

ALTERNATIVE SYSTEMS MANUAL

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ALTERNATIVE SYSTEMS MANUAL

1. General

1.1 General Conditions

1.1.1 This document establishes the allowed uses, the design and installation criteria and operational requirements of alternative septic systems that have been approved by the Missoula City-County Health Department.

1.1.2 Unless a provision under an alternative system provides otherwise, all rules pertaining to conventional drainfields and septic tanks apply to alternative systems.

1.1.3 Use of an alternative system may preclude future divisions of the property pursuant to State requirements. The applicant and future owners assume responsibility for any restrictions, liabilities or encumbrances that are caused by the use of an alternative system.

1.1.4 All alternative system designs must provide for replacement areas equivalent to those required for conventional systems.

1.2 Applicable Rules and Design Manuals

1.2.1 Applicable rules and design manuals are available at the Health Department at 301 West Alder in Missoula and on the Environmental Health Website (www.co.missoula.mt.us/EnvHealth/IndSepticSys/issindex.html). At the time of adoption, the documents were also available at the websites listed below. Copy fees apply to documents picked up at the Health Department.

1.2.2 Section IX, Regulation 1, Missoula City-County Health Code (Health Code), sets forth the conditions for approval and use of alternative systems. Available at www.co.missoula.mt.us/EnvHealth/EnvHlthDiv/Regulations/MCCHC2004/hlthcodemain.html.

1.2.3 Alternative systems must be designed in accordance with the Department of Environmental Quality (DEQ) Circular 4, "Montana Standards for Subsurface Wastewater Treatment Systems," 2004 Edition (DEQ 4) except when noted otherwise in this manual. Available at www.deq.mt.gov/wqinfo/Circulars/DEQ42004Edition.pdf

1.2.4 The Wisconsin Mound Soil Absorption System: Siting, Design and Construction Manual, Edition 2000 (Wisconsin Manual), sets forth siting, design and construction requirements for elevated sand mounds. Available at: http://www.soils.wisc.edu/sswmp/SSWMP_15.24.pdf

1.2.5 The DEQ "List of Subsurface Wastewater Treatment Systems (SWTS) that are Approved as a Nitrogen Reducing System" (Approved Systems for Nitrogen Reduction) governs which systems can be used for nitrogen reduction. Approved systems are listed in Appendix A of this manual.

1.2.6 DEQ Circular 2, “Design Standards for Wastewater Facilities”, 1999 Edition (DEQ 2) applies to Wastewater Reclamation and Reuse systems. Available at <http://www.deq.state.mt.us/wqinfo/Circulars/DEQ2.pdf>

1.2.7 The United States Environmental Protection Agency’s (EPA) “Design Manual for Land Treatment of Municipal Wastewater”, Chapter 4 (EPA 625/1-81-013) or succeeding documents, applies to Wastewater Reclamation and Reuse systems. Available at <http://www.epa.gov/nrmrl/pubs/625181013/625181013FrontMatter.pdf>

2. Shallow Drainfields

2.1 Definition

Shallow drainfields are conventional drainfields installed less than 24" deep.

2.2 Use

Shallow drainfields may be used where depth to seasonal high groundwater, bedrock or any limiting layer is 5 feet or more from the natural ground surface.

2.3 Design

2.3.1 **Pressure distribution is required.**

2.3.2 Trenches must be at least 12" deep.

2.3.3 The system must meet the cap requirements of DEQ 4, Section 8.3.2.5.

2.3.4 Soil texture used for the cap must be the same or one textural class finer than the natural topsoil.

2.3.5 A minimum of ten (10) feet must separate the edge of the fill and the nearest trench sidewall.

2.3.6 The cap must be fenced from livestock and protected from any potentially damaging conditions.

2.4 Construction

Unless otherwise stated on the permit, the capping fill system must be constructed as follows:

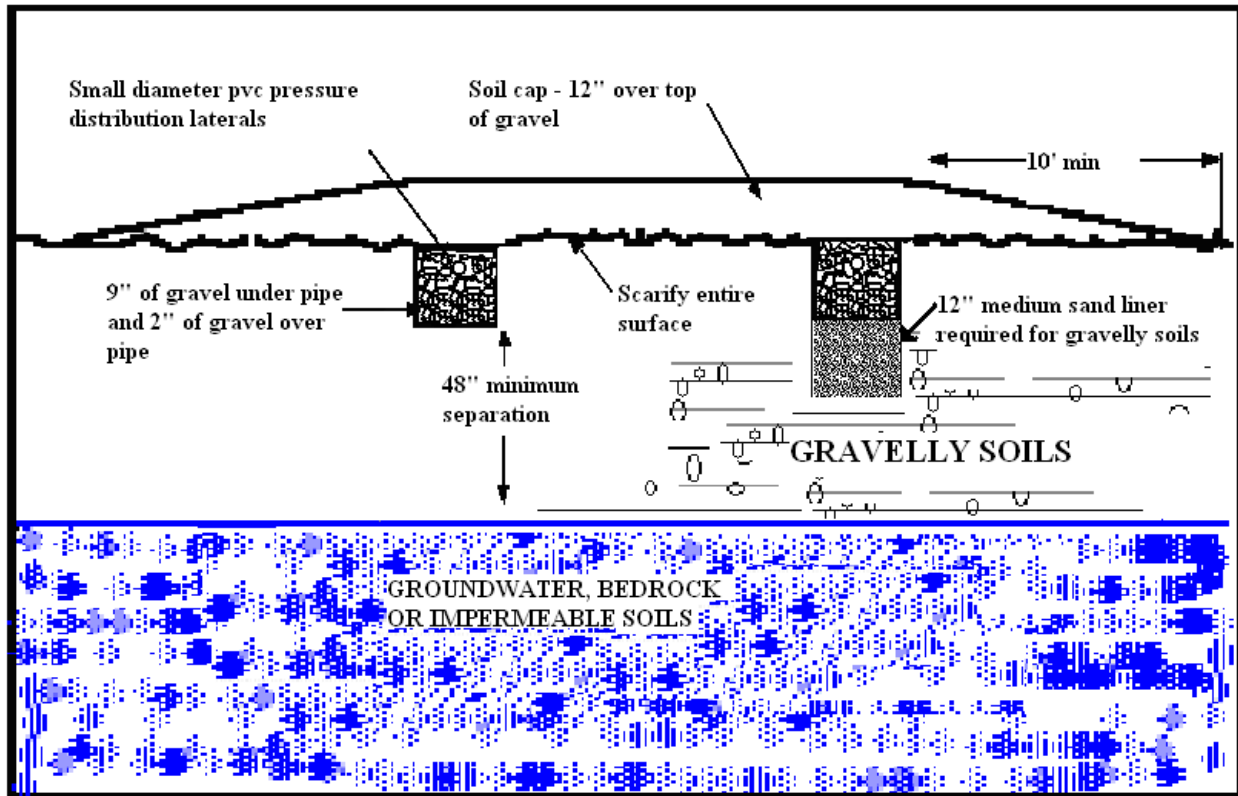
2.4.1 Capping fill systems must be installed during dry weather conditions when the moisture content of the soil is low enough to prevent the loss of soil structure.

2.4.2 The absorption system site and the site from which the fill material is taken must be scarified to destroy vegetation.

2.4.3 The fill must be applied to the absorption system site and worked in so that the original soil and fill soil are mixed. The fill material must be evenly graded to a final depth of 16 inches over the drainfield gravel. The trench fill and the cap must be placed over the system at the same time.

2.4.4 The cap must be seeded.

**FIGURE 2.1
CROSS SECTION OF SHALLOW
DRAINFIELD**



2.5 Inspections

All shallow drainfields must receive two inspections including:

- 2.5.1 A pre-cover inspection of the installed absorption system, scarification areas, and cap material; and
- 2.5.2 A final inspection after the cap is installed.

3. Deep Absorption Trenches

3.1 Definition

Deep absorption trenches are drainfields with trenches more than thirty-six inches deep, which break through a less permeable soil to a more permeable soil layer below.

3.2 Use

Deep absorption trenches may be used to break through a less permeable soil layer and allow effluent to infiltrate a deeper and more permeable soil.

3.3 Design

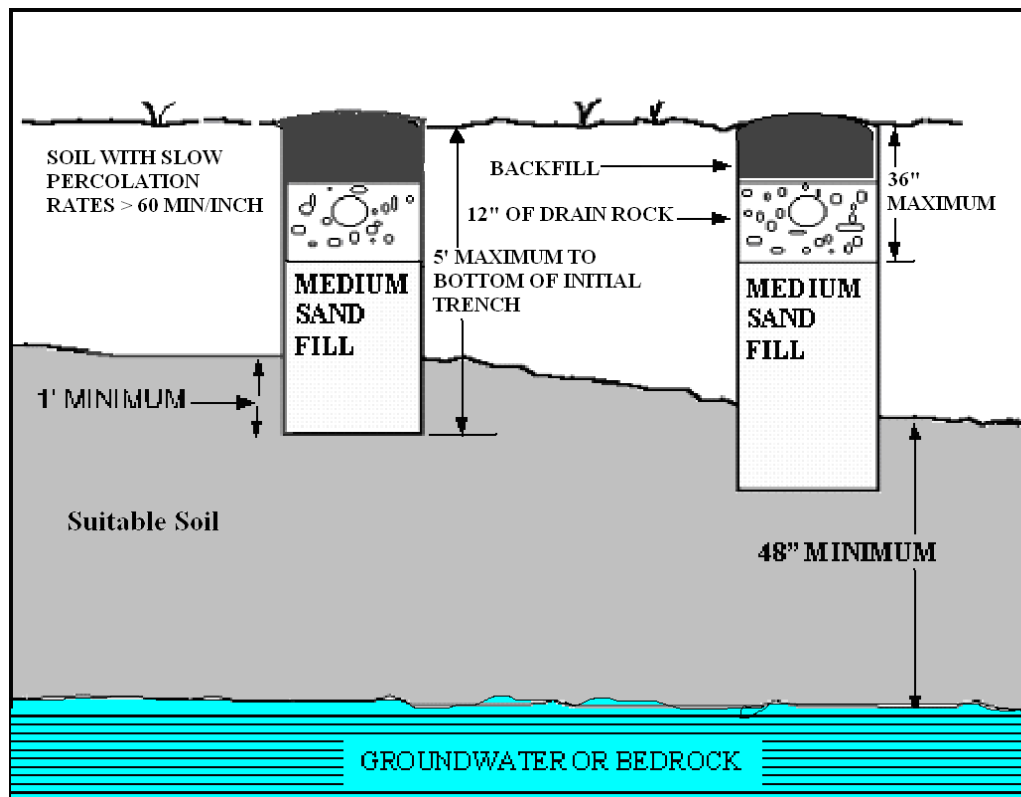
3.3.1 Deep absorption trenches must be constructed using the criteria in DEQ 4, Edition 2004, Chapter 10, in addition to the requirements of this section.

3.3.2 The bottom of the trench may not be more than 5 feet below natural ground surface.

3.3.3 The suitable soil below the less permeable soil must be at least 48" thick above a limiting layer. (See Figure 3.1.)

3.3.4 The trenches must be filled with medium sand to the level of a standard absorption trench.

**FIGURE 3.1
DEEP ABSORPTION TRENCH CROSS SECTION**



4. Elevated Sand Mounds

4.1 Definition

Elevated sand mounds are absorption systems installed above natural ground in a mound of medium sand. A typical mound system is depicted in Figure 4.1.

4.2 Use

Elevated sand mounds may be used to maintain separation between high seasonal groundwater, bedrock, or impermeable layers when these limiting layers are more than 4 feet and less than 6 feet from the natural ground surface.

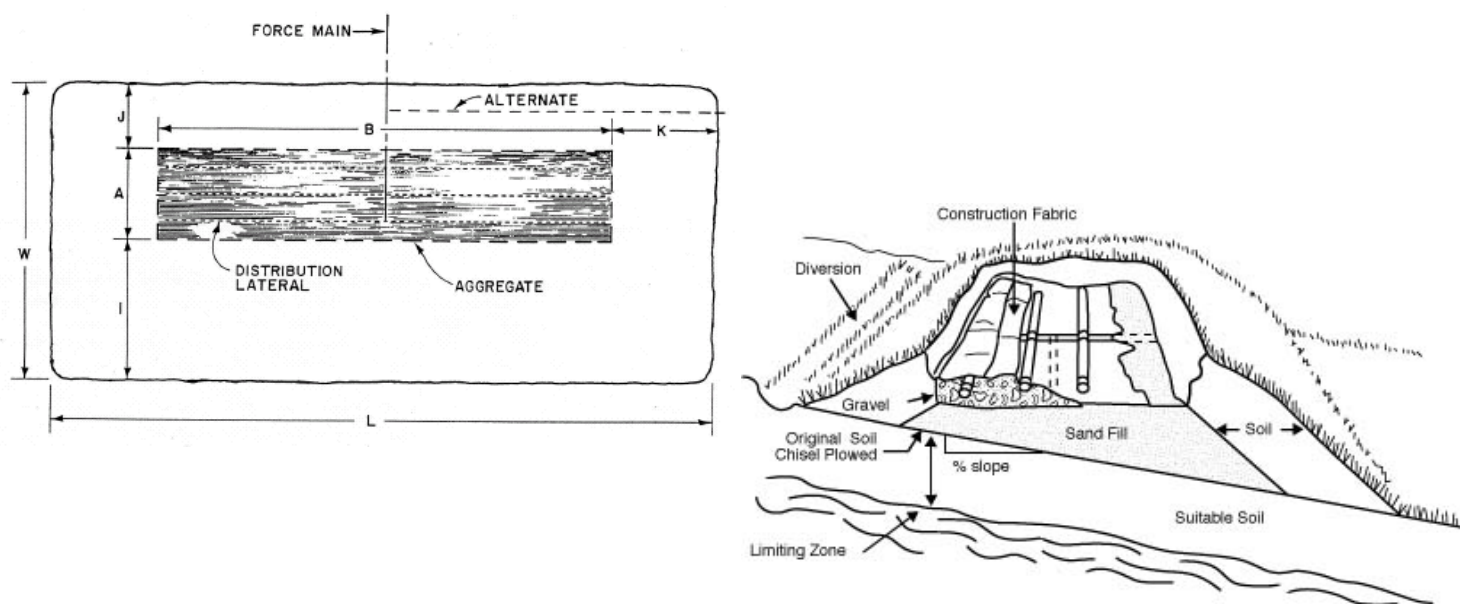
4.3 Design

4.3.1 Elevated Sand Mounds must be sited, designed and constructed in accordance with DEQ 4, Edition 2004, Chapter 11 & 14 and the Wisconsin Mound Soil Absorption System: Siting, Design and Construction Manual, January, Edition 2000, in addition to the requirements of this section.

4.3.2 Linear and basal loading rates from the Wisconsin Manual must be used.

4.3.3 The maximum application rate for mound trench design is 0.8 gallons per square foot per day.

FIGURE 4.1
ELEVATED SAND MOUND
(as depicted in Wisconsin Manual)

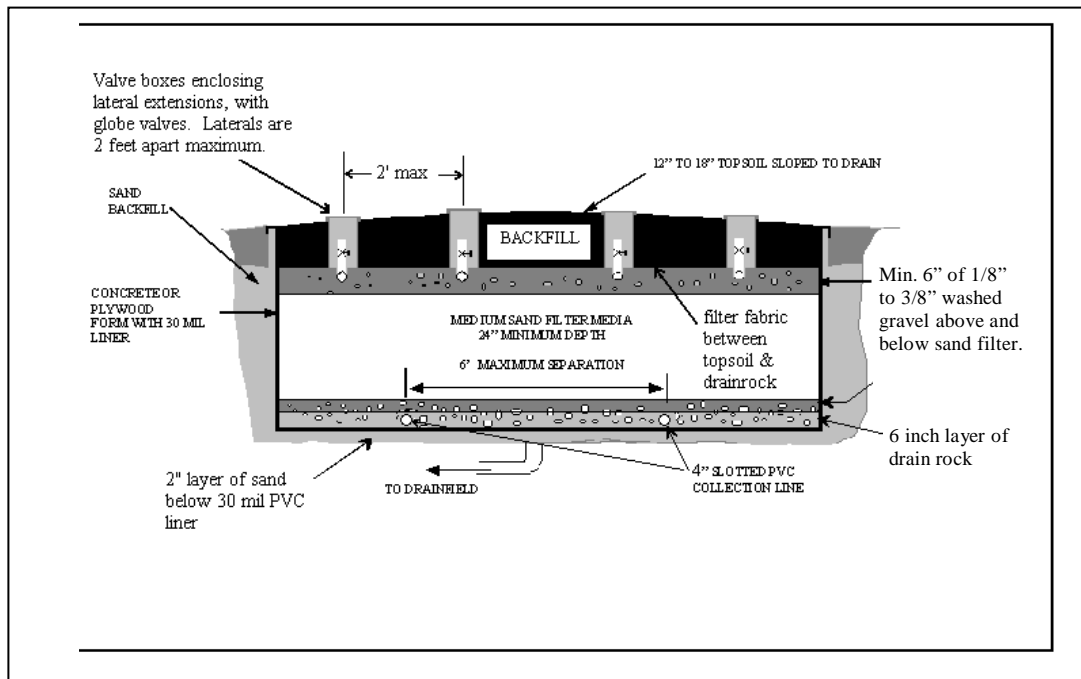


5. INTERMITTENT SAND FILTER

5.1 Definition

Intermittent sand filters (ISF) are sand-filled chambers or boxes used to filter or treat primary effluent from a septic tank or other type of primary treatment device. The filters are dosed intermittently and the effluent is disposed of in a drainfield or other approved wastewater treatment system allowed by the Health Code. Figure 5.1 depicts the cross section of a typical ISF.

**FIGURE 5.1
INTERMITTENT SAND FILTER**



5.2 Use

Intermittent Sand Filters may be used for improving effluent quality (including reducing nitrogen when approved by DEQ and listed in Appendix A of this manual) before disposal in any approved system.

5.3 Design

5.3.1 Intermittent Sand Filters (ISF) must be designed in accordance with DEQ 4, Edition 2004, Chapter 15 in addition to the requirements of this section.

5.3.2 **No reduction in drainfield size is allowed for drainfields installed in soil that is finer than silt loam or with an average percolation rate slower than 60 minutes per inch.** These soils include clay, silty clay, sandy clay, silty clay loam, sandy clay loam and clay loam.

5.4 Construction

5.4.1 A perimeter support frame, made of plywood or concrete, must be used to hold the liner in place during construction. Sand must be placed between frame supports structure supports and

the excavated soil while the filter media is being installed to keep the framework and liner vertical during construction. The frame may not have any nails or sharp objects located on the inside where they may puncture the liner.

5.5 Maintenance

5.5.1 Intermittent Sand filters must be operated and maintained to ensure they work as designed. At a minimum:

5.5.1.1. Septic tanks must be inspected every year and pumped at least every fourth year.

5.5.1.2 Filters must be inspected every year. If effluent begins to pond above the distribution line, the filter media must be replaced. The system must be repaired or replaced before the effluent ponds above the level of the washed drain rock.

5.5.1.3 The distribution system must be inspected every year and flushed when needed.

5.5.2 A maintenance and operation plan is required which ensures maintenance will occur as required by this section and which includes a funding mechanism for repairs and replacement.

5.5.3 Proposed subdivisions with three or more lots that are or will be served with individual, shared, multi-family and community systems with intermittent sand filters must provide a Maintenance Special Improvement District, a Sewer and Water District or other mechanism providing equivalent institutional and financial stability, as approved by the Department.

5.5.4 The owner of an individual lot with an intermittent sand filter system is responsible for its maintenance and operation. A maintenance and operation plan must be signed by the owner and attached to the septic permit at the time of issuance.

5.5.5 Owners of individual lots who apply for a permit for an intermittent sand filter shall execute a deed restriction requiring on-going operation and maintenance of the system and waiving the option to protest the creation of a Maintenance Special Improvement District, a Sewer and Water District, or other approved mechanism instituted to ensure maintenance of the sand filter system, using the language set forth below. The filing of a deed restriction is not required if previously filed for the same parcel, or where similar language has been shown on an approved and filed subdivision plat.

"I/We, the undersigned, hereby certify that I/we are the owners of the real property located at (legal description) and hereby agree to operate and maintain the intermittent sand filter as stated in the operation and maintenance plan on file with the Missoula City-County Health Department and I/we waive the option to protest an RSID or SID affecting said property for the purpose of financing the maintenance, repair or replacement of the sand filter system serving said property. Further, my/our signatures on this waiver may be used in lieu of my/our signature(s) on an RSID or SID petition for the creation of one or more RSIDs or SIDs for the purpose of financing the maintenance and repair or replacement of the sand filter system used for the above-described property. This deed restriction is granted to the County or City of Missoula in exchange for permission to discharge sewage into the ground until such time that public sewer is installed.

6. RECIRCULATING SAND FILTERS

6.1 Definition

Recirculating Sand Filters (RSF) are “pea gravel” (or similar material) filled chambers or boxes used to filter or treat primary effluent from a septic tank or other type of primary treatment device. The filter has a tank that circulates the filtered effluent back through the filter using a minimum equivalent of 4 passes through the filter. The effluent is disposed of in a drainfield or other approved wastewater treatment system. Figure 6.1 depicts the cross-section of a typical RSF.

6.2 Use

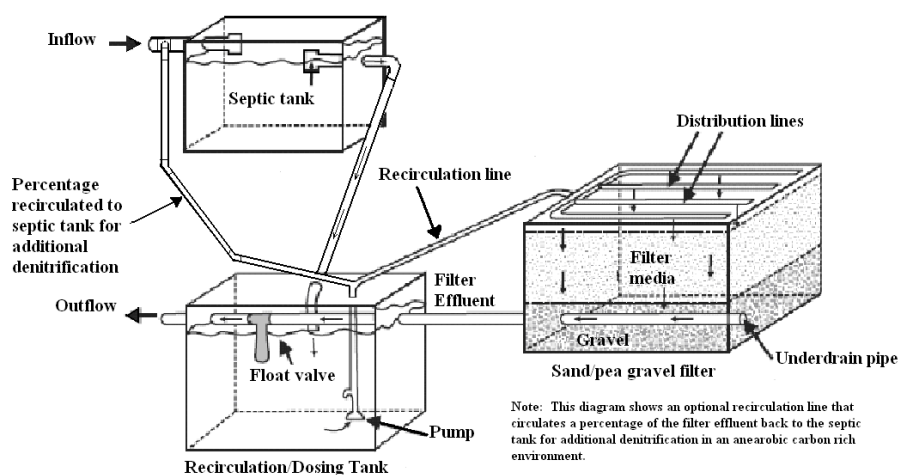
Recirculating Sand Filters may be used for improving effluent quality (including reducing nitrogen when approved by DEQ and listed in Appendix A of this manual) before disposal in an approved system.

6.3 Design

6.3.1 Recirculating Sand Filters must be designed in accordance with DEQ 4, Edition 2004, Chapter 16, in addition to the requirements of this section.

6.3.2 **No reduction in drainfield size is allowed for drainfields installed in soil that is finer than silt loam or with an average percolation rate slower than 60 minutes per inch.** These soils include clay, silty clay, sandy clay, silty clay loam, sandy clay loam and clay loam.

**FIGURE 6.1
RECIRCULATING SAND FILTER**



6.4 Construction

A plywood or concrete perimeter support frame is required to hold the liner in place during construction. Sand must be placed between structure supports and the excavated soil while the filter media is being installed to keep the framework and liner vertical during construction. The

frame may not have any nails or sharp objects located on the inside where they may puncture the liner.

6.5 Maintenance

6.5.1 Recirculating sand filters must be operated and maintained to ensure they work as designed. At a minimum:

6.5.1.1. Septic tanks must be inspected every year and pumped at least every fourth year.

6.5.1.2 Filters must be inspected every year. If effluent begins to pond above the distribution line, the filter media must be replaced. The system must be repaired or replaced before the effluent ponds above the level of the washed drain rock.

6.5.1.3 The distribution system must be inspected every year and flushed when needed.

6.5.2 A maintenance and operation plan is required which ensures maintenance will occur as required by this section and which includes a funding mechanism for repairs and replacement.

6.5.3 Proposed subdivisions with three or more lots that are or will be served with individual, shared, multi-family and community systems with recirculating sand filters must provide a Maintenance Special Improvement District, a Sewer and Water District or other mechanism providing equivalent institutional and financial stability, as approved by the Department.

6.5.4 The owner of an individual lot with an recirculating sand filter system is responsible for its maintenance and operation. A maintenance and operation plan must be signed by the owner and attached to the septic permit at the time of issuance.

6.5.5 Owners of individual lots who apply for a permit for an recirculating sand filter shall execute a deed restriction requiring on-going operation and maintenance of the system and waiving the option to protest the creation of a Maintenance Special Improvement District, a Sewer and Water District, or other approved mechanism instituted to ensure maintenance of the sand filter system, using the language set forth below. The filing of a deed restriction is not required if previously filed for the same parcel, or where similar language has been shown on an approved and filed subdivision plat.

"I/We, the undersigned, hereby certify that I/we are the owners of the real property located at (legal description) and hereby agree to operate and maintain the recirculating sand filter as stated in the operation and maintenance plan on file with the Missoula City-County Health Department and I/we waive the option to protest an RSID or SID affecting said property for the purpose of financing the maintenance, repair or replacement of the recirculating sand filter system serving said property. Further, my/our signatures on this waiver may be used in lieu of my/our signature(s) on an RSID or SID petition for the creation of one or more RSIDs or SIDs for the purpose of financing the maintenance and repair or replacement of the sand filter system used for the above-described property. This deed restriction is granted to the County or City of Missoula in exchange for permission to discharge sewage into the ground until such time that public sewer is installed.

7. RECIRCULATING TRICKLING FILTERS

7.1 Definition

Recirculating Trickling Filters (RTF's) use aerobic, attached-growth treatment processes to biologically oxidize organic material and convert ammonia to nitrate (nitrification). A trickling filter consists of a bed of highly permeable medium to which a bio-film adheres. Wastewater is applied to the top of the bed and it trickles through the media. Microorganisms in the bio-film degrade organic material and may also nitrify the wastewater. An under-drain system collects the treated wastewater and any sloughed solids and transports it to a settling tank, from which it is recirculated through the trickling filter. The effluent is disposed of in a drainfield or other approved wastewater treatment system. Figure 7.1 depicts the cross section of a typical RTF.

7.2 Use

Recirculating Trickling Filters may be used for improving effluent quality (including reducing nitrogen when approved by DEQ and listed in Appendix A of this manual) before disposal in any approved system.

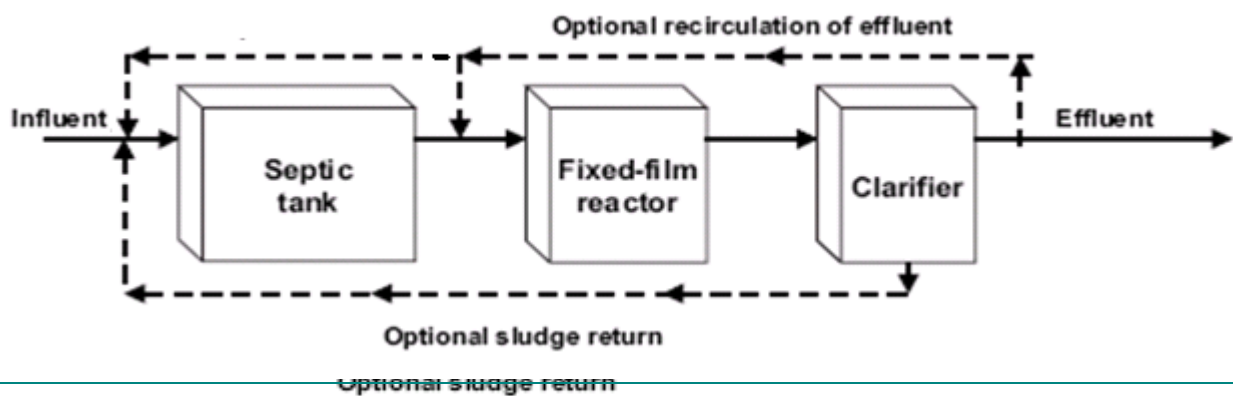
7.3 Design & Construction

7.3.1 Recirculating Trickling Filters (RSF) must be designed and constructed in accordance with DEQ 4, Edition 2004, Chapter 17 in addition to the requirements of this section.

7.3.2 **No reduction in drainfield size is allowed for drainfields in soil that is finer than silt loam or with an average percolation rate slower than 60 minutes per inch.** These soils include clay, silty clay, sandy clay, silty clay loam, sandy clay loam and clay loam.

7.3.3 Package designs may be used if engineered specifications are included with the permit application and are approved by the Department.

FIGURE 7.1
RECIRCULATING TRICKLING FILTER



7.4 Maintenance

7.4.1 Recirculating trickling filters must be operated and maintained to ensure they work as designed. At a minimum:

7.4.1.1. Septic tanks must be inspected every year and pumped at least every fourth year.

7.4.1.2 Filters must be inspected every year. If effluent begins to pond above the distribution line, the filter media must be replaced. The system must be repaired or replaced before the effluent ponds above the level of the washed drain rock.

7.4.1.3 The distribution system must be inspected every year and flushed when needed.

7.4.2 A maintenance and operation plan is required which ensures maintenance will occur as required by this section and which includes a funding mechanism for repairs and replacement.

7.4.3 Proposed subdivisions with three or more lots that are or will be served with individual, shared, multi-family and community systems with recirculating trickling filters must provide a Maintenance Special Improvement District, a Sewer and Water District or other mechanism providing equivalent institutional and financial stability, as approved by the Department.

7.4.4 The owner of an individual lot with an recirculating trickling filter system is responsible for its maintenance and operation. A maintenance and operation plan must be signed by the owner and attached to the septic permit at the time of issuance.

7.4.5 Owners of individual lots who apply for a permit for an recirculating trickling filter shall execute a deed restriction requiring on-going operation and maintenance of the system and waiving the option to protest the creation of a Maintenance Special Improvement District, a Sewer and Water District, or other approved mechanism instituted to ensure maintenance of the sand filter system, using the language set forth below. The filing of a deed restriction is not required if previously filed for the same parcel, or where similar language has been shown on an approved and filed subdivision plat.

"I/We, the undersigned, hereby certify that I/we are the owners of the real property located at (legal description) and hereby agree to operate and maintain the recirculating trickling filter as stated in the operation and maintenance plan on file with the Missoula City-County Health Department and I/we waive the option to protest an RSID or SID affecting said property for the purpose of financing the maintenance, repair or replacement of the recirculating trickling filter system serving said property. Further, my/our signatures on this waiver may be used in lieu of my/our signature(s) on an RSID or SID petition for the creation of one or more RSIDs or SIDs for the purpose of financing the maintenance and repair or replacement of the recirculating trickling filter system used for the above-described property. This deed restriction is granted to the County or City of Missoula in exchange for permission to discharge sewage into the ground until such time that public sewer is installed.

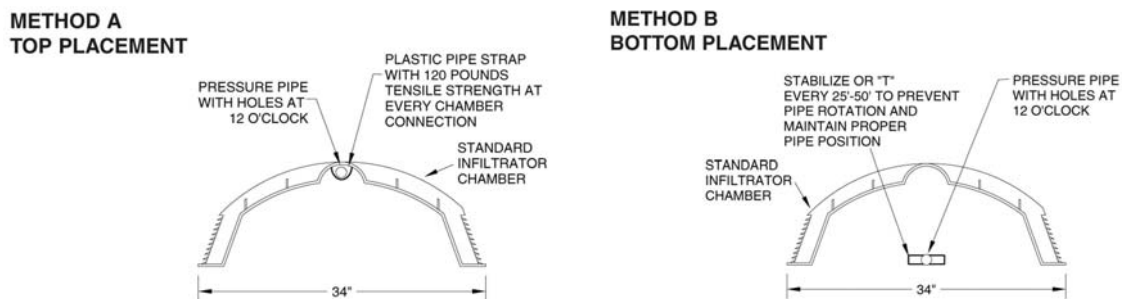
8. LEACHING CHAMBERS

8.1 Definition

8.1.1. Leaching chambers are plastic (often polyolefin) chambers with an open bottom, structurally designed to carry the earth loading. Figure 8.1 shows a typical cross section of a leaching chamber installed with pressure distribution.

8.1.2 The Department considers leaching chambers to be conventional systems for the purpose of who can install them (Class II certified installers) and the septic permit fees charged.

FIGURE 8.1
CUT AWAY OF A TYPICAL LEACHING CHAMBER SYSTEM
(Images courtesy of Infiltrator Systems)



8.2 Use

8.2.1 Leaching chambers made of high density polyolefin or other approved material may be used as an alternative to a gravel-filled trench.

8.3 Design

8.3.1 Leaching chamber systems must meet the requirements of DEQ 4, Chapter 13.

8.4 Construction

8.4.1 Installers shall follow manufacturer's recommendations for construction, in addition to the construction requirements required by this section.

8.4.2 Leaching chambers must have at least 6" of cover and be compacted by foot compression along the sides of the chamber to provide support for the chambers.

8.4.3 In clay soils, the space between the louvers of chamber systems and the trench sidewall must be filled with loam or sandy soil. Clay type soil (soils finer than silt loam), including clay, sandy clay, silty clay, sandy clay loam, silty clay loam and clay loam may not be used to back fill the trenches.

8.4.4 For installations with pressure distribution, the following requirements apply:

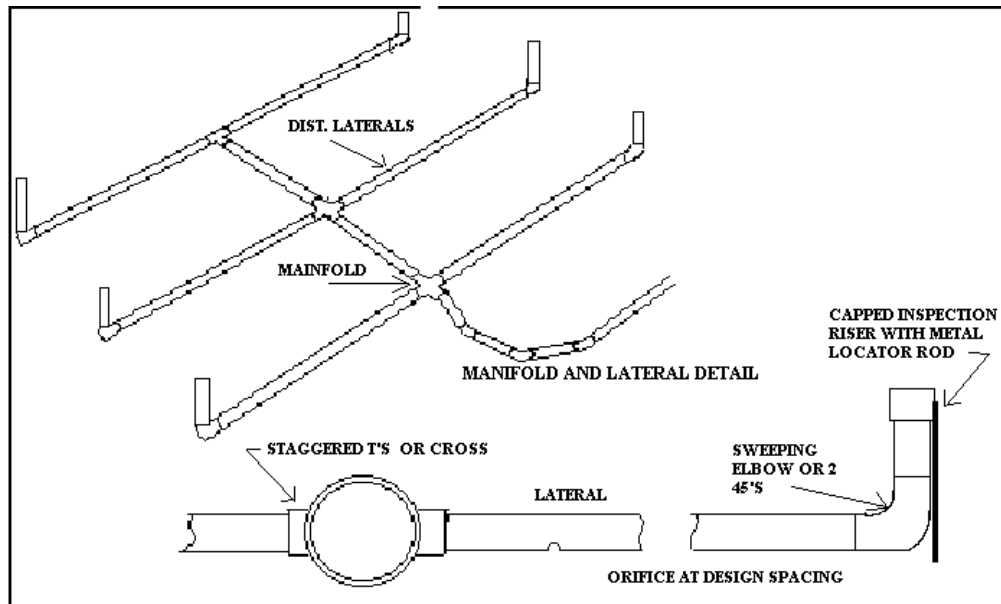
8.4.4.1 For installations with pipe hung in the top of the chamber (see Figure 8.1) the pipes must be secured with plastic strap with a minimum 120 pounds of tensile strength.

8.4.4.2 For installations with pipe placed directly on the trench bottom (see Figure 8.1) stabilizing T's must be installed every 25 to 50 feet to prevent pipe rotation and maintain orifice position. Stabilizing T's are only required when the lateral is more than 50 feet long.

8.4.4.3 Orifices must be placed at the 12 o'clock position, except the first and last orifice must be faced down and have an orifice shield placed over them to allow for drainage of the pipe.

8.4.4.4 Access for pipe maintenance and flushing must be provided at the end of the system. (Figure 8.2 below shows an example of an access port.)

FIGURE 8.2



9. MEDIUM SAND-FILLED DRAINFIELD SITE

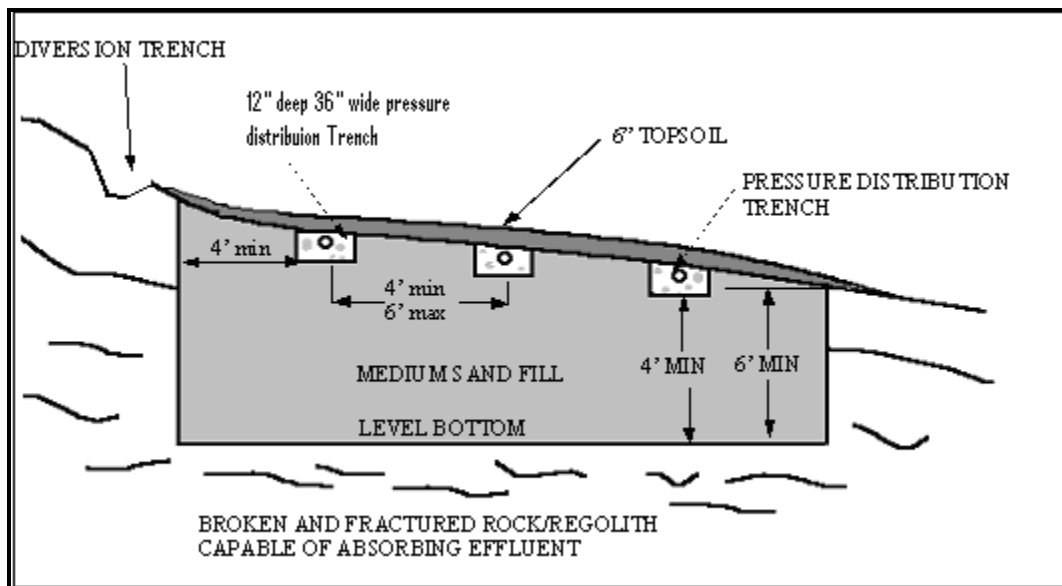
9.1 Definition

Sand-filled drainfield sites are excavations that are filled with medium sand to the extent necessary to provide the minimum separations to limiting layers required for a conventional system.

9.2 Use

Medium sand-filled drainfields may only be used to obtain separation from broken or fractured rock/regolith on existing lots or parcels. Medium sand-filled drainfields are not allowed in solid or unfractured bedrock. Only one system serving a single-family dwelling or structure with a maximum sewage flow of 350 gallons per day is allowed per lot or parcel.

FIGURE 9.1
MEDIUM SAND-FILLED DRAINFIELD SITE



9.3 Design

9.3.1 Three percolation tests evenly spaced throughout the basal (or bottom) area are required for system sizing and ensuring the site is capable of absorbing effluent. The Department may deny a permit for a sand-filled drainfield site if it determines that there is inadequate fracturing of the underlying material or if there is evidence of aquifer contamination in the area.

9.3.2 The effluent application rate for the basal (or bottom) area is determined using the criteria in Table 2 of the Wisconsin Sand Mound Manual.

9.3.3 Trenches must be a minimum of 4 feet and a maximum of 6 feet apart, measured from pipe to pipe. Trenches must be a minimum of 4 feet and a maximum of 6 feet from the side wall, measured from the edge of the trench.

9.3.4 The minimum amount of trench used for distributing the effluent is determined using an application rate of .8 gallons/square-foot/day. The Department may require a larger distribution system based on the required bottom area and the maximum separations allowed in 9.3.3.

9.3.5 The bottom of the excavation must be substantially level.

9.3.6 A minimum of 4' of medium sand must surround the sides and ends of the drainfield trench; and a minimum of 4' of medium sand must be placed below the distribution trench bottom.

9.3.7 The medium sand fill (USDA Soils Classification) must be approved by the Department. The Department may require a sieve analysis to ensure the sand meets specifications for medium sand.

9.3.8 Pressure distribution is required.

9.3.9 Water must be diverted away from the site using berms or trenches to prevent infiltration of run-off into the drainfield.

9.3.10 Horizontal setback distances required by Table 1 of the Health Code, Regulation 1 are measured from the edge of the sand fill.

9.4 Inspections

9.4.1 The Department must inspect the site twice: once after the site has been excavated to ensure adequate fracturing of underlying material and again after the trenches have been installed.

10. Evapotranspiration Absorption Systems

10.1 Definition

Evapotranspiration absorption (ETA) systems are absorption beds or trenches designed to provide for the absorption and evaporation of effluent. The systems are designed to store effluent through months when evaporation is low until dryer, warmer months when evaporation is high. The systems also use absorption of effluent to minimize the amount of storage required.

10.2 Use

Evapotranspiration absorption systems may be used in soils with percolation rates that are slower than 120 minutes per inch and where a design is submitted showing that total water lost through evaporation and absorption equals or exceeds the total water gained through precipitation and effluent discharge.

10.3 Design

10.3.1 ETA systems must be designed in accordance with DEQ 4, 2004 Edition, Chapter 18 in addition to the requirements of this section.

10.3.2 ETA systems installed on land with a slope greater than 6 percent must use a maximum 36-inch-wide beds with 4 foot separation between trench sidewalls.

10.3.3 Drain rock (3/4" to 2 1/2") must be used for a minimum of 24" below and 2" above the distribution laterals.

10.3.4 For soils with percolation rates of up to 300-minutes per inch, ETA systems must be designed using an absorption rate of .15 gallons per day per square foot. For soils with percolation rates slower than 300 minutes per inch the application rate is determined using the formula $2.4/\text{sq. rt. } T$, where T is the percolation rate in minutes per inch.

10.4 Construction

Construction must be completed in accordance with requirements found in DEQ 4, 2004 Edition, Chapter 18.

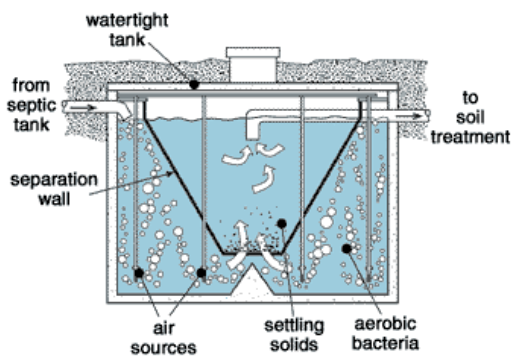
11. AEROBIC WASTEWATER TREATMENT UNITS

11.1 Definition

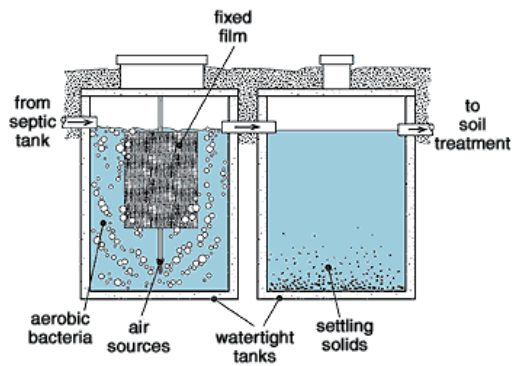
Aerobic Treatment Units (ATUs) refer to a broad category of engineered wastewater treatment devices designed to oxidize both organic material and ammonium-nitrogen (to nitrate nitrogen), decrease suspended solids concentrations and reduce pathogen concentrations. They include units referred to as suspended growth ATUs, fixed film reactor ATUs and sequencing batch reactor ATUs as depicted in Figure 11.1.

Figure 11.1
Suspended Growth, Fixed Film and Sequencing Batch ATUs

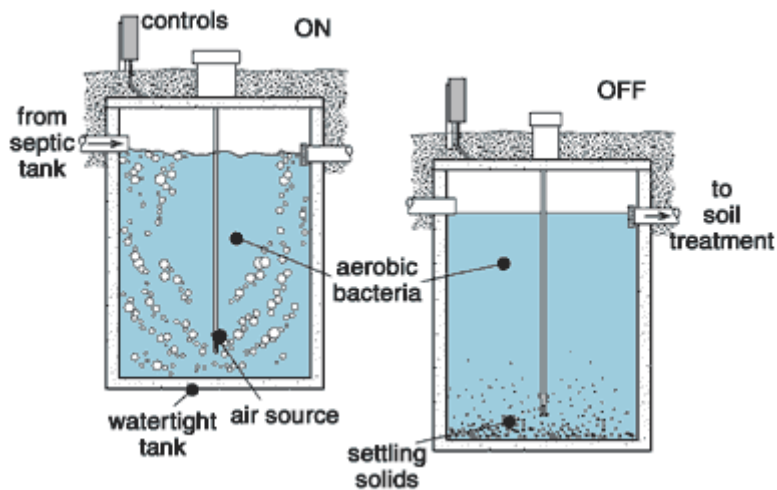
Suspended Growth Reactor



Fixed Film Reactor



Sequencing Batch Reactor



11.2 Use

ATUs may be used for improving effluent quality (including reducing nitrogen when approved by DEQ and listed in Appendix A of this manual) before disposal in any approved system.

11.3 Design

11.3.1 ATUs must be designed and installed in accordance with DEQ 4, 2004 Edition, Chapter 20.

11.4 Maintenance

11.4.1 ATUs must meet the operation and maintenance criteria in DEQ 4, 2004 Edition, Chapter 20, in addition to the criteria in this section.

11.4.2 ATUs must be operated and maintained to ensure they work as designed.

11.4.2 A maintenance and operation plan is required which ensures maintenance will occur as required by this section and which includes a funding mechanism for repairs and replacement.

11.4.3 Proposed subdivisions with three or more lots that are or will be served with individual, shared, multi-family and community systems with ATUs must provide a Maintenance Special Improvement District, a Sewer and Water District or other mechanism providing equivalent institutional and financial stability, as approved by the Department.

11.4.4 The owner of an individual lot with an ATU system is responsible for its maintenance and operation. A maintenance and operation plan must be signed by the owner and attached to the septic permit at the time of issuance.

11.4.5 Owners of individual lots who apply for a permit for an ATU shall execute a deed restriction requiring on-going operation and maintenance of the system and waiving the option to protest the creation of a Maintenance Special Improvement District, a Sewer and Water District, or other approved mechanism instituted to ensure maintenance of the sand filter system, using the language set forth below. The filing of a deed restriction is not required if previously filed for the same parcel, or where similar language has been shown on an approved and filed subdivision plat.

"I/We, the undersigned, hereby certify that I/we are the owners of the real property located at (legal description) and hereby agree to operate and maintain the aerobic treatment unit (ATU) as stated in the operation and maintenance plan on file with the Missoula City-County Health Department and I/we waive the option to protest an RSID or SID affecting said property for the purpose of financing the maintenance, repair or replacement of the ATU system serving said property. Further, my/our signatures on this waiver may be used in lieu of my/our signature(s) on an RSID or SID petition for the creation of one or more RSIDs or SIDs for the purpose of financing the maintenance and repair or replacement of the ATU system used for the above-described property. This deed restriction is granted to the County or City of Missoula in exchange for permission to discharge sewage into the ground until such time that public sewer is installed.

12. WASTEWATER RECLAMATION AND REUSE REQUIREMENTS

12.1 Definition.

Land application of municipal sewage is an alternative to traditional methods of municipal waste treatment and septic systems. Persons wanting to land apply treated sewage, use it for some other beneficial use, or install a lagoon must comply these requirements.

12.2 Applicability and Purpose

12.2.1 The purpose of Missoula City-County wastewater reclamation and reuse requirements are to protect public health, safety and welfare of those persons who may come in contact with treated wastewater and those using surface and groundwater in Missoula County. The requirements shall be broadly construed to affect their purpose. Wastewater reclamation and reuse systems are alternative treatment systems, as defined in the Missoula City-County Health Code.

12.2.2 These requirements do not relieve a person from the requirements of any other federal, state, or local regulation, and shall supplement Montana Department of Environmental Quality (DEQ) Circular WQB 2, Design Standards for Wastewater Facilities, 1995 edition, as amended. If Missoula City-County Wastewater reclamation requirements are more stringent than the requirements of DEQ Circular 2, County requirements govern.

12.2.3 In addition to requirements in this chapter, reclamation plants and use areas must meet the requirements of Section I(A) and Section IX of the Missoula City-County Health Code, with the exception of Section I (2)(A).

12.3 Definitions

12.3.1 *Alarm* means an instrument or device which continuously monitors a specific function of a treatment process and automatically gives warning of an unsafe or undesirable condition by means of visual, electronic or audible signal.

12.3.2 *Approved Laboratory Method* means those specified in the latest edition of Standard Methods for the Examination of Water and Wastewater, prepared and published jointly by the American Public Health Association, the American Water Works Association, and the Water Environment Federation, and which are conducted in laboratories approved or accredited by the Montana Department of Environmental Quality (DEQ).

12.3.3 *Class A Reclaimed Water* means water that, at a minimum, is all times oxidized, coagulated, filtered, disinfected wastewater. The wastewater shall be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 per 100 milliliters, as determined from the results of samples required in Table 2, and the number of total coliform organisms does not exceed 23 per 100 milliliters in any sample.

12.3.4 *Class B Reclaimed Water* means water that, at a minimum, is all times oxidized, disinfected wastewater. The wastewater shall be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 per 100 milliliters, as determined from the results of samples required in Table 2, and the number of total coliform organisms does not exceed 23 per 100 milliliters in any sample.

12.3.5 *Class C Reclaimed Water* means water that, at a minimum, is all times oxidized, disinfected wastewater. The wastewater shall be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 23 per 100 milliliters, as determined from the results of samples required in Table 2, and the number of total coliform organisms does not exceed 240 per 100 milliliters in any sample.

12.3.6 *Class D Reclaimed Water* means water that, at a minimum, is at all times oxidized wastewater, which may or may not be disinfected. Class D reclaimed water applied to wildlands does not require disinfection provided the setbacks in section V(1)(C) are maintained. Class D wastewater used for any other purpose or applied to any other type of crop must be disinfected. Should disinfection be required, the wastewater shall be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 240 per 100 milliliters, as determined from the results of samples required in Table 2.

12.3.7 *Clay* means a soil comprised of particles less than 0.002 millimeters in diameter, having an intrinsic permeability between 10^{-6} to 10^{-3} darcys, and a hydraulic conductivity between 10^{-9} and 10^{-6} cm/sec.

12.3.8 *Coagulated Wastewater* means an oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated prior to filtration by the addition of chemicals or by an equally effective method.

12.3.9 *CT Value* means the product of the disinfectant contact time in minutes and the concentration of the disinfectant residual in mg/l measured at the end of the contact time. The product of these two parameters (CT) provides a measure of the degree of inactivation of specific organisms.

12.3.10 *Department* means the Missoula City-County Health Department.

12.3.11 *Disinfected Wastewater* means wastewater in which pathogenic organisms have been destroyed by chemical, physical, or biological means.

12.3.12 *Filtered Wastewater* means an oxidized, coagulated wastewater which has been passed through natural undisturbed soils or filter media, such as sand or anthracite, so that the turbidity as determined by approved laboratory methods does not exceed an average

operating turbidity of 2 nephelometric turbidity units (NTU), determined monthly, and does not exceed 5 NTU at any time.

12.3.13 *Food Crops* mean any crops intended for human consumption.

12.3.14 *Large Reclamation Plant* means a facility that receives sewage from 500 or more homes, or treats more than 112,500 gallons of wastewater per day or 41,062,500 gallons per year.

12.3.15 *Long-term Storage* means storing of untreated or partially treated wastewater for at least 20 days.

12.3.16 *Medium Reclamation Plant* means a facility that receives sewage from 50-499 homes, or treats between 11,025 and 112,275 per day or 4,024,125 and 40,980,375 per year.

12.3.17 *Nonrestricted Recreational Impoundment* means a body of reclaimed water in which no limitations are imposed on body-water contact water activities.

12.3.18 *Non-Residential Use Area* means a rural area, where the distance from the land application area to the nearest residential zoned area, down gradient residence or potable water well is greater than 1000 feet.

12.3.19 *Oxidized Wastewater* means wastewater in which organic matter has been stabilized such that the biochemical oxygen demand (BOD) does not exceed 30 mg/l and the total suspended solids (TSS) does not exceed 30 mg/l, is nonputrescible, and contains dissolved oxygen.

12.3.20 *Permittee* means any person to which a permit is issued for a reclamation plant or for use of reclaimed water.

12.3.21 *Person* means any state, individual, public or private corporation, political subdivision, government subdivision, government agency, municipality, copartnership, association, firm, trust estate, or any other legal entity whatever.

12.3.22 *Reclaimed Water* means effluent derived in any part from sewage that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for a beneficial use.

12.3.23 *Reclamation Plant* means an arrangement of devices, structures, equipment, processes, and controls which produce reclaimed water for the intended use, including lagoons.

12.3.24 *Restricted Recreational Impoundment* means a body of reclaimed water in which recreation is limited to fishing, boating, and other non-body-contact water recreation activities.

12.3.25 *Reuse* means the use of reclaimed water, in compliance with Missoula City-County Health Department Regulations, for a direct beneficial use.

12.3.26 *Secondary Sedimentation* means the removal by gravity of settleable solids remaining in the effluent after biological treatment process.

12.3.27 *Residential Use Area* means an area where the distance from the land application area to the nearest residential zoned area, down gradient residence or potable water well is less than 1000 feet.

12.3.28 *Sewage* means water-carried human wastes, together with such groundwater infiltration, surface waters, or industrial wastewater as may be present.

12.3.29 *Short-term Storage* means storing of untreated or partially treated wastewater for at least a 24-hour period.

12.3.30 *Small Reclamation Plant* means a facility that receives sewage from less than 50 homes, or treats less than 11,025 gallons of wastewater per day or 4,0241,025 gallons per year.

12.3.31 *Spray Irrigation* means application of reclaimed water to land by spraying it from sprinklers or orifices in piping.

12.3.32 *Standby Power Source* means an automatically actuated self-starting alternative energy source maintained in immediate operating condition and of sufficient capacity to provide service during failure of the normal power supply.

12.3.33 *Standby Unit Process* means an alternate unit process or an equivalent unit process which is maintained in operable condition and which is capable of providing comparable treatment for the entire design flow of the unit for which it is a substitute.

12.3.34 *Surface Irrigation* means application of reclaimed water to land by means other than spraying and includes drip irrigation.

12.3.35 *Unit Process* means an individual stage in the wastewater treatment sequence which performs a single treatment operation.

12.3.36 *Use Area* means any facility, building, or area designed, constructed, and operated to treat reclaimed water through the use of crops and/or irrigation methods.

12.3.37 *Wastewater* means sewage that has not been treated in a reclamation plant.

12.3.38 *Wildlands* means a natural forested area where domestic animals are excluded.

12.4 Permitting

12.4.1 A permit to operate a reclamation plant or use area must be obtained from the Department before construction of new facilities begins. Existing reclamation plants or use areas must get an operations permit from the Department no later than January 1, 2002. The permit to operate must be renewed annually.

12.4.2 The permit application for a reclamation plant must include an engineering report, as required in section 12.5.3. An application to operate a use area must describe the measures that will be taken to meet the requirements of section 12.10.

12.4.3 Applications for operating an existing reclamation plant or use area must include detailed information on the current operation of the facility, and describe the requirements of this chapter that are not being met.

12.4.4 A permit may only be issued after review of the permit application and payment of a permit fee. Plan review and permit fees shall be established by the Department. Permits for reclamation or reuse of sewage at facilities may be granted only to municipalities, City or County Special Improvement Districts, or persons which provide for the construction, maintenance, and operation of the facility.

12.4.5 Application of reclaimed water to a use area or operation of a reclamation plant without an operations permit from the Department is prohibited.

12.5 Reclamation Plant Design Requirements

12.5.1 Flexibility of Design.

The design of process piping, equipment arrangement, and unit structures in the reclamation plant must allow for efficiency and convenience in operation and maintenance and provide flexibility of operation to permit the highest possibility of treatment under varying conditions.

12.5.2 Alarms

12.5.2.1 Alarms must be installed to provide warning of loss of power from the normal power supply to equipment required for biological treatment, disinfection, coagulation, filtration or any other specific process for which warning is required by the Department.

12.5.2.2 The licensed wastewater treatment plant operator responsible for operation of the treatment system or use area must be warned by the alarm.

12.5.2.3 Where the reclamation plant is not attended full time, the alarm(s) must alert the wastewater treatment plant operator 24 hours a day.

12.5.3 Engineering Report

12.5.3.1 No person may produce or supply reclaimed water for a beneficial use unless he files an engineering report with the Department.

12.5.3.2 The report must be prepared by an engineer registered in Montana and experienced in the field of wastewater treatment, and must contain a description of the design of the proposed reclamation plant. The report must clearly indicate the means for compliance with these regulations, DEQ Circular 2, and any other requirements specified by the Department.

12.5.3.3 The report must contain a contingency plan that assures no untreated or inadequately treated wastewater will be delivered to the use area.

12.5.3.4 The report must address cross-connection control.

12.5.4 Storage Requirements

12.5.4.1 Where no alternative disposal system is permitted, system storage or other acceptable means must be provided to assure retention of reclaimed water under adverse weather conditions or at other times when reuse is precluded.

12.5.4.2 When wet weather, frozen ground conditions, or snow cover preclude the use of reclaimed water, the reclamation plant and/or use area storage volume must be established by determining the storage needed for the duration of unacceptable reuse conditions using the reclamation plant average daily flow, plus a 15% safety factor.

12.5.5 Lagoons or Ponds

12.5.5.1 Lagoons or ponds used for the storage or treatment of wastewater or reclaimed water must have a synthetic or clay liner.

12.5.5.2 The liner must be installed in accordance with manufacturer's specifications by a licensed engineer.

12.5.5.3 No more than 600 gallons/acre/day may leach through a liner, based on the area of pond or lagoon. Prior to pond or lagoon operation, the liner must be tested to meet the above leaching limitation

12.5.6 Flow Meter

All reclamation plants must have a flow meter to determine the volume of wastewater treated and reused.

12.5.7 Reliability Requirements

12.5.7.1 Emergency Storage

12.5.7.1.1 Where short-term storage facilities are used as a reliability feature, they must be reserved for the purpose of storing untreated or partially treated wastewater for at least 24-hours. The facilities must include all the necessary diversion works, provisions for odor control, conduits, and pumping and pump back equipment.

12.5.7.1.2 Where long-term storage facilities are used as a reliability feature, they must consist of ponds, reservoirs, downstream sewers leading to other treatment facilities or any other facilities reserved for the purpose of emergency storage of untreated or partially treated wastewater. These facilities must have sufficient capacity to provide storage of wastewater for least 20 days, and must include the necessary diversion works, provisions for odor control, conduits, and pumping and pump back equipment.

12.5.7.1.3 Diversion of partially wastewater to a different type of reuse is an acceptable alternative provided that the quality of the partially treated wastewater is suitable for the type of reuse, as specified in these regulations.

12.5.7.1.4 Where used, automatically actuated short-term and long-term storage facilities must include the necessary sensors, instruments, valves, and other devices to automatically divert untreated or partially treated wastewater to approved emergency storage.

12.5.7.2 Biological Treatment

12.5.7.2.1 All biological treatment unit processes must have one of the following reliability features:

- (a) Multiple biological treatment units capable of producing oxidized wastewater with one unit not in operation,
- (b) Short-term storage or disposal provisions, and standby replacement equipment, or
- (c) Long-term storage.

12.5.7.3 Secondary Sedimentation

12.5.7.3.1 All secondary sedimentation unit processes must have one of the following reliability features:

- (a) Multiple sedimentation units capable of treating the entire flow with one unit not in operation,
- (b) Standby sedimentation unit process, or
- (c) Long-term storage.

12.5.7.4 Coagulation

12.5.7.4.1 All coagulation unit processes must have the following features for uninterrupted chemical feed:

- (a) Standby Feeders,
- (b) Adequate chemical storage and conveyance facilities,
- (c) Adequate reserve chemical supply, and
- (d) Automatic dosage control.

12.5.7.4.2 All coagulation unit processes must have at least one of the following reliability features:

- (a) Multiple coagulation units capable of treating the entire flow with one unit not in operation,
- (b) Short-term storage or disposal provisions, and standby replacement equipment,
- (c) Long-term storage or
- (d) Standby coagulation unit process.

12.5.7.5 Filtration

12.5.7.5.1 All filtration unit processes must have at least one of the following reliability features:

- (a) Multiple filter units capable of treating the entire flow with one unit not in operation,
- (b) Short-term storage and standby replacement equipment,
- (c) Long-term storage, or
- (d) Standby filtration unit process.

12.5.7.6 Disinfection

12.5.7.6.1 All disinfection unit processes where chlorine is used as the disinfectant must have at least one of the following reliability features:

- (a) Standby chlorinator,
- (b) Short-term storage and standby replacement equipment,
- (c) Long-term storage, or
- (d) Multiple point chlorination. Each point of chlorination shall have an independent power source, separate chlorinator and separate chlorine supply.

12.5.7.7 Other Alternatives To Reliability Requirements

Other reliability mechanisms may be accepted if the applicant demonstrates to the satisfaction of the Department that the proposed alternative will assure an equal degree of reliability.

12.6 Irrigation of Reclaimed Water

12.6.1 Nonfood Crops

12.6.1.1 Reclaimed water used for the irrigation of trees or fodder, fiber, and seed crops must be Class D reclaimed water or better.

12.6.1.2 Reclaimed water used for the irrigation of sod, ornamental plants for commercial use, or pasture to which milking cows or goats have access must be Class C reclaimed water or better.

12.6.1.3 Disinfection is not required for irrigation of wildlands, but is required for irrigation of crops. (See Table 11.1.)

12.6.1.4 Where effluent is not disinfected, a 200-foot buffer between the perimeter fence and irrigated area and a 200-foot buffer from the perimeter fence to any road, dwelling or public area must be maintained. Where the buffer zones are not owned by the party irrigating, an easement must be obtained prohibiting the construction of any dwelling, road or public area within the buffer zones. The buffer zone from the perimeter fence to a dwelling, road or public area may be reduced if the applicator can demonstrate to the Department through mechanical or other means (i.e. overland flow or drip irrigation) that the public will not come in contact with non-disinfected effluent. In all cases the Department shall require buffer zones adequate to protect public health.

12.6.2 Food Crops

12.6.2.1 Except as noted in 12.16.2.5, reclaimed water used for spray irrigation of food crops must be Class A reclaimed water or better.

12.6.2.2 Except as noted in 12.16.2.5, reclaimed water used for surface irrigation of food crops, where there is no contact between the reclaimed water and the edible portions of the crop, must be Class B water or better.

12.6.2.3 Reclaimed water used for surface irrigation of root crops must be Class A reclaimed water or better.

12.6.2.4 Reclaimed water used for surface irrigation of orchards and vineyards must be Class D reclaimed water or better. No orchard or vineyard fruit may be harvested that has come in contact with the irrigating water or ground.

12.6.2.5 Food crops which undergo physical or chemical commercial processing sufficient to destroy all pathogenic agents prior to distribution or sale may be spray or surface irrigated with Class D reclaimed water or better.

12.6.3 Landscape Irrigation

12.6.3.1 Reclaimed water used for the irrigation of restricted access areas (e.g. cemeteries, freeway landscapes, or other areas where the public has similar access or exposure to the reclaimed water) must be Class C water or better.

12.6.3.2 Reclaimed water used for the irrigation of open access areas (e.g. golf courses, parks, playgrounds, schoolyards, residential landscapes, or other areas where the public has similar access or exposure to the reclaimed water) must be Class A water or better.

12.6.3.3 Reclaimed water used as a source of supply for a landscape impoundment must be Class C water or better.

12.6.4 Restricted and Nonrestricted Recreational Impoundments

12.6.4.1 Reclaimed water used as a source of supply for a restricted recreational impoundment must be at Class B water or better.

12.6.4.2 Reclaimed water used as a source of supply for a nonrestricted recreational impoundment must be Class A water or better.

12.6.4.3 Reclaimed water may not be used as a source of supply for swimming pools.

12.6.4.4 Nutrient removal to reduce the levels of phosphorus and nitrogen is recommended for reclaimed water used as a source of supply for recreational impoundments to minimize algal growths and maintain acceptable aesthetic conditions.

12.6.5 Treatment and quality requirements for reclaimed water use are summarized in Table 1.

12.7 Groundwater Recharge

Reclaimed water used for groundwater recharge must be the quality of the groundwater or better. In no instance may the discharge of reclaimed water to groundwater result in a measurable increase of any contaminant in the groundwater.

12.8 Operational Requirements

12.8.1 Personnel

Each reclamation plant must have a sufficient number of qualified personnel to operate the facility effectively so as to achieve the required level of treatment at all times. Qualified personnel must meet wastewater treatment plant certification and other requirements established by the State of Montana.

12.8.2 Maintenance

Each reclamation plant must have a preventative maintenance program and keep equipment in a reliable operating condition.

12.8.3 Operating Records and Reports

12.8.3.1 Operating records must be maintained at the reclamation plant. These must include: volume of wastewater treated, volume of wastewater reused, all analyses specified in these regulations; records of operational problems, unit process and equipment breakdowns, and diversions to emergency storage; and corrective or preventive actions taken.

12.8.3.2 Process or equipment failures triggering an alarm must be recorded and maintained as a separate record file. The recorded information must include the time and cause of failure and corrective action taken.

12.8.3.3 A summary of operating records as specified under 12.8.3.1 must be filed annually with the Department.

12.8.3.4 Any discharge of untreated or partially treated wastewater to the use area, must be reported immediately by telephone to the Department.

12.8.4 Bypass

There may be no bypassing of untreated or partially treated wastewater from the reclamation plant or any intermediate unit processes to the point of use.

12.8.5 Disinfection

12.8.5.1 Where chlorine is used as the disinfectant in the treatment process, a chlorine residual of at least 1 mg/l after contact of at least 30 minutes is required.

12.8.5.2 A chlorine residual of at least 0.5 mg/l must be maintained in the reclaimed water during conveyance from the reclamation plant to the use area.

12.8.5.3 Maintenance of a chlorine residual is not required in reclaimed water impoundments or storage ponds.

12.8.5.4 A CT value to assure pathogen reduction may be required by the Department for those projects that need additional public health protection.

12.8.6 Responsibilities

12.8.6.1 The permittee shall maintain control over, and be responsible for, all facilities and activities inherent to the production of reclaimed water to ensure that the reclamation plant operates as approved by the Department.

12.8.6.2 Where the reclaimed water use area is under direct control of the permittee, the permittee shall maintain control, and be responsible for, all facilities and activities inherent to the use of the reclaimed water to ensure the entire reuse system operates as approved by the Department.

12.8.6.3 Where the reclaimed water distribution system or use area is not under direct control of the permittee, the person who distributes reclaimed water, owns or otherwise maintains control over the use area is responsible for the reuse facilities and activities inherent to the distribution and use of the reclaimed water to ensure that the system operates as approved by the Department.

12.8.6.4 Where the reclaimed water distribution system or use area is not under the direct control of the permittee, a binding agreement among the parties involved is required to ensure that construction, operation, maintenance, and monitoring meet all requirements of the Department.

12.9 Sampling and Analysis Requirements

12.9.1 Wastewater effluent must be analyzed for the parameters and at the frequency specified in Table 2. The frequency of testing is dependent on the size the reclamation plant and/or location of the use area, as specified in Table 2. Compliance is dependent on the frequency of testing required and the quality of water required for reuse.

12.9.2 Samples collected for BOD, TSS, total coliform, and dissolved oxygen analyses must be analyzed by approved laboratory methods, and analyses must be conducted in laboratories approved by DEQ.

12.9.3 Sampling and analysis requirements for reclamation of wastewater from commercial or industrial facilities will be determined by the Department on a case-by-case basis.

12.9.4 The Department may require additional effluent analytical testing depending upon the nature of the wastewater reclaimed and its intended use.

12.10 Use Area Requirements

12.10.1 General

12.10.1.1 The public and employees shall be notified of the use of reclaimed water at all use areas. This must be accomplished by posting advisory signs at the use areas, distribution of written notices to residents or employees, or by other methods.

12.10.1.2 Adequate measures must be taken to prevent ponding of reclaimed water on the reuse area.

12.10.1.3 Reclaimed water, including runoff and spray, ~~shall~~must be confined to the designated and approved use area in accordance with the operations permit.

12.10.1.4 Reclaimed water may not be sprayed on people or any facility or area not designated for reuse.

12.10.1.5 Maximum attainable separation between reclaimed water lines and potable water lines must be practiced. A minimum horizontal separation of 10 feet must be maintained between reclaimed water lines and potable water lines. When crossing, a minimum vertical separation of 18 inches must be maintained between reclaimed water lines, and the potable water line must be above the reclaimed water line.

12.10.1.6 All reclaimed water valves, storage facilities, and outlets must be tagged or labeled to warn the public that the water is not intended for drinking.

12.10.1.7 All reclaimed water valves and outlets must be of a type, or secured in a manner, that allows operation only by authorized personnel.

12.10.1.8 For irrigation of reclaimed water, the hydraulic loading rate of reclaimed water is determined based on a detailed water balance analysis. The calculated loading rate and the parameters and methods used to determine the loading rates must be submitted to the Department for approval, prior to application of reclaimed water.

12.10.1.9 The person(s) responsible of the operation of the use area shall follow methods described in Chapter 4 of the Design Manual for Land Treatment of Municipal Wastewater: EPA 625/1-81-013 or succeeding documents, published by

the U.S. Environmental Protection Agency. Loadings of nitrogen, phosphorus, and trace metal must be addressed. The loading rate must be approved by the Department prior to reclaimed water reuse.

12.10.1.10 Reclaimed water may not be applied when the ground is saturated, frozen, or covered with snow.

12.10.1.11 Storage ponds are required to provide adequate storage when reuse is not feasible.

12.10.1.12 Adequate measures must be taken to prevent the breeding of vectors of health significance and the creation of odors, slimes, or aesthetically displeasing deposits.

12.10.1.13 Groundwater, soil, and vadose zone monitoring may be required by the Department. Where required, the permittee must propose the monitoring program for Department review and approval. Where applicable, the monitoring program must be based on reclaimed water quality and quantity, site specific soil and hydrogeologic characteristics, and other considerations.

12.10.2 Tank Trucks

12.10.2.1 Tank trucks and other equipment used to distribute reclaimed water must be clearly identified with advisory signs.

12.10.2.2 Tank trucks and other hoses or equipment used to transport reclaimed water may not be used to transport potable water.

12.10.3 Cross-Connection Control

12.10.3.1 There may be no cross-connections between reclaimed water and potable water systems.

12.10.3.2 Where both reclaimed water and potable water are supplied to a reclaimed water use area, a reduced pressure principle backflow prevention device or an approved air gap separation must be installed at the potable water service connection to the use area.

12.10.3.3 Where potable water supplements a reclaimed water system, there must be an air gap separation, approved and regularly inspected by the potable water supplier, between the potable water and reclaimed water.

12.10.3.4 Reclaimed water may not enter a dwelling unit, unless the reclaimed water is used for fire protection or toilet or urinal flushing.

12.10.4 Setback Requirements

12.10.4.1 For Class A reclaimed water, the following setbacks distances apply:

- (a) 50 feet between any reclaimed water pipeline and potable water supply well.
- (b) 50 feet between the area subject to spray or surface irrigation and the use area property line.
- (c) 50 feet between the area subject to spray or surface irrigation and a potable water supply well.
- (d) 100 feet from the perimeter of an impoundment, lagoon or pond and any potable water supply well.

12.10.4.2 For Class B and C reclaimed water, the following setbacks distances apply:

- (a) 100 feet between any reclaimed water pipeline and potable water supply well.
- (b) 50 feet between the area subject to spray irrigation and areas accessible to the public and the use area property boundary.
- (c) 100 feet between the area subject to surface or spray irrigation and any potable water supply well
- (d) 100 feet from the perimeter of an impoundment, lagoon or pond and any potable water supply well.

12.10.4.3 For Class D reclaimed water, the following setback distances apply:

- (a) 300 feet between any reclaimed water pipeline and potable water supply well.
- (b) 100 feet between the area subject to spray irrigation and areas accessible to the public and the use area property boundary.
- (c) 300 feet between the area subject to surface or spray irrigation and any potable water supply well
- (d) 300 feet from the perimeter of an impoundment, lagoon or pond and any potable water supply well.

12.10.5 Fencing and Posting Requirements

12.10.5.1 Wastewater Reclamation Plants and Use Areas must be fenced and posted.

12.10.5.2 Fencing must be capable of discouraging unauthorized persons from entering the wastewater treatment area, without hindering maintenance or operation of the facilities.

12.10.5.3 Fence surrounding reclamation plants or residential use areas must be six-foot high cyclone fence. Fence for non-residential use areas may be cyclone, wood, barbed wire, or other type adequate to prevent public entry.

12.10.5.4 Adequate space must be provided between fencing and treatment areas to allow for maintenance.

12.10.5.5 Fencing must be maintained in good condition.

12.10.5.6 All gates must have locks, and access to the facility must be restricted to authorized persons.

Table 12.1: Treatment and Quality Requirements for Reclaimed Water Use

1 – Reclaimed water must be disinfected

Use	Type of Reclaimed Water Allowed			
	Class A	Class B	Class C	Class D
Irrigation of Nonfood Crops Wildlands Fodder, fiber, and seed crops Sod, ornamental plants, pasture to which domestic animals have access	yes yes yes	yes yes yes	yes yes yes	yes yes ¹ no
Irrigation of Food Crops <i>Spray Irrigation</i> All Food Crops Foods crops which undergo physical or chemical processing sufficient to destroy all pathogens <i>Surface Irrigation</i> Food crops where there is no reclaimed water contact with edible portion of crop Root Crops Orchards Foods crops which undergo physical or chemical processing sufficient to destroy all pathogens	yes yes yes yes	no yes yes no	no yes no yes	no yes no yes
Landscape Irrigation Restricted access areas (e.g., cemeteries/ freeways) Open access areas (e.g., golf courses, parks, playgrounds, schoolyards, residential landscapes)	yes yes	yes no	yes no	no no
Impoundments Landscape Impoundments Restricted Recreational Impoundment Nonrestricted Recreational Impoundment	yes yes yes	yes yes no	yes no no	no no no
Street Cleaning Street Sweeping, brush dampening Street Washing, spray	yes yes	yes no	yes no	no no
Washing of Corporation Yards/Lots	yes	yes	no	no
Dust Control	yes	yes	yes	no
Fire Fighting and Protection Hydrants or sprinkler systems for buildings	yes	yes	no	No
Industrial Boiler Feed	yes	yes	yes	No
Industrial Cooling Aerosols and other mist not created Aerosols or other mists created (e.g., use in cooling towers, forced air evaporation, or spraying)	yes yes	yes no	yes no	no no
Industrial Process Without exposure to workers With exposure to workers	yes yes	yes no	yes no	no no

Table 12.2: Monitoring Requirements

Parameter	Sample Type and Frequency				Compliance Requirements			
	Small Reclamation Plant	Medium Reclamation Plant	Large Reclamation Plant	Small or Medium Reclamation Plant with Non-Residential Use Area	Small Reclamation Plant	Medium Reclamation Plant	Large Reclamation Plant	Small or Medium Reclamation Plant with Non-Residential Use
Biological Oxygen Demand	24 hr composite, collected monthly	24 hr composite, collected weekly	24 hr composite, collected weekly	24 hr composite, collected monthly	May not exceed 30 mg/l, based on the median result of last 4 samples			
Total Suspended Solids	24 hr composite, collected monthly	24 hr composite, collected weekly	24 hr composite, collected weekly	24 hr composite, collected monthly	May not exceed 30 mg/l, based on the median result of last 4 samples			
Total Coliforms ¹	Grab, collected every two weeks	Grab, collected weekly	Grab, collected daily	Grab, collected every two weeks	Compliance determined quarterly, based on the median value of last 6 samples and quality of reclaimed water required for reuse	Compliance determined monthly, based on the median value of last 4 samples and quality of reclaimed water required for reuse	Compliance determined daily, based on the median value of last 7 samples and quality of reclaimed water required for reuse	Compliance determined quarterly, based on the median value of last 6 samples and quality of reclaimed water required for reuse
Dissolved Oxygen	Grab, collected every two weeks	Grab, collected weekly	Grab, collected daily	Grab, collected every two weeks	Must contain oxygen			

1: Total Coliform testing required when disinfection is required

Reclamation Plant Definitions

- Small Reclamation Plant: A facility that receives sewage from less than 50 homes, or treats less than 11,025 gallons per day or 4,024,125 gallons per year.
- Medium Reclamation Plant: A facility that receives sewage from 50-499 homes, or treats between 11,025 and 112,275 gallons per day or 4,024,125 and 40,980,375 gallons per year.
- Large Reclamation Plant: A facility that receives sewage from 500 or more homes, or treats more than 112,500 gallons per day or 41,062,500 gallons per year.

APPENDIX A

DEQ Approved Systems for Nitrogen Reduction

Pursuant to Administrative Rules of Montana (ARM) 17.30.702(9)(10) and (11), DEQ defines three different types of nitrogen-reducing SWTS, level 1a, level 1b and level 2 systems. The definitions from the rule are as follows:

- (9) "Level 1a treatment" means a subsurface wastewater treatment system (SWTS) that:
- (a) removes at least 50%, but less than 60%, of total nitrogen as measured from the raw sewage load to the system; or
 - (b) discharges a total nitrogen effluent concentration of greater than 24 mg/L, but not greater than 30 mg/L. The term does not include treatment systems for industrial waste. A level 1a designation allows the use of 30 mg/L nitrate (as N) as the nitrate effluent concentration for mixing zone calculations.
- (10) "Level 1b treatment" means a SWTS that:
- (a) removes at least 34%, but less than 50%, of total nitrogen as measured from the raw sewage load to the system; or
 - (b) discharges a total nitrogen effluent concentration of greater than 30 mg/L, but not greater than 40 mg/L. The term does not include treatment systems for industrial waste. A level 1b designation allows the use of 40 mg/L nitrate (as N) as the nitrate effluent concentration for mixing zone calculations.
- (11) "Level 2 treatment" means a SWTS that:
- (a) removes at least 60% of total nitrogen as measured from the raw sewage load to the system; or
 - (b) discharges a total nitrogen effluent concentration of 24 mg/L or less. The term does not include treatment systems for industrial waste.

As of the date at the top of this document, the following list shows those SWTS that are designated as level 1a, level 1b or level 2 by DEQ (the date next to each SWTS is the date it was designated for that level of treatment):

Level 2	Level 1a	Level 1b
Recirculating Sand Filter (~1993)		Intermittent Sand Filter (5/1/2005)
Orenco – AdvanTex (8/4/2004)		
Fluidyne – Eliminite (8/5/2004)		
International Wastewater Systems (IWS) model 6000 sequencing batch reactor (7/28/2005)		

* NOTE: As of May 1, 2005 elevated sand mounds (ESM) were removed from the level 2 list. They no longer qualify for any level of nitrogen reduction (the effluent concentration for an ESM in the nitrogen dilution calculations is the same as a septic tank/drainfield system, 50 mg/L).

This list will be updated on a regular basis as it changes. Systems can be both added and removed from the list at any time, check back frequently to insure you are working off of the current list.

From: The Department of Environmental Quality's "List of Subsurface Wastewater Treatment Systems (SWTS) that are Approved as a Nitrogen-Reducing System," October 11, 2005. Available at http://www.deq.mt.gov/wqinfo/nondeg/level2_web_list.pdf