

**567—65.110(459A) AT systems—design requirements.****65.110(1) Containment volume.**

*a.* Adequate capacity must be provided within the AT system or within the solids settling facility for the open feedlot operation to contain expected open feedlot effluent from November 1 to March 30 or to hold the precipitation event as required by 65.101(2) “*a*,” whichever is greater. Controls on the solids settling facility or the AT system shall prevent release of collected open feedlot effluent to waters of the United States during the period from November 1 to March 30.

*b.* If the containment volume required in 65.110(1) “*a*” is provided in an open feedlot operation structure whose primary purpose is to remove settleable solids from open feedlot effluent prior to discharge into an AT system, the basin shall not be required to comply with the liner design and construction requirements of 65.109(7), provided the basin does not retain collected open feedlot effluent for more than seven consecutive days following a precipitation event during the period from March 30 to November 1.

**65.110(2) Solids settling.** Settleable solids shall be removed from open feedlot effluent prior to discharge of the effluent into an AT system. Solids settling shall be conducted in conformance with the requirements of paragraph 65.101(1) “*b*.”

**65.110(3) Drainage tile investigation and removal.** Prior to constructing an AT system, the owner of the open feedlot operation shall investigate the site for the AT system for drainage tile lines. The investigation shall be made by digging a core trench to a depth of at least six feet from ground level at the projected center of the berm of the AT system. A written record of the investigation shall be submitted as part of the construction certification required in rule 65.111(459A). If a drainage tile line is discovered, one of the following solutions shall be implemented:

*a.* The drainage tile line shall be rerouted around the perimeter of the AT system at a distance of least 25 feet horizontally separated from the toe of the outside berm of the AT system. For an area of the system where there is not a berm, the drainage tile line shall be rerouted at least 50 feet horizontally separated from the edge of the system.

*b.* The drainage tile line shall be replaced with a nonperforated tile line under the AT system. The nonperforated tile line shall be continuous and without connecting joints. There must be a minimum of three feet of separation between the nonperforated tile line and the soil surface of the AT system.

**65.110(4) Soils and hydrogeologic report.** An AT system constructed pursuant to a construction permit issued pursuant to rule 65.105(459A) shall meet design standards as required by a soils and hydrogeologic report. The report shall be submitted with the construction permit application as provided in rule 65.107(459A). The report shall include all of the following:

*a.* A description of the steps taken to determine the soils and hydrogeologic conditions at the proposed construction site, a description of the geologic units encountered, and a description of the effects of the soil and groundwater elevation and direction of flow on the construction and operation of the AT system.

*b.* Subsurface soil classification of the site. A subsurface soil classification shall be based on ASTM international designation D 2487-92 or D 2488-90.

*c.* The results of a soils investigation conducted at a minimum of three locations within the area of the proposed AT system for AT systems of five acres or less, with one additional soils investigation site utilized for each additional three acres of surface area or fraction thereof. The soils investigation results shall be used in determining subsurface soil characteristics and groundwater elevation and direction of flow at the proposed AT system site. The soils investigation shall be conducted and utilized as follows:

(1) By a qualified person ordinarily engaged in the practice of performing soils investigations.

(2) At locations that reflect the continuous soil profile conditions existing within the area of the proposed AT system. The soils investigation shall be conducted to a minimum depth of ten feet below the elevation of the soil surface of the proposed AT system.

(3) By methods which identify the continuous soil profile and do not result in mixing of soil layers. Investigation methods may include soil corings using hollow stem augers, soil test pits, or other suitable methods.

(4) If located in karst terrain, at least one soil coring shall be taken to a minimum depth of 25 feet below the elevation of the soil surface of the proposed AT system or into bedrock, whichever is shallower. The department may accept well log information from the department's Geosam database in lieu of the coring. If bedrock is encountered, adequate investigation of the bedrock formation shall be made to determine if it consists of limestone, dolomite, or other soluble rock.

(5) Soil core holes may be used to determine current groundwater levels by completing the core holes as temporary monitoring wells and measuring the water levels in these wells not earlier than seven days after installation.

(6) Upon abandonment of the soil core holes, all soil core holes, including those developed as temporary water level monitoring wells, shall be plugged with concrete, Portland cement concrete grout, bentonite, or similar materials.

(7) If soil test pits or other excavation methods are used in conducting the soils investigation, upon closure these excavations must be filled with suitable materials and adequately compacted to ensure they will not compromise the integrity of the AT system.

**65.110(5) Hydrology—groundwater table.** For purposes of this rule, groundwater table is the seasonal high-water table determined by a professional engineer, a groundwater professional certified pursuant to 567—Chapter 134, or qualified staff from the department or Natural Resources Conservation Service (NRCS). If a construction permit is required, the department must approve the groundwater table determination.

*a. Groundwater level measurements.* Groundwater levels shall be measured using at least one of the following methods:

(1) Temporary monitoring wells. Three temporary monitoring wells shall be developed to a minimum of ten feet below the surface of the proposed AT system and constructed in accordance with requirements of 567—subrule 110.11(8). The top of the well screen shall be within five feet of the ground surface. These monitoring wells may be installed in the soil core holes developed as part of conducting the soils investigation required in paragraph 65.110(4) "c."

(2) Test pits. Test pits may be used in lieu of temporary monitoring wells to determine the seasonal high-water table or prior to the construction of an AT system to ensure the required separation distance to the seasonal high-water table is being met. The bottom of each pit shall be a minimum of five feet below the proposed surface of the AT system. However, if the test pit is also being used to conduct the soils investigation required in 65.110(4) "c," the bottom of the pit shall be a minimum of ten feet below the surface of the proposed AT system. Each pit shall be allowed to remain open and unaltered for a minimum of seven days for viewing by the department or NRCS qualified staff. Adequate protection (temporary berms and covers) shall be provided to prevent surface runoff from entering the test pits. Test pits shall be located as needed to provide an accurate assessment of soil materials and seasonal high groundwater levels throughout the area of the proposed AT system. A description of the materials present in the test pit shall be documented by all of the following:

- Digital photos;
- Description of soils including mottling;
- Weather conditions both prior to and during the period in which test pits are open.

*b. Determination of seasonal high-water table.* The seasonal high-water table shall be determined by considering all relevant data, including the groundwater levels measured in the temporary monitoring wells or test pits not earlier than seven days following installation, NRCS soil survey information, soil characteristics such as color and mottling found in soil cores and test pits, other existing water table data, and other pertinent information. If a drainage system for artificially lowering the groundwater table will be installed in accordance with the requirements of paragraph 65.110(6) "g" or 65.110(7) "g," the level to which the groundwater table will be lowered will be considered to represent the seasonal high-water table.

**65.110(6) Vegetative infiltration basin followed by vegetative treatment area.**

*a. Computer modeling.* Results of predictive computer modeling for the proposed AT system shall be used to determine suitability of the proposed site for the AT system and to predict performance of the

AT system as compared to the use of a 25-year, 24-hour runoff containment system, over a 25-year period. A summary of the computer modeling results shall be provided to the department.

*b. Size.* The computer model used to determine if the proposed AT system will meet the equivalent performance standard shall also be used to establish the minimum required size of the VIB and VTA. However, the size of the VIB shall not be less than 30 percent of the total drainage area (feedlot and other) served by the basin, and the size of the VTA shall not be less than 30 percent of the surface area of the VIB.

*c. Slope.* The following slope requirements apply to the constructed system components.

- (1) VIB. The maximum slope of the constructed VIB shall not exceed 1 percent.
- (2) VTA. The constructed VTA shall be level in one dimension and have a slight slope (maximum of 5 percent) in the other dimension.

*d. Berming.*

(1) VIB. The VIB must be bermed to prevent inflow of surface water from outside the VIB and prevent surface outflow of feedlot effluent from the VIB.

(2) VTA. The VTA must be bermed to prevent inflow of surface water from outside areas.

*e. Spreaders.* Settled open feedlot effluent must be discharged evenly across the top width of the VTA and allowed to slowly flow downslope through the VTA. Level spreaders or other practices may be required to maintain uniform flow of settled open feedlot effluent across the width of the VTA as flow moves downslope through the VTA.

*f. Soil permeability.* Soil permeability within the VIB and VTA must be from 0.6 to 2.0 inches per hour throughout the soil profile to a depth of five feet. Soil permeability must be verified by conducting on-site or laboratory soil permeability testing.

*g. Groundwater lowering system.* The seasonal high-water table within the VIB and the VTA must be capable of being lowered to a depth of four to five feet with a perimeter tile system installed outside of the VIB or VTA. Design information must be provided which demonstrates the adequacy of the proposed groundwater lowering system. The tile system must satisfy the following requirements:

(1) If the tile system does not have a surface outlet accessible on the property where the AT system is located, a device to allow monitoring of the water in the tile system and a device to allow shutoff of the flow in the tile system must be installed.

(2) Tile lines in the system must be installed horizontally at least 25 feet away from the outside toe of the berm of the VIB or VTA.

*h. Tile system to enhance infiltration within the VTA.* A tile system may be installed at the perimeter of the VTA cells to enhance infiltration within the VTA. The tile system must satisfy the following requirements:

(1) Tile lines shall be installed at the centerline of the berms of the VTA cells.

(2) The tile lines shall be constructed such that no settled open feedlot effluent can enter the lines except through infiltration through the soil profile.

(3) A shutoff valve and sampling point located downslope of the VTA cell shall be provided for each individual tile line. However, if multiple tile lines are brought together into a common tile line, a single shutoff valve and sampling point may be utilized.

(4) Monitoring of the tile lines must be conducted in accordance with the requirements of 65.104(9)“d”(2).

*i. Depth to sands, gravels, or glacial outwash.*

(1) VIB. A VIB is not allowed if the depth to sands, gravels, or glacial outwash is less than ten feet.

(2) VTA. A VTA is not allowed if the depth to sands, gravels, or glacial outwash is less than six feet.

(3) A soils investigation that documents sands found are in isolated sand lenses that will not have a significant impact on subsurface water flow or groundwater quality shall not prohibit use of the site.

*j. Depth to bedrock.* A minimum of ten feet of overburden or loose material must exist between the surface of the constructed VIB or VTA and underground bedrock.

*k. Flooding.* Both the VIB and the VTA must be constructed in areas which are not subject to flooding more frequently than once in 25 years.

*l. Distance to water bodies.* The following distances, measured along the path of water flow, shall be provided between the point of discharge from the VTA and the receiving water body.

(1) Designated use streams referenced in 567—subrule 61.3(5). A minimum distance of 500 feet or one-half foot distance per animal unit capacity of the open feedlot area which drains to the VTA, whichever is greater, shall be provided.

(2) All other uncrossable intermittent streams. A minimum distance of 200 feet shall be provided.

**65.110(7) Stand-alone VTA.**

*a. Computer modeling.* Results of predictive computer modeling for the proposed alternative technology system shall be used to determine suitability of the proposed site for the system and to predict performance of the alternative technology system as compared to the use of a 25-year, 24-hour runoff containment system, over a 25-year period. A summary of the computer modeling results shall be provided to the department.

*b. Size.* The computer model used to determine if the proposed AT system will meet the equivalent performance standard shall also be used to establish the minimum required size of the VTA. However, in no case shall the size of the VTA be less than the following:

(1) 50 percent of the total drainage area (feedlot and other) served if the soil permeability is from 0.6 to 2.0 inches per hour.

(2) 100 percent of the total drainage area (feedlot and other) served if the soil permeability is from 0.2 to 0.6 inches per hour.

*c. Slope.* The constructed VTA shall be level in one dimension and have a slight slope (maximum of 5 percent) in the other dimension.

*d. Berming.* The VTA must be bermed to prevent inflow of surface water from outside areas.

*e. Spreaders.* Settled open feedlot effluent must be discharged evenly across the top width of the VTA and allowed to slowly flow downslope through the VTA. Level spreaders or other practices may be required to maintain uniform flow of settled open feedlot effluent across the width of the VTA as flow moves downslope through the VTA.

*f. Soil permeability.* Soil permeability within the VTA must be from 0.2 to 2.0 inches per hour throughout the soil profile to a depth of five feet. Soil permeability must be verified by conducting on-site or laboratory soil permeability testing.

*g. Groundwater lowering system.* The seasonal high-water table within the VTA must be capable of being lowered to a depth of four to five feet with a perimeter tile system installed outside of the VTA. Design information must be provided which demonstrates the adequacy of the proposed groundwater lowering system. The tile system must satisfy the following requirements:

(1) If the tile system does not have a surface outlet accessible on the property where the AT system is located, a device to allow monitoring of the water in the tile system and a device to allow shutoff of the flow in the tile system must be installed.

(2) Tile lines in the system must be installed horizontally at least 25 feet away from the outside toe of the berm of the VTA.

*h. Tile system to enhance infiltration within the VTA.* A tile system may be installed at the perimeter of the VTA cells to enhance infiltration within the VTA. The tile system must satisfy the following requirements:

(1) Tile lines shall be installed at the centerline of the berms of the VTA cells.

(2) The tile lines shall be constructed such that no settled open feedlot effluent can enter the lines except through infiltration through the soil profile.

(3) A shutoff valve and sampling point located downslope of the VTA cell shall be provided for each individual tile line. However, if multiple tile lines are brought together into a common tile line, a single shutoff valve and sampling point may be utilized.

(4) Monitoring of the tile lines must be conducted in accordance with the requirements of 65.104(9)“d”(2).

*i. Depth to sands, gravels, or glacial outwash.* A VTA is not allowed if the depth to sands, gravels, or glacial outwash is less than six feet. A soils investigation that documents sands found are in isolated

sand lenses that will not have a significant impact on subsurface water flow or groundwater quality shall not prohibit use of the site.

*j. Depth to bedrock.* A minimum of ten feet of overburden or loose material must exist between the surface of the constructed VTA and underground bedrock.

*k. Flooding.* The VTA must be constructed in areas which are not subject to flooding more frequently than once in 25 years.

*l. Distance to water bodies.* The following distances, measured along the path of water flow, shall be provided between the point of discharge from the VTA and the receiving water body.

(1) Designated use streams referenced in 567—subrule 61.3(5). A minimum distance of 500 feet or one-half foot distance per animal unit capacity of the feedlot area which drains to the VTA, whichever is greater, shall be provided.

(2) All other uncrossable intermittent streams. A minimum distance of 200 feet shall be provided.