reducing Biofilters (INRB)				X							
Absorption trenches in saprolite									X		
Chemical/Recirculating toilet[10]						X		X	X	X[11]	

[8] Wastewater must be pre-treated to a point that it is nominally free of coliform bacteria.
[9] Tire chip aggregate in Florida may not be used where the seasonal high-water table is less than 12 inches below the bottom of the drainfield at the wettest season of the year.
[10] A chemical toilet must be used with a holding tank. Holding tanks have limited applicability and may only be used for replacement systems.
[11] South Dakota considers a septic tank a conventional system and composting, incinerating, or chemical toilets unconventional systems. All unconventional systems are considered experimental systems and all plans and specifications shall be submitted to the secretary for approval as an experimental system prior to installation. OAR 74:53:01:10

DEVIATIONS, VARIANCES, AND WAIVERS

All states surveyed offer a process to apply for a deviance, variance, or waiver from adopted rules. While some states use different terminology, all seem to be of the understanding that while set regulations are important, not all circumstances can be adequately accounted for in rule, and thus a process for deviating from rule on a case-by-case basis is important.

The process is very similar for all states and most provided two options: either apply to use a system not currently provided for in rule or ask to deviate from requirements related to soil composition or location. Instead of providing the specific processes for each state, the general process is summarized here:

- To use "experimental" systems or those not currently included in rule, states require data proving the system adequately treats wastewater to a level required and that the system will not pollute or degrade current water supplies, surface water, or any other waters of the state.
- To deviate from other current regulations, states use a similar process of providing data that proves the variance or deviation is necessary and that the deviation or variance would not adversely affect water quality.

APPENDIX

APPENDIX1: ARIZONA VERTICAL SEPARATION

Arizona rule provides additional details regarding vertical separation, which are found in AR18-9-A312(E). The minimum vertical separation may be calculated using the following tables:

Soil Absorption Rate (gallons per day per square foot)			Minimum Vertical Separation between the bottom of the Disposal works and the seasonal high water table (feet)	
Trench and Chamber	Bed	Seepage Pit	Trench, Chamber, and Bed	Seepage Pit
1.20+	0.93+	1.20+	Not allowed for septic tank effluent	Not allowed
0.63+ to 1.20	0.42 to 0.93	1.63+ to 1.20	10	60
0.20 to 0.63	0.13 to 0.42	0.36 to 0.63	5	60
Less than 0.20	Less than 0.13	Less than 0.36	Not allowed for septic tank effluent	Not allowed

If the minimum vertical separation distance to the seasonal high-water table for a disposal works receiving septic tank effluent specified in the above table is not met, the applicant shall comply with the following:

a. Employ one or more technologies to achieve a reduced concentration of harmful microorganisms, expressed as total coliform in colony forming units per 100 milliliters (cfu/100 ml) delivered to native soil at the bottom of the disposal works. The applicant shall use the following table to select works that achieve a reduced total coliform concentration corresponding to the available vertical separation distance between the bottom of the disposal works and the seasonal high-water table:

Available Vertical Separation distance between the bottom of the disposal works and the seasonal high water table (feet)		**Maximum allowable total coliform concentration, 95th percentile, delivered to natural soil by the disposal works (Log_{10} of coliform concentration in cfu per 100 milliliters)**
For SAR[12], 0.20 to 0.63	**For SAR[13], 0.63+ to 1.20**	
5	10	8[14]
4	8	7
3.5	7	6
3	6	5
2.5	5	4
2	4	3
1.5	3	2
1	2	1
0	0	0[15]

b. Include a hydraulic analysis with the Notice of Intent to Discharge, based on the dimensions of the absorption surfaces, showing that the soil is sufficiently permeable to conduct wastewater downward and laterally without surfacing for the site conditions at the disposal works.

[12] Soil absorption rate from percolation testing or soil characterization, in gallons per square foot per day.
[13] Soil absorption rate from percolation testing or soil characterization, in gallons per square foot per day.
[14] Nominal value for a standard septic tank and disposal field (10^8 colony forming units per 100 ml).
[15] Nominally free of coliform bacteria.

APPENDIX 2: COLORADO TREATMENT LEVELS

When reading the following table related to treatment levels, the following definitions apply (5 CCR 1002-43.3):

BOD_5 (Biochemical Oxygen Demand, Five-Day) – 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).

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

TSS (Total Suspended Solids) – measure of all suspended solids in a liquid; expressed in mg/L.

Treatment Level	BOD_5 (mg/L)	$CBOD_5$[16] (mg/L)	TSS (mg/L)	Total Nitrogen (mg/L)
Level 1[17]	180	--	80	60-80
Level 2	--	25	30	N/A[18]
Level 2N	--	25	30	>50% reduction[19]
Level 3	--	10	10	N/A
Level 3N	--	10	10	20 mg/L

[16] Requirements for CBOD5 are only related to effluent samples from a higher level treatment system.
[17] 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.
[18] 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 BOD5 and TSS reductions.
[19] NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction requires reduction of 50 percent rather than an absolute value.

APPENDIX 3: MINNESOTA VERTICAL SEPARATION BY LEVEL OF TREATMENT

Minnesota AR 7080.2350 Table XI

Treatment component performance levels and method of distribution by texture group[20]			
Vertical Separation (inches)	Texture Group[21]		
	All sands and loamy sands	Sandy loam, loam, silt loam	Clay, clay loams
12 to 17[22]	Treatment level A Uniform distribution Timed dosing	Treatment level A Uniform distribution Timed dosing	Treatment level A Uniform distribution Timed dosing
18 to 35	Treatment level B Uniform distribution Timed dosing	Treatment level B Uniform distribution Timed dosing	Treatment level B Uniform distribution
36+	Treatment level A-2 or B-2 Uniform distribution Treatment level C	Treatment level A-2 or B-2 Uniform distribution Treatment level C	Treatment level A-2 or B-2 Uniform distribution Treatment level C

[20] The treatment component performance levels correspond with those established for treatment components under the product testing requirements in the table on the following page.
[21] With less than 50 percent rock fragments.
[22] Additional vertical separation distance is required as determined in part 7080.2150, subpart 3, item C, subitem (1), unit (b).

Minnesota AR 7083.4030 Table III

Treatment component/sequence category	Product performance requirements					
Category A: Designed to treat sewage with strength typical of a residential source when septic tank effluent is anticipated to be equal to or less than treatment Level C	Treatment system performance testing levels					
	Level	Parameters				
		$CBOD_5$[23] (mg/L)	TSS (mg/L)	O&G (mg/L)	FC (#/100 ml)	Nutrient (mg/L)
	A	15	15	--	1,000	--
	A-2	15	15	--	--	--
	B	25	30	--	10,000	--
	B-2	25	30	--	--	--
	C	125*	60	25	--	--
	TN	--	--	--	--	<20 or actual value
	TP	--	--	--	--	<5 or actual value
	* BOD5 = 170 mg/L Values for levels A, A-2, B, and B-2 are 30-day values (averages for CBOD5 , TSS, and geometric mean for FC). All 30-day averages throughout the test period must meet these values in order to be registered at these levels. Values for levels C, TN, and TP are derived from full test averages.					
Category B: Designed to treat high-strength sewage when septic tank effluent is anticipated to be greater than treatment level C, including restaurants, grocery stores, mini-marts, group homes, medical clinics, residences, etc.	All of the following requirements must be met: (1) all full test averages must meet level C; and (2) the treatment capacity of the product tested in pounds per day for CBOD5 must be reported.					
Total nitrogen and phosphorus reduction in Categories A and B	Test results must establish product performance effluent quality meeting Levels TN and TP, when presented as the full test average.					

[23] See definitions in Appendix 2, page 29.