

 <p>CLEAR CREEK COUNTY Public and Environmental Health</p>	<p><b>Higher Level Treatment Systems</b></p>	<p><b>Section 19</b></p>
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**1. General Requirements**

- A. Higher level treatment systems may be public domain technology systems or proprietary systems.
- B. Public domain technology systems shall be designed, installed, and maintained according to established criteria and additional criteria established by the Department. When design criteria are not specifically provided in these Regulations, the criteria used in the design shall be from a reference commonly used as an industry standard and the criteria shall be cited in the design.
- C. Proprietary systems shall be designed, installed, and maintained according to manufacturer’s instructions and additional criteria identified by CDPHE as part of their Technology Review and Acceptance process pursuant to Section 43.13 of Regulation 43
- D. Reductions to soil treatment area or separation distances listed in Table A-1 of Appendix A may only apply provided when the system is inspected and maintained as specified in the requirements of Section 6. The owners of properties with higher level treatment systems shall obtain and maintain an operating permit issued by the Department.
- E. For higher level treatment systems or other components under an O&M contract, a clearly visible, permanently attached label, or plate giving instruction for obtaining service shall be placed at a conspicuous location.
- F. Soil treatment areas for higher level treatment systems shall be pressure dosed.
- G. All systems shall be capable of accommodating all anticipated flows and organic loads.
- H. Mechanical components shall be installed in a properly vented location and all vents, air intakes, and air hoses shall be protected from snow, ice, or water vapor accumulations.
- I. All systems shall be installed to include protection of openings against entry of insects, rodents, other vectors, and unauthorized people.

**2. Treatment Levels for Higher Level Treatment Systems**

- A. Treatment levels for proprietary treatment systems shall be assigned by CDPHE based on their Technology Review and Acceptance process and shall be used to size the STA in accordance with Section 18.
- B. Treatment levels for public domain higher level treatment systems are identified in Table 19-1.

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Table 19-1 Treatment Levels for Public Domain Higher Level Treatment Systems

Type of System	Treatment Level	Design Criteria
Mounded Sand Filters (mound systems)	TL2	Section 19.3.D
Lined Sand Filters (single pass)	TL3	Section 19.3.B
Lined Sand Filters (recirculating)	TL3N	Section 19.3.E

### 3. Sand Filters

#### A. Intermittent (Single Pass) Sand Filters

1. The filtering material used in a sand filter shall be clean, coarse sand, all passing a screen having four (4) meshes to the inch. The sand shall have an effective size between 0.25 and 0.60 mm. The uniformity coefficient shall be 4.0 or less. Material meeting ASTM 33, for concrete sand, with one (1) percent or less fines passing 200 mesh sieve may be used.
2. The sand below the distribution lines shall be at least two (2) feet deep.
3. Distribution system
  - a. Dispersal of effluent to the surface of the sand filter shall be by a pressurized distribution system for equal distribution.
  - b. Pipes used to disperse the effluent shall be surrounded by washed coarse screened gravel or crushed stone. All of the gravel or stone shall pass a 2 1/2-inch screen and shall be retained on a 3/4-inch screen.
  - c. Manufactured media may be used as an alternative to gravel or stone.
  - d. The separation distance between parallel distribution lines shall not exceed six (6) feet, and a distribution line shall be located within three (3) feet of each filter sidewall.
4. Application Rates
  - a. When receiving wastewater that meets TL1 treatment level, a maximum sand filter application rate of 1.0 gpd/ft<sup>2</sup> shall be used.
  - b. When receiving wastewater that meets TL2, TL2N, TL3, or TL3N treatment levels, the sand filter shall be sized based on the long-term acceptance rate for Soil Type 1.
  - c. An intermittent sand filter shall not be used to treat wastewater that does not conform to TL1 treatment level or better.

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### B. Lined Sand Filters

1. Lined sand filters shall have an impervious liner on the sides and bottom of the filter. The liner shall consist of a 30 mil thickness PVC material or equivalent.
2. A minimum four-inch diameter under-drain pipe shall be used. The under-drain pipe shall be surrounded by washed coarse screened gravel or crushed stone. All of the gravel or stone shall pass a 2 1/2 inch screen and shall be retained on a 3/4-inch screen. Manufactured media may be used as an alternative to gravel or stone.
3. Under-drain effluent collected below the sand filter shall be dispersed to a soil treatment area. The soil treatment area receiving the sand filter effluent may be sized with a long-term acceptance rate for TL3 treatment level effluent.

### C. Unlined (Open Bottom) Sand Filters

1. The bottom of the sand filter receiving TL1 treatment level shall be no less than two (2) feet above the high ground water surface or bedrock for installations in which effluent percolates downward through the soil.
2. The bottom of the sand bed receiving effluent greater than TL1 treatment level shall be at or above the high ground water surface or bedrock.
3. An unlined sand filter is to be sized based on Section 18.2 or the LTAR as set forth in Appendix C, whichever results in the larger area.

### D. Mounded Sand Filters (Mound Systems)

1. Effluent introduced into a mounded sand filter shall be pre-treated to TL1 treatment level or better.
2. When the infiltrative surface area of the media receiving wastewater effluent is above the natural ground surface, the system shall be considered a mounded sand filter.
3. Mounded sand filters shall conform to Section 19.3.C for unlined (open bottom) sand filters.
4. The basal area and linear loading rate shall be determined from the loading rate for the soil type under the mound and the slope of the site.
5. The final slope of the mound shall be no greater than three (3) feet horizontal to one (1) foot vertical.

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6. The surface of the mounded area shall be planted with a suitable vegetative cover that does not require irrigation.
7. If the thickness of the sand is at least two (2) feet, the treatment level for mounded sand filters is TL2 treatment level and it does not need an additional two-foot unlined sand filter.

### E. Recirculating Sand Filters

1. A recirculating sand filter shall have an impervious liner on the sides and bottom of the filter. The liner shall consist of a 30 mil thickness PVC material or equivalent.
2. A minimum four-inch diameter under-drain pipe shall be used. The under-drain pipe shall be surrounded by washed coarse screened gravel or crushed stone. All of the gravel or stone shall pass a 2 1/2 inch screen and shall be retained on a 3/4 inch screen. Manufactured media may be used as an alternative to gravel or stone.
3. Filter media effective size (D10) shall range from 1.0 to 1.50 millimeter and the uniformity coefficient (D60/D10) shall be less than 4.0. Fines passing a 200 mesh sieve shall be less than one (1) percent. Material meeting ASTM C33, for concrete sand, with one (1) percent or less fines passing 200 mesh sieve may be used.
4. Sand depth shall be a minimum of two (2) feet.
5. Typical loading rates are 3.0 to 5.0 gal/sq ft/day. Rate shall not exceed 5.0 gal/sq ft/day.
6. Design re-circulation ratios may be 3:1 to 5:1.
7. Effluent collected from the sand filter shall be discharged to a STA. The STA receiving the sand filter effluent may be sized with a LTAR for TL3N treatment level effluent.