



## COLORADO

Water Quality  
Control Commission

Department of Public Health & Environment

### NOTICE OF PUBLIC RULEMAKING HEARING BEFORE THE COLORADO WATER QUALITY CONTROL COMMISSION

#### SUBJECT:

For consideration of the adoption of revisions to the Graywater Control Regulation, Regulation #86 (5 CCR 1002-86).

The revisions to Regulation #86 proposed by the Water Quality Control Division, along with proposed Statement of Basis, Specific Statutory Authority and Purpose language, are attached to this notice as Exhibit 1. In this attachment, proposed new language is shown with double-underlining and proposed deletions are shown with ~~strikeouts~~. Any alternative proposals related to the subject of this hearing will also be considered.

During the commission's consideration of whether to approve this notice of rulemaking, the commission determined that there is not a likelihood of significant controversy during the rulemaking process. Therefore, the commission has chosen to pursue an alternative rulemaking process consistent with section 24-4-103(4)(a) C.R.S.; and section 21.3(C)(6) of the Procedural Rules. Questions or comments regarding this process are welcome.

It is the goal of the commission to complete this rulemaking without oral testimony.

#### PARTY STATUS:

Pursuant to section 21.3(D) of the commission's Procedural Rules, there shall be no party status for this rulemaking proceeding.

#### WRITTEN COMMENTS AND RESPONSIVE COMMENTS:

Initial written comments and evidence with respect to the proposed amendments are due by **September 30, 2015**. In addition, any written responsive comments must be received by **October 28, 2015**.

Anyone providing written comments and evidence or responsive comments should deliver an electronic copy to [cdphe.wqcc@state.co.us](mailto:cdphe.wqcc@state.co.us) by the due date. All written comments will be available to the public on the commission's web site.

#### HEARING SCHEDULE:

DATE: Monday, November 9, 2015  
TIME: 1:00 p.m.  
PLACE: Florence Sabin Conference Room  
Department of Public Health and Environment  
4300 Cherry Creek Drive South  
Denver, CO 80246

At this time and place, the commission will conduct its deliberations, based on the written comments and evidence submitted.

SPECIFIC STATUTORY AUTHORITY:

The provisions of sections 25-8-202; 25-8-205; 25-8-401; and 25-8-402 C.R.S., provide the specific statutory authority for consideration of the regulatory amendments proposed by this notice. Should the commission adopt the regulatory language as proposed in this notice or alternative amendments, it will also adopt, in compliance with section 24-4-103(4) C.R.S., an appropriate Statement of Basis, Specific Statutory Authority, and Purpose.

Dated this 11<sup>th</sup> day of August 2015 at Denver, Colorado.

WATER QUALITY CONTROL COMMISSION

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Trisha Oeth, Administrator

**EXHIBIT 1**  
**WATER QUALITY CONTROL DIVISION**

**COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT**

**Water Quality Control Commission**

**5 CCR 1002-86**

**REGULATION NO. 86**

**GRAYWATER CONTROL REGULATION**

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**86.7 Enforcement and Division Oversight**

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- B. The Colorado Water Quality Control Division oversees state-wide implementation of this regulation. As part of the state-wide implementation, a local city, city and county, or county that chooses to adopt a local graywater control program must notify the Water Quality Control Division within 60 days of program adoption, implementation, revision, or modification. A copy of the ordinance or resolution and, if applicable, rule must be submitted to: Water Quality Control Division, Colorado Department of Public Health and Environment, 4300 Cherry Creek Drive South, Denver, Colorado 80246-1530.

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**86.9 Administration**

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- B. Minimum Requirements for a Local Graywater Control Program
1. The local city, city and county, or county that chooses to authorize graywater use within its jurisdiction must adopt an ordinance, or resolution, ~~or for certain program elements, a rule,~~ which meets the following minimum requirements:
    - a. ~~The ordinance or resolution must be in~~ Require compliance with the minimum requirements of this regulation.
    - b. ~~The ordinance or resolution must r~~ Require compliance with all applicable federal, state, and local requirements.
    - c. ~~The ordinance or resolution must d~~ Define the legal boundary of the local city, city and county, or county's local graywater control program. If the area in which graywater systems are allowed by a local control program is smaller than the maximum legal boundary, then the excluded area must be clearly identified, which, at a maximum, is limited by the provisions in Titles 30 and 31 of the C.R.S. and the Colorado Constitution. If coordination with other agencies results

~~in graywater implementation not being allowed within a portion of the local city, city and county, or county then these areas must be clearly excluded.~~

- ~~d. The ordinance, resolution, or rule must explicitly state which graywater use categories defined in section 86.10 are allowed within the local city, city and county, or county's local graywater control program boundary.~~
- ~~e d. The ordinance or resolution must identify the local agency or agencies Identify the local agency, or agencies, that is responsible for oversight and implementation of all graywater regulatory activities including, but not limited to, design review, inspection, enforcement, tracking, and complaints.~~
- ~~f e. The ordinance or resolution must clearly indicate whether Identify if a fee(s) will be imposed for graywater activities, and if so, which local agency establishes the fee(s) and where fee(s) information is located.~~
- ~~g f. The ordinance or resolution must include a requirement for Require a searchable tracking mechanism that is indefinitely maintained by the local agency that must include, at a minimum, the following information:~~
  - ~~i. Legal address of each facility with graywater treatment works, allowed graywater uses at each facility, and a graywater treatment works description;~~
  - ~~ii. The legally responsible party associated with every graywater treatment works;~~
  - ~~iii. Where required, the certified operator associated with every graywater treatment works; and~~
  - ~~iv. Any changes to the legally responsible party, certified operator, and status of the graywater treatment works must be updated within 60 days.~~
- ~~g. Require the local agency to administer and enforce the provisions of the ordinance or resolution, and where applicable for certain program elements, the rule.~~

2. The local city, city and county, or county that chooses to authorize graywater use within its jurisdiction must adopt an ordinance, resolution or rule which meets the following minimum requirements:

- ~~a. The ordinance, resolution, or rule must include a requirement for Require a local agency to develop a graywater design criteria document, which includes the following:~~
  - ~~i. The design criteria document must meet the minimum requirements of this regulation but may be more stringent. Requirements that are at least as stringent as the minimum design requirements in this regulation; and~~
  - ~~ii. The graywater design criteria must define a site and soil evaluation methodology for subsurface irrigation systems unless only single family dispersed subsurface irrigation systems are allowed. Define a site evaluation protocol for subsurface irrigation systems as defined in section 86.12(B)(1)(i)(i), unless exclusively allowing single family, dispersed subsurface irrigation systems (under Categories A and C)~~

sized with the irrigation area equation protocol as defined in section 86.12(B)(1)(i)(ii).

- b. Identify which graywater use categories as defined in section 86.10 are allowed within the legal boundary of the local graywater control program.
  - i c. The ordinance, resolution, or rule must include a requirement and process for the Require a local agency to approve or deny the installation of new graywater treatment works or modifications to an existing graywater treatment works, and As part of the approval review process the local agency(ies) must review a design submittal and perform a construction verification in accordance with consider the design documentation associated with the graywater system, which must include the following information:

    - i. All graywater treatments works must submit the following design information: the graywater uses, graywater treatment system location, design flow calculations for the graywater treatment works, fixtures that are the source of the graywater, design of the plumbing or irrigation system, any supporting soil analysis information, a description of the products or components, legally responsible party information, and contact information for system designer or professional engineer and operator, if applicable. The application for graywater treatment works must be signed by the legally responsible party.
    - ii. All graywater treatment works must be inspected or verified and accepted by the local agency.
  - i. The graywater uses;
  - ii. Location of the graywater treatment system;
  - iii. Design flow calculations for the graywater treatment works;
  - iv. The fixture(s) that are the source(s) of the graywater;
  - v. The design of the plumbing and irrigation system; if applicable
  - vi. A description of the products or components;
  - vii. If applicable, any supporting soil analysis information;
  - viii. If applicable, contact information for system designer or professional engineer and operator;
  - ix. Name and address of the legally responsible party; and
  - x. Must be signed by the legally responsible party.
- d. Require that graywater treatment works be inspected or verified and accepted by the local agency.
- e. The ordinance, resolution, or rule must require all graywater treatment works to have an operation and maintenance (O&M) manual. Require an operation and

maintenance (O&M) manual for all graywater treatment works, and require that the O&M manual:

i. The O&M manual must Remain with the graywater treatment works throughout the system's- life of the system;

ii. and be updated based on each modification and approval made to the system. Be updated at the time the system is modified; and

iii. The O&M manual must be transferred, upon change of ownership or occupancy, to the new owner or tenant. Upon change of ownership or occupancy of the property where the graywater treatment works is located, transfer to the new owner or tenant.

k. f. The ordinance, resolution, or rule must clearly indicate if any reporting is required for graywater regulatory activities, the required parameters, and the required frequency. If reporting to the local city, city and county, county, or local agency is required, identify the reporting requirements, including the required parameters and the required frequency.

l. The ordinance or resolution must include a requirement for the local agency to administer and enforce the provisions of the ordinance or resolution.

C. Discontinuation of local graywater program

A local city, city and county, and county that decides to revoke or rescind an adopted local graywater control program must require that all previously allowed graywater treatment works either:

1. Be physically removed or permanently disconnected; or
2. Be regulated under a limited graywater control program for existing graywater systems. In this case, the local city, city and county, or county must continue a limited graywater control program for the existing graywater treatment works. The limited graywater program must include a graywater control program for the existing graywater treatment works but no new graywater treatment works. At a minimum, the limited graywater control program must include items: 86.9(B)(1)(a), 86.9(B)(1)(b), 86.9(B)(1)(d), 86.9(B)(1)(f), 86.9(B)(1)(g) and 86.9(B)(2)(e) items a, b, e, g, j, and l. If the limited graywater control program allows modifications to existing treatment works then items d, h, and i 86.9(B)(2)(a), 86.9(B)(2)(b), and 86.9(B)(2)(c) must also be included; or
3. Be regulated under another jurisdiction's local graywater control program which assumes authority over the existing graywater treatment works. The existing graywater treatment works will need to comply with the new city, city and county, or county's local graywater control program, including any required graywater treatment works modifications.

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**86.11 Graywater Treatment Works – Flow Projections**

**A. Flow projections for all graywater treatment works**

1. Graywater treatment works must be sized appropriately using the following flow projection methods:

- a. Residential users: Flow to graywater treatment works must be calculated on the occupancy and the fixtures connected to the graywater treatment works. The calculated graywater flow is the number of occupants multiplied by the estimate graywater flow in terms of gpd/occupant from the attached fixtures.
  - i. The occupancy must be calculated based on a minimum of two (2) occupants for the first bedroom and one (1) occupant for each additional bedroom.
  - ii. The estimated graywater flow from each fixture is based on the design flow of the fixture or if the fixture's design flow is unknown then the estimated graywater flow per occupant is with based on the following gallons per day per occupant.
    - (a) Traditional fixtures: 25 gpd/occupant for each shower, bathtub, and wash basin and 15 gpd/occupant for each clothes washer.
    - (b) Water saving fixtures: 20 gpd/occupant for each shower, bathtub, and wash basin and 8 gpd/occupant for each clothes washer.
- b. Non-residential users: Graywater treatment works must be sized in accordance with fixture or water use records taking into account the number of fixtures attached to the graywater treatment works.

## **86.12 Graywater Treatment Works - Design Criteria**

### **A. Design criteria for all graywater treatment works**

The following minimum design criteria are required for all graywater treatment works. All graywater treatment works must:

1. Meet all design requirements of this regulation and meet any additional design requirements of the Colorado Plumbing Code.
2. Each treatment component or combination of multiple components must have a design flow greater than the calculated peak graywater production, if upstream of the storage tank or if no tank is present.
3. Include a diversion valve that directs graywater to either the graywater treatment works or a closed sewerage system. The diversion valve must be:
  - a. Easily operable;
  - b. Clearly labeled;
  - c. Constructed of material that is durable, corrosion resistant, watertight;
  - d. Designed to accommodate the inlet and outlet pipes in a secure and watertight manner; and
  - e. Indirectly connect the bypass line to the closed sewerage system.
4. Not have any piping that allows the treatment process(es) or a storage tank to be bypassed prior to graywater use.

5. Include a tank to collect and store graywater, except for a subsurface irrigation system that discharges to a mulch basin. The storage tank must:
- a. Be constructed of durable, non-absorbent, water-tight, and corrosion resistant materials;
  - b. Be closed and have access openings for inspection and cleaning;
  - c. Be vented:
    - i. for indoor tanks: the tanks must be vented to the atmosphere outside of the house;
    - ii. for outdoor tanks: the storage tank must have a downturned screened vent;
  - d. Have an overflow line:
    - i. with the same or larger diameter line as the influent line;
    - ii. without a shut off valve;
    - iii. that is trapped to prevent the escape of gas vapors from the tank; and
    - iv. that is indirectly connected to the closed sewerage system;
  - e. Have a valved drain line with the same or larger diameter line as the influent line that is indirectly connected to the closed sewerage system;
  - f. Be a minimum of 50 gallons;
  - g. Be placed on a stable foundation;
  - h. If located outdoors, not be exposed to direct sunlight; and
  - i. Have a permanent label that states "CAUTION! NON-POTABLE WATER. DO NOT DRINK."
6. For indoor toilet or urinal flushing systems (Categories C and D) graywater treatment works must have a backup potable water system connection. For subsurface irrigation systems (Categories A and B) graywater treatment works may, but are not required to, have a backup potable water system that provides potable irrigation water when graywater is not being produced or is produced in insufficient quantities. A backup potable water system connection must meet the following requirements:
- a. For non-public water system, potable water system connections: uncontrolled cross connections between a potable water system and a graywater treatment works are prohibited. All cross connections must be protected by a reduced pressure principle backflow prevention zone assembly or an approved air gap.
  - b. For public water system, potable water system connections: uncontrolled cross connections between a public water system and a graywater treatment works are prohibited. The graywater treatment works design must protect the public water system from cross connections by meeting the requirements of Regulation #11: Colorado Primary Drinking Water Regulations.



7. Not be used as a factor to reduce the design, capacity or soil treatment area requirements for OWTS or domestic wastewater treatment works.
8. Have any wastewater from graywater treatment works (e.g., filter backwash water) be properly contained and disposed into a closed sewerage system or an approved Underground Injection Control (UIC) well.
9. Have all graywater piping clearly distinguished and must be clearly labeled, including pipe identification and flow arrows.
10. If located in a 100-year floodplain area, meet or exceed the requirements of FEMA and the local emergency agency. The graywater system must be designed to minimize or eliminate infiltration of floodwaters into the system and prevent discharge from the system into the floodwaters.
11. Not be located in floodways.
12. Be located within the confines of the legal property boundary and not within an easement;

B. Design criteria for subsurface irrigation systems

1. All subsurface irrigation systems:

The following minimum design criteria are required for all graywater treatment works being used for subsurface irrigation. All subsurface graywater irrigation systems must:

- a. Have the subsurface irrigation components of the graywater irrigation system installed a minimum of four inches (4") and a maximum of twelve inches (12") below the finished grade.
- b. Have the subsurface irrigation components of the graywater irrigation system installed in suitable soil, as defined in section 86.8(36).
- c. Have a minimum of twenty-four inches (24") of suitable soil between the subsurface irrigation components of the graywater irrigation system and any restrictive soil layer, bedrock, concrete, or the highest water table. Restrictive soil layers are soil types 4, 4A, and 5 in Table 12-2.
- d. Include controls, such as valves, switches, timers, and other controllers, as appropriate, to ensure the distribution of graywater throughout the entire irrigation zone.
- e. If utilizing emitters, the emitters be designed to resist root intrusion and be of a design recommended by the manufacturer for the intended graywater flow and use. Minimum spacing between emitters shall be sufficient to deliver graywater at an agronomic rate and to prevent surfacing or runoff.
- f. Have all irrigation supply lines be polyethylene tubing or PVC Class 200 pipe or better and Schedule 40 fittings. All joints shall be pressure tested at 40 psi (276 kPa), and shown to be drip tight for five minutes before burial. Drip feeder lines can be poly or flexible PVC tubing.
- g. Meet the following setback distances in Table 12-1.

**Table 12-1: Graywater System Setback Requirements**

<u>Minimum Horizontal Distance Required from:</u>	<u>Graywater Storage Tank</u>	<u>Irrigation Field</u>
<u>Buildings</u>	<u>5 feet</u>	<u>2 feet</u>
<u>Property line adjoining private property</u>	<u>10 feet</u>	<u>10 feet</u>
<u>Property line adjoining private property with supporting property line survey</u>	<u>1.5 feet</u>	<u>1.5 feet</u>
<u>Water supply wells</u>	<u>50 feet</u>	<u>100 feet</u>
<u>Streams and lakes</u>	<u>50 feet</u>	<u>50 feet</u>
<u>Seepage pits or cesspools</u>	<u>5 feet</u>	<u>5 feet</u>
<u>OWTS disposal field</u>	<u>5 feet</u>	<u>25 feet</u>
<u>OWTS tank</u>	<u>5 feet</u>	<u>10 feet</u>
<u>Domestic potable water service line</u>	<u>10 feet</u>	<u>10 feet</u>
<u>Public water main</u>	<u>10 feet</u>	<u>10 feet</u>

h. The irrigation field must be located on slopes of less than thirty percent (30%) from horizontal.

i. Protocols for determining the size of the subsurface irrigation area:

The irrigation area must be determined using one of the following protocols.

i) Site evaluation protocol: The following site evaluation must be conducted to determine the appropriate size of the irrigation area for all subsurface irrigation systems, except single family dispersed subsurface irrigation systems (Category A and C dispersed subsurface irrigation systems) that are sized using the irrigation area equation protocol as defined in section 86.12(B)(1)(i)(ii).

The site evaluation must include:

(a) Site information, including:

(1) a site map; and

(2) location of proposed graywater irrigation area in relation to physical features requiring setbacks in Table 12-1.

(b) Soil investigation to determine long-term acceptance rate of a graywater irrigation area as a design basis. Soil investigation must be completed by either:

(1) a visual and tactile evaluation of soil profile test pit, or

(2) a percolation test.

(c) Irrigation rates must not exceed maximum allowable soil loading rates in Table 12-2 based on the finest textured soil in the twenty-four inches (24") of suitable soil beneath the subsurface irrigation components.

**Table 12-2: Soil Type Description and Maximum Hydraulic Loading Rate**

<u>Soil Type</u>	<u>USDA Soil Texture</u>	<u>USDA Structure – Shape</u>	<u>USDA Soil Structure-Grade</u>	<u>Percolation Rate (MPI)</u>	<u>Loading Rate for Graywater (gal./sq. ft./day)</u>
<u>0</u>	<u>Soil Type 1 with more than 35% Rock (&gt;2mm); Soil Types 2-5 with more than 50% Rock (&gt;2mm)</u>	<u>==</u>	<u>0 (Single Grain)</u>	<u>Less than 5</u>	<u>Not suitable without augmentation</u>  <u>1.0 with augmentation</u>
<u>1</u>	<u>Sand, Loamy Sand</u>	<u>==</u>	<u>0</u>	<u>5-15</u>	<u>Not suitable without augmentation</u>  <u>1.0 with augmentation</u>
<u>2</u>	<u>Sandy Loam, Loam, Silt Loam</u>	<u>PR BK GR</u>	<u>2 (Moderate) 3 (Strong)</u>	<u>16-25</u>	<u>0.8</u>
<u>2A</u>	<u>Sandy Loam, Loam, Silt Loam</u>	<u>PR, BK, GR 0 (none)</u>	<u>1 (Weak) Massive</u>	<u>26-40</u>	<u>0.6</u>
<u>3</u>	<u>Sandy Clay Loam, Clay Loam, Silty Clay Loam</u>	<u>PR, BK, GR</u>	<u>2, 3</u>	<u>41-60</u>	<u>0.4</u>
<u>3A</u>	<u>Sandy Clay Loam, Clay Loam, Silty Clay Loam</u>	<u>PR, BK, GR 0</u>	<u>1 Massive</u>	<u>61-75</u>	<u>0.2</u>
<u>4</u>	<u>Sandy Clay, Clay, Silty Clay</u>	<u>PR, BK, GR</u>	<u>2, 3</u>	<u>76-90</u>	<u>Not suitable</u>
<u>4A</u>	<u>Sandy Clay, Clay, Silty Clay</u>	<u>PR, BK, GR 0</u>	<u>1 Massive</u>	<u>91-120</u>	<u>Not suitable</u>
<u>5</u>	<u>Soil Types 2-4A</u>	<u>Platy</u>	<u>1, 2, 3</u>	<u>121+</u>	<u>Not suitable</u>

(d) Suitable soil may consist of original, undisturbed soil or original soil that is augmented. Not suitable soil may be augmented as needed to ensure suitable soil is used.

(e) If the original soil is augmented, the mixture used for augmentation must meet the following criteria to ensure that suitable soil is achieved:

- (1) The mixture must have an organic content that is at least five percent (5%) and no greater than ten percent (10%);
- (2) The mixture must be a well blended mix of mineral aggregate (soil) and compost where the soil ratio depends on the requirements for the plant species; and
- (3) The mineral aggregate must have the following gradation:

<u>Sieve Size</u>	<u>Percent Passing</u>
<u>3/8</u>	<u>100</u>
<u>No. 4</u>	<u>95 - 100</u>
<u>No. 10</u>	<u>75 - 90</u>
<u>No. 40</u>	<u>25 - 40</u>
<u>No. 100</u>	<u>4 - 10</u>
<u>No. 200</u>	<u>2 - 5</u>

(f) If the original soil is augmented, the additional soil must be tilled into the native soil a minimum of six inches (6") below irrigation application zone.

(g) Soil types 0 and 1 must be augmented before use. Soil type 4, 4A, and 5 are not suitable for subsurface irrigation.

ii) Irrigation area equation protocol: The following irrigation area equation protocol may be used to determine the appropriate size of the irrigation area for single family, dispersed subsurface irrigation systems (Categories A and C dispersed subsurface irrigation systems).

This protocol cannot be used to size mulch basins.

$$\underline{LA = GW / (CF \times ET \times PF)}$$

Where:

LA = Landscaped area (square feet) ;

GW = Estimated graywater flow (gallons per week) ;

CF = 0.62 (square foot x inch / gallon) = ((7.48 gallons/ 1-cu-ft) / 12 inch/ft) ;

ET = Evapotranspiration rate (inch / week), as determined by USDA Natural Resources Conservation Service CO652.0408 "Figure CO4-1: Map of Colorado Climate Zones" dated April 1978, or weekly averages based on actual conditions;

PF = Plant factor, 0.5

## 2. Mulch basin irrigation system requirements

The following minimum design criteria are required for graywater treatment works using mulch basin systems for subsurface irrigation:

a. Mulch shall be permeable enough to allow rapid infiltration of graywater.

b. The minimum void space mulch basin volume must be either:

i. Three (3) times the anticipated average daily flow for graywater treatment works without a storage tank to allow for graywater volume surges and to prevent surfacing or runoff.

ii. One and a half (1.5) times the anticipated average daily flow for graywater treatment works with storage tank meeting the section 86.11(Ag)(5) design criteria.

c. Piping to mulch basins must discharge a minimum of four inches (4") below grade into a container for dispersal of graywater into the mulch basin. The container must be designed to have four inches (4") of freefall between the invert of the discharge pipe and the mulch. The container must have an access lid for observation of flow and to check mulch levels.

d. The mulch basin must have a minimum depth of twelve inches (12") below grade and not more than twenty four (24") below grade.

e. A filter is not required.

3. Dispersed subsurface irrigation system requirements

The following minimum design criteria are required for graywater treatment works using dispersed irrigation systems for subsurface irrigation:

a. Include a cartridge filter, which must meet the following requirements:

i. A minimum of 60 mesh;

ii. Located between the storage tank and the irrigation system;

iii. If a pump is being used to pressurize the graywater distribution system, the filter must be located after the pump.

C. Design criteria for indoor toilet and urinal flushing graywater treatment works (Categories C and D)

1. Category C: single family, indoor toilet and urinal flushing graywater treatment works

The following minimum design criteria are required for graywater treatment works for Category C: single family, indoor toilet and urinal flushing:

a. The graywater treatment works must be certified under "Class R" of NSF/ANSI 350 Onsite Residential and Commercial Water Reuse Treatment Systems.

b. If a disinfection process is not part of NSF/ANSI 350-2011 equipment, separate disinfection system equipment is required. For graywater treatment works that use sodium hypochlorite (bleach), the graywater treatment works must be capable of providing a free chlorine residual of 0.2 to 4.0 mg/L in the graywater throughout the indoor graywater plumbing system.

c. The graywater treatment works must include a dye injection system that is capable of providing a dye concentration that is visibly distinct from potable water.

d. For Category C indoor toilet and urinal flushing graywater treatment works that are also capable of using graywater for subsurface irrigation, the system may be designed to allow graywater to be diverted to the subsurface irrigation graywater treatment works prior to the disinfection and dye process, however after the point of diversion the subsurface irrigation portion of the system must meet the requirements in section 86.12(B).

2. Category D: non-single family, indoor toilet and urinal flushing graywater treatment works

The following minimum design criteria are required for Category D: non-single family, indoor toilet and urinal flushing:

a. The graywater treatment works must be certified under “Class R” or “Class C” of NSF/ANSI 350 Onsite Residential and Commercial Water Reuse Treatment Systems. Required classification shall be dictated by the size of the graywater treatment works and if the graywater sources are residential or commercial as defined by NSF/ANSI 350.

b. Separate disinfection system equipment is required if a disinfection process is not part of NSF/ANSI 350-2011 equipment. A graywater treatment works must be capable of providing a free chlorine residual of 0.2 to 4.0 mg/L in the graywater throughout the indoor graywater plumbing system.

c. The graywater treatment works must include a dye injection system that is capable of providing a dye concentration that is visibly distinct from potable water.

d. For Category D indoor toilet and urinal flushing graywater treatment works that are also capable of using graywater for subsurface irrigation, the system may be designed to allow graywater to be diverted to the subsurface irrigation graywater treatment works prior to the disinfection and dye process, however after the point of diversion the subsurface irrigation portion of the system must meet the requirements in section 86.12(B).

e. For graywater treatment works that have a capacity to receive greater than 2,000 gallons per day, the design must be prepared under the supervision of and submitted with the seal and signature of a professional engineer licensed to practice engineering in the State of Colorado in accordance with the requirements of the Colorado Department of Regulatory Agencies (DORA) – Division of Registrations.

D. Signage requirements for non-single family graywater treatment works (Categories B and D)

1. All required notifications shall include posting of signs of sufficient size to be clearly read with the language below in the dominant language(s) expected to be spoken at the site.

2. All non-single family graywater treatment works (Categories B and D)

All non-single graywater treatment works must comply with the following signage requirements.

a. A permanent warning sign must be visible at all fixtures from which graywater is collected. The signs must state that, “WATER FROM THIS FIXTURE IS REUSED. CHEMICALS, EXCRETA, PETROLEUM OILS AND HAZARDOUS MATERIALS MUST NOT BE DISPOSED DOWN THE DRAIN”:

b. Each room that contains graywater treatment works components must have a sign that says “CAUTION GRAYWATER TREATMENT WORKS, DO NOT DRINK, DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM. NOTICE: CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.”; and

3. Non-single family, subsurface irrigation non-single family graywater treatment works (Categories B and D)

Non-single family, subsurface irrigation graywater treatment works (Categories B and D, if applicable) must comply with the following signage requirement:

a. Each irrigation area must have a sign that says “CAUTION GRAYWATER BEING USED FOR IRRIGATION. DO NOT DRINK, DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM.”

4. Non-single family, indoor toilet or urinal flushing, non-single family graywater treatment works (Category D)

Non-single family, indoor toilet and urinal flushing graywater treatment works (Category D) must comply with the following signage requirement:

a. Each toilet and urinal must have a sign that says: “TO CONSERVE WATER, THIS BUILDING USES TREATED NON-POTABLE GRAYWATER TO FLUSH TOILETS AND URINALS.”

### **86.13 Operation and Maintenance Manual**

All graywater systems must have an O&M manual. The O&M manual must include the following items:

A. A graywater treatment works description including: equipment list, design basis data including but not limited to, design volumes, design flow rates of each component and service area, system as-built drawing, and process description.

B. Maintenance information for the graywater treatment works including but not limited to: component maintenance schedule, instructions for component repair, replacement, or cleaning, replacement component source list, testing and frequency for potable containment device, and instructions for periodic removal of residuals.

C. Operational ranges for parameters including but not limited to: disinfectant concentration levels, filter replacement parameters, pressure ranges, tank level, and valve status under normal operation.

D. Step-by-step instructions for starting and shutting down the graywater treatment works including but not limited to: valve operation, any electrical connections, cleaning procedures, visual inspection, and filter installation.

E. A guide for visually evaluating the graywater treatment works and narrowing any problem scope based on alarm activations, effluent characteristics, system operation, and history.

F. A list of graywater control measures in which the graywater treatment works must be operated.

### **86.144 Graywater Use Requirements - Control Measures**

A. Control measures are operational requirements representing best management practices that graywater systems must follow when operating a graywater treatment works.

A B. Control measures that apply to Aall graywater uses

All graywater treatment works must be operated in accordance with the following control measures:

....

6. Graywater must not be stored for more than 24 hours unless the graywater has been treated by a graywater treatment works that meets the design requirements of section 86.12. All graywater must be stored inside a tank(s) that meets the design requirements of section 86.12(~~BA~~)(5).
7. Temporary or semi-temporary connections from the potable water system or public water system to the graywater treatment works are prohibited. Permanent connections from the potable water system or public water system to the graywater treatment works must meet the design requirements of 86.12(~~1~~)(~~BA~~)(6).

B C. Control measures that apply to Ssubsurface irrigation graywater use

~~Graywater use for subsurface irrigation must also comply~~Subsurface irrigation graywater treatment works must be operated in accordance with the following additional control measures:

1. Agricultural irrigation with graywater is prohibited.
2. Irrigation is prohibited when the ground is frozen, plants are dormant, during rainfall events, or the ground is saturated.
3. Irrigation scheduling must be adjusted so that application rates are closely matched with soil and weather conditions.
4. Graywater must be applied in a manner that does not result in ponding, runoff, or unauthorized discharge to state waters. For dispersed subsurface irrigation systems, the graywater must be applied at an agronomic rate. For mulch basins systems, the graywater must not be applied in excess of the soil adsorption rate.
5. For mulch basin systems, mulch must be replenished and undergo periodic maintenance as needed to reshape or remove material to maintain surge capacity and to prevent ponding and runoff.

C D. Control measures that apply to Indoor toilet and urinal flushing graywater use

~~Graywater use for indoor toilet and urinal flushing must also comply~~ Indoor toilet and urinal flushing graywater treatment works (Categories C and D) must be operated in accordance with the following additional control measures.

1. Graywater for toilet and urinal flushing use must be disinfected.
  - a. Graywater treatment works that utilize chlorine for disinfection must have a minimum of 0.2 mg/L and a maximum of 4.0 mg/L of free chlorine residual throughout the indoor graywater plumbing system, including fixtures.



- b. Single family graywater treatment works that utilize non-chemical methods, such as UV, for disinfection must have a chlorine puck present in each toilet or urinal tank.
2. Graywater for toilet and urinal flushing must be dyed with either blue or green food grade vegetable dye and be visibly distinct from potable water.

**86.12 ~~Graywater Treatment Works - Design Criteria~~**

**A. ~~Graywater treatment works flow projections~~**

All graywater treatment works must be sized using the following flow projection methods:

- 1. ~~Residential users: Flow to graywater treatment works must be calculated on the occupancy and the fixtures connected to the graywater treatment works. The calculated graywater flow is the number of occupants multiplied by the estimate graywater flow in terms of gpd/occupant from the attached fixtures.~~
  - a. ~~The occupancy must be calculated based on a minimum of two (2) occupants for the first bedroom and one (1) occupant for each additional bedroom.~~
  - b. ~~The estimated graywater flow from each fixture is based on the design flow of the fixture. If the fixture's design flow is unknown then the estimated graywater flow per occupant is:
 
    - i. ~~Traditional fixtures: 25 gpd/occupant for each shower, bathtub, and wash basin and 15 gpd/occupant for each clothes washer.~~
    - ii. ~~Water saving fixtures: 20 gpd/occupant for each shower, bathtub, and wash basin and 8 gpd/occupant for each clothes washer.~~~~
- 2. ~~Non-residential users: Graywater treatment works must be sized must be sized in accordance with fixture or water use records taking into account the number of fixtures attached to the graywater treatment works.~~

**B. ~~Graywater treatment works design criteria~~**

All graywater treatment works must comply with the following design criteria:

- 1. ~~The graywater treatment works must be designed to meet the design requirements of this regulation and meet any additional requirements of the Colorado Plumbing Code.~~
- 2. ~~The design flow of each treatment component or combination of multiple components must be greater than the calculated peak graywater production if upstream of the storage tank or no tank is present.~~
- 3. ~~The graywater treatment works must have a diversion valve that directs graywater to either the graywater treatment works or a closed sewerage system. The diversion valve must be easily operable and clearly labeled. The diversion valve must be constructed of material that is durable, corrosion resistant, watertight, and designed to accommodate the inlet and outlet pipes in a secure and watertight manner. The bypass line must be indirectly connected to the closed sewerage system.~~

4. ~~Piping that allows the treatment process(es) or a storage tank to be bypassed prior to graywater use is prohibited unless the graywater bypass piping has an indirect connection to a closed sewerage system.~~
5. ~~Graywater treatment works must include a tank to collect and store graywater except for subsurface irrigation systems that discharge to a mulch basin which meets the sizing criteria of section 86.12(C)(3)(g)(ii)(a) for Category A and C graywater treatment works or 86.12(D)(4)(g)(ii)(a) for Category B and D graywater treatment works.~~

~~The storage tank must:~~

- a. ~~be made of durable, non-absorbent, water-tight, and corrosion-resistant materials;~~
  - b. ~~be closed and have access openings for inspection and cleaning;~~
  - c. ~~be vented:~~
    - i. ~~for indoor tanks: the tanks must be vented to the atmosphere outside of the house;~~
    - ii. ~~for outdoor tanks: the storage tank must have a downturned screened vent;~~
  - d. ~~have an overflow line:~~
    - i. ~~with the same or larger diameter line as the influent line;~~
    - ii. ~~without a shut-off valve;~~
    - iii. ~~that is trapped to prevent the escape of gas vapors from the tank; and~~
    - iv. ~~that is indirectly connected to the closed sewerage system;~~
  - e. ~~have a valved drain line with the same or larger diameter line as the influent line that is indirectly connected to the closed sewerage system;~~
  - f. ~~be a minimum of 50 gallons;~~
  - g. ~~be placed on a stable foundation; and~~
  - h. ~~have a permanent label that states "CAUTION! NON-POTABLE WATER. DO NOT DRINK."~~
6. ~~Category A and Category B graywater treatment works may, but are not required to, have a backup potable water system that provides potable irrigation water when graywater is not being produced or is produced in insufficient quantities. Category C and Category D graywater treatment works must have a backup potable water system connection.~~

~~Backup potable water system connections must meet the following requirements:~~

- a. ~~For non-public water system, potable water system connections: uncontrolled cross-connections between a potable water system and a graywater treatment works are prohibited. All cross-connections must be protected by a reduced pressure principle backflow prevention zone assembly or an approved air gap.~~

- b. ~~For public water system potable water system connections: uncontrolled cross connections between a public water system and a graywater treatment works are prohibited. The graywater treatment works design must protect the public water system from cross connections by meeting the requirements of Regulation #11: Colorado Primary Drinking Water Regulations.~~
- 7. ~~Use or installation of graywater treatment works cannot be used as a factor to reduce the design, capacity or soil treatment area requirements for OWTS or domestic wastewater treatment works.~~
- 8. ~~Wastewater from graywater treatment works (e.g., filter backwash water) must be properly contained and disposed into a closed sewerage system or an approved Underground Injection Control (UIC) well.~~
- 9. ~~All graywater piping shall be clearly distinguished and must be clearly labeled, including pipe identification and flow arrows.~~
- 10. ~~Graywater treatment works located in a 100-year floodplain must meet or exceed the requirements of FEMA and the local emergency agency. The graywater system must be designed to minimize or eliminate infiltration of floodwaters into the system and prevent discharge from the system into the floodwaters.~~
- 11. ~~Graywater treatment works are prohibited in floodways.~~
- 12. ~~The graywater treatment works must be located:
 
  - a. ~~Within the confines of the legal property boundary and not within an easement; and~~
  - b. ~~Outdoor tanks must not be exposed to direct sunlight.~~~~

C. ~~Category A: Graywater treatment works design criteria~~

~~In addition to the requirements in sections 86.12(A) and 86.12(B), graywater treatment works for "Category A: Single family, subsurface irrigation" uses must include the following components:~~

- 1. ~~The graywater treatment works must include either:
 
  - a. ~~For mulch basin systems, a filter is not required but the mulch basin design must meet the design criteria in sections 86.12(C)(2) and 86.12(C)(3).~~
  - b. ~~For dispersed subsurface irrigation systems, a cartridge filter is required. The cartridge filter must be a minimum of 60 mesh. The filter must be located between the storage tank and the irrigation system. If a pump is being used to pressurize the graywater distribution system, the filter must be located after the pump. The dispersed subsurface irrigation system must meet design criteria in sections 86.12(C)(2) and 86.12(C)(4).~~~~
- 2. ~~Subsurface irrigation system designs, including dispersed subsurface irrigation systems and mulch basin systems, must meet the following criteria:
 
  - a. ~~The subsurface irrigation components of the graywater irrigation system must be installed a minimum of four inches (4") and a maximum of twelve inches (12") below the finished grade.~~~~

- b. The subsurface irrigation components of the graywater irrigation system must be installed in suitable soil, as defined in section 86.8(36).
- c. There must be a minimum of twenty-four inches (24") of suitable soil between the subsurface irrigation components of the graywater irrigation system and any restrictive soil layer, bedrock, concrete, or the highest water table. Restrictive soil layers are soil types 4, 4A, and 5 in Table 12-2.
- d. The system design shall provide the user with controls, such as valves, switches, timers, and other controllers, as appropriate, to ensure the distribution of graywater throughout the entire irrigation zone.
- e. When used, emitters shall be designed to resist root intrusion and shall be of a design recommended by the manufacturer for the intended graywater flow and use. Minimum spacing between emitters shall be sufficient to deliver graywater at an agronomic rate and to prevent surfacing or runoff.
- f. All irrigation supply lines shall be polyethylene tubing or PVC Class 200 pipe or better and Schedule 40 fittings. All joints shall be pressure tested at 40 psi (276 kPa), and shown to be drip tight for five minutes before burial. Drip feeder lines can be poly or flexible PVC tubing.
- g. All irrigation systems must meet the following setback distances in Table 12-1.

**Table 12-1: Graywater System Setback Requirements**

<u>Minimum Horizontal Distance Required from:</u>	<u>Graywater Storage Tank</u>	<u>Irrigation Field</u>
Buildings	5 feet	2 feet
Property line adjoining private property	10 feet	10 feet
Property line adjoining private property with supporting property line survey	1.5 feet	1.5 feet
Water supply wells	50 feet	100 feet
Streams and lakes	50 feet	50 feet
Seepage pits or cesspools	5 feet	5 feet
OWTS disposal field	5 feet	25 feet
OWTS tank	5 feet	10 feet
Domestic potable water service line	10 feet	10 feet
Public water main	10 feet	10 feet

- h. The irrigation field may only be located on slopes of less than thirty percent (30%) from horizontal.
3. Mulch basin systems must be designed to meet the following requirements:
- a. A site and soil evaluation must be conducted for each proposed graywater irrigation area to determine the site suitability. The site and soil evaluation must include:
    - i. Site information, including:

- (a) — a site map; and
  - (b) — location of proposed graywater irrigation area in relation to physical features requiring setbacks in Table 12-1.
- ii. — Soil investigation to determine long-term acceptance rate of a graywater irrigation area as a design basis. Soil investigation must be completed by either:
- (a). — a visual and tactile evaluation of soil profile test pit, or
  - (b) — a percolation test.
- b. — Irrigation rates must not exceed maximum allowable soil loading rates in Table 12-2 based on the finest textured soil in the twenty-four inches (24") of suitable soil beneath the subsurface irrigation components.

**Table 12-2: Soil Type Description and Maximum Hydraulic Loading Rate**

<u>Soil Type</u>	<u>USDA Soil Texture</u>	<u>USDA Structure-Shape</u>	<u>USDA Soil Structure-Grade</u>	<u>Percolation Rate (MPI)</u>	<u>Loading Rate for Graywater (gal./sq. ft./day)</u>
0	Soil Type 1 with more than 35% Rock (>2mm); Soil Types 2-5 with more than 50% Rock (>2mm)	--	0 (Single Grain)	Less than 5	Not suitable without augmentation  1.0 with augmentation
1	Sand, Loamy Sand	--	0	5-15	Not suitable without augmentation  1.0 with augmentation
2	Sandy Loam, Loam, Silt Loam	PR BK GR	2 (Moderate) 3 (Strong)	16-25	0.8
2A	Sandy Loam, Loam, Silt Loam	PR, BK, GR 0 (none)	1 (Weak) Massive	26-40	0.6
3	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR	2, 3	41-60	0.4
3A	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR 0	1 Massive	61-75	0.2
4	Sandy Clay, Clay, Silty Clay	PR, BK, GR	2, 3	76-90	Not suitable
4A	Sandy Clay, Clay, Silty Clay	PR, BK, GR 0	1 Massive	91-120	Not suitable
5	Soil Types 2-4A	Platy	1, 2, 3	121+	Not suitable

- e. — Suitable soil may consist of original, undisturbed soil or original soil that is augmented. Not suitable soil may be augmented as needed to ensure suitable soil is used.

d. ~~If the original soil is augmented, the mixture used for augmentation must meet the following criteria to ensure that suitable soil is achieved:~~

- i. ~~The mixture must have an organic content that is at least five percent (5%) and no greater than ten percent (10%);~~
- ii. ~~The mixture must be a well blended mix of mineral aggregate (soil) and compost where the soil ratio depends on the requirements for the plant species; and~~
- iii. ~~The mineral aggregate must have the following gradation:~~

<u>Sieve Size</u>	<u>Percent Passing</u>
<del>3/8</del>	<del>100</del>
<del>No. 4</del>	<del>95 - 100</del>
<del>No. 10</del>	<del>75 - 90</del>
<del>No. 40</del>	<del>25 - 40</del>
<del>No. 100</del>	<del>4 - 10</del>
<del>No. 200</del>	<del>2 - 5</del>

e. ~~If the original soil is augmented, the additional soil must be tilled into the native soil a minimum of six inches (6") below irrigation application zone.~~

f. ~~Soil types 0 and 1 must be augmented before use. Soil type 4, 4A, and 5 are not suitable for subsurface irrigation.~~

g. ~~Mulch basins must be designed to meet the following requirements:~~

- i. ~~Mulch shall be permeable enough to allow rapid infiltration of graywater.~~
- ii. ~~The minimum void space mulch basin volume must be either:~~
  - (a) ~~Three (3) times the anticipated average daily flow for graywater treatment works without a storage tank to allow for graywater volume surges and to prevent surfacing or runoff.~~
  - (b) ~~One and a half (1.5) times the anticipated average daily flow for graywater treatment works with storage tank meeting the section 86.12(B)(5) design criteria.~~
- iii. ~~Piping to mulch basins must discharge a minimum of four inches (4") below grade into a container for dispersal of graywater into the mulch basin. The container must be designed to have four inches (4") of freefall between the invert of the discharge pipe and the mulch. The container must have an access lid for observation of flow and to check mulch levels.~~
- iv. ~~The mulch basin must have a minimum depth of twelve inches (12") below grade and not more than twenty four (24") below grade.~~

4. ~~Dispersed subsurface irrigation systems must be sized using one of the following methodologies:~~

a. Irrigation area equation:

The minimum graywater irrigation area must be calculated using the following equation:

$$LA = GW / (CF \times ET \times PF)$$

Where:

LA = Landscaped area (square feet)

GW = Estimated graywater flow (gallons per week)

CF = 0.62 (square foot x inch / gallon) = ((7.48 gallons / 1-cu-ft) / 12 inch/ft)

ET = Evapotranspiration rate (inch / week), as determined by USDA Natural Resources Conservation Service CO652.0408 "Figure CO4-1: Map of Colorado Climate Zones" dated April 1978, or weekly averages based on actual conditions;

PF = Plant factor, 0.5;

or,

b. The mulch basin system design criteria in Section 86.12(C)(3), except 86.12(C)(3)(g).

D Category B: Graywater treatment works design criteria

In addition to the requirements in sections 86.12(A) and 86.12(B), graywater treatment works for "Category B: Non-single family, subsurface irrigation, 2,000 gallons per day (gpd) or less" uses must include the following treatment components:

1. The graywater treatment works must include either:

a. For mulch basin systems, a filter is not required but the mulch basin design must meet design criteria in sections 86.12(D)(3) and 86.12(D)(4).

b. For dispersed subsurface irrigation systems, a cartridge filter is required. The cartridge filter must be a minimum of 60 mesh located between the storage tank and the irrigation system. If a pump is being used to pressurize the graywater distribution system the filter must be located after the pump. The dispersed subsurface irrigation system must meet the design criteria in sections 86.12(D)(3) and 86.12(D)(4), except 86.12(D)(4)(g).

2. Signage: Notification shall include posting of signs of sufficient size to be clearly read with the language below in the dominant language(s) expected to be spoken at the site.

a. A permanent warning sign must be visible at all fixtures from which graywater is collected. The signs must state that, "WATER FROM THIS FIXTURE IS REUSED. CHEMICALS, EXCRETA, PETROLEUM OILS AND HAZARDOUS MATERIALS MUST NOT BE DISPOSED DOWN THE DRAIN";

- ~~b. Each room that contains graywater treatment works components must have a sign that says "CAUTION GRAYWATER TREATMENT WORKS, DO NOT DRINK, DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM. NOTICE: CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM."; and~~
- ~~c. Each irrigation area must have a sign that says "CAUTION GRAYWATER BEING USED FOR IRRIGATION. DO NOT DRINK, DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM."~~
- ~~3. Subsurface irrigation system designs, including dispersed subsurface irrigation systems and mulch basin systems, must meet the following criteria:~~
  - ~~a. The subsurface irrigation components of the graywater irrigation system must be installed a minimum of four inches (4") and a maximum of twelve inches (12") below the finished grade.~~
  - ~~b. The subsurface irrigation components of the graywater irrigation system must be installed in suitable soil, as defined in section 86.8(36).~~
  - ~~c. There must be a minimum of twenty-four inches (24") of suitable soil between the subsurface irrigation components of the graywater irrigation system and any restrictive soil layer, bedrock, concrete, or the highest water table. Restrictive soil layers are soil types 4, 4A, and 5 in Table 12-2.~~
  - ~~d. The system design shall provide the user with controls, such as valves, switches, timers, and other controllers, as appropriate, to ensure the distribution of graywater throughout the entire irrigation zone.~~
  - ~~e. When used, emitters shall be designed to resist root intrusion and shall be of a design recommended by the manufacturer for the intended graywater flow and use. Minimum spacing between emitters shall be sufficient to deliver graywater at an agronomic rate and to prevent surfacing or runoff.~~
  - ~~f. All irrigation supply lines shall be polyethylene tubing or PVC Class 200 pipe or better and Schedule 40 fittings. All joints shall be pressure tested at 40 psi (276 kPa), and shown to be drip tight for five minutes before burial. Drip feeder lines can be poly or flexible PVC tubing.~~
  - ~~g. All irrigation systems must meet the setback distances in Table 12-1.~~
  - ~~h. The irrigation field may only be located on slopes of less than thirty percent (30%) from horizontal.~~
- ~~4. Dispersed subsurface irrigation systems and mulch basin systems must be designed to meet the following requirements:~~
  - ~~a. A site and soil evaluation must be conducted for each proposed graywater irrigation area to determine the site suitability. The site and soil evaluation must include:
    - ~~i. Site information, including:
      - ~~(a) a site map; and~~~~~~



- (b) ~~location of proposed graywater irrigation area in relation to physical features requiring setbacks in Table 12-1.~~
- ii. ~~Soil investigation to determine long-term acceptance rate of a graywater irrigation area as a design basis. Soil investigation must be completed by either:~~
  - (a) ~~a visual and tactile evaluation of soil profile test pit, or~~
  - (b) ~~a percolation test.~~
- b. ~~Irrigation rates must not exceed maximum allowable soil loading rates in Table 12-2 based on the finest textured soil in the twenty-four inches (24") of suitable soil beneath the subsurface irrigation components.~~
- c. ~~Suitable soil may consist of original, undisturbed soil or original soil that is augmented. Not suitable soil may be augmented as needed to ensure suitable soil is used.~~
- d. ~~If the original soil is augmented, the mixture used for augmentation must meet the following criteria to ensure that suitable soil is achieved:~~
  - i. ~~The mixture must have an organic content that is at least five percent (5%) and no greater than ten percent (10%);~~
  - ii. ~~The mixture must be a well-blended mix of mineral aggregate (soil) and compost where the soil ratio depends on the requirements for the plant species; and~~
  - iii. ~~The mineral aggregate must have the following gradation:~~

<u>Sieve Size</u>	<u>Percent Passing</u>
<del>3/8-</del>	<del>100-</del>
<del>No. 4-</del>	<del>95-100-</del>
<del>No. 10-</del>	<del>75-90-</del>
<del>No. 40-</del>	<del>25-40-</del>
<del>No. 100-</del>	<del>4-10-</del>
<del>No. 200-</del>	<del>2-5-</del>
- e. ~~If the original soil is augmented, the additional soil must be tilled into the native soil a minimum of six inches (6") below irrigation application zone.~~
- f. ~~Soil types 0 and 1 must be augmented before use. Soil type 4, 4A, and 5 are not suitable for subsurface irrigation.~~
- g. ~~Mulch basins must be designed to meet the following requirements:~~
  - i. ~~Mulch shall be permeable enough to allow rapid infiltration of graywater.~~
  - ii. ~~The minimum void space mulch basin volume must be either:~~

- (a) ~~Three (3) times the anticipated average daily flow for graywater treatment works without a storage tank to allow for graywater volume surges and to prevent surfacing or runoff.~~
- (b) ~~One and a half (1.5) times the anticipated average daily flow for graywater treatment works with storage tank meeting the section 86.12(B)(5) design criteria.~~
- iii. ~~Piping to mulch basins must discharge a minimum of four inches (4") below grade into a container for dispersal of graywater into the mulch basin. The container must be designed to have four inches (4") of freefall between the invert of the discharge pipe and the mulch. The container must have an access lid for observation of flow and to check mulch levels.~~
- iv. ~~The mulch basin must have a minimum depth of twelve inches (12") below grade and not more than twenty four (24") below grade.~~

~~E. Category C: Graywater treatment works design criteria~~

~~In addition to the requirements in Sections 86.12(A) and (B), graywater treatment works for "Category C: Single family, indoor toilet and urinal flushing, subsurface irrigation" uses must include the following treatment components:~~

- 1. ~~The graywater treatment works must be certified under "Class R" of NSF/ANSI 350 Onsite Residential and Commercial Water Reuse Treatment Systems.~~
- 2. ~~If a disinfection process is not part of NSF/ANSI 350-2011 equipment, separate disinfection system equipment is required. For graywater treatment works that use sodium hypochlorite (bleach), the graywater treatment works must be capable of providing a free chlorine residual of 0.2 to 4.0 mg/L in the graywater throughout the indoor graywater plumbing system.~~
- 3. ~~The graywater treatment works must include a dye injection system that is capable of providing a dye concentration that is visibly distinct from potable water.~~
- 4. ~~Category C graywater treatment works that use graywater for subsurface irrigation may divert graywater prior to the disinfection and dye process. The subsurface irrigation system design must meet:~~
  - a. ~~For mulch basin systems, the mulch basin design must meet the design criteria in sections 86.12(C)(2) and 86.12(C)(3).~~
  - b. ~~For dispersed subsurface irrigation systems, the dispersed subsurface irrigation system must meet design criteria in sections 86.12(C)(2) and 86.12(C)(4).~~

~~F. Category D: Graywater treatment works design criteria~~

~~In addition to the requirements in Sections 86.12(A) and (B), graywater treatment works for "Category D: Non-single family, indoor toilet and urinal flushing, subsurface irrigation" uses must include the following treatment components:~~

- 1. ~~The graywater treatment works must be certified under "Class R" or "Class C" of NSF/ANSI 350 Onsite Residential and Commercial Water Reuse Treatment Systems.~~

~~Required classification shall be dictated by the size of the graywater treatment works and if the graywater sources are residential or commercial as defined by NSF/ANSI 350.~~

- ~~2. Separate disinfection system equipment is required if a disinfection process is not part of NSF/ANSI 350-2011 equipment. A graywater treatment works must be capable of providing a free chlorine residual of 0.2 to 4.0 mg/L in the graywater throughout the indoor graywater plumbing system.~~
- ~~3. The graywater treatment works must include a dye injection system that is capable of providing a dye concentration that is visibly distinct from potable water.~~
- ~~4. Signage: Notification shall include posting of signs of sufficient size to be clearly read with the language below in the dominant language(s) expected to be spoken at the site.
  - ~~a. A permanent warning sign must be visible at all fixtures from which graywater is collected. The signs must state that, "WATER FROM THIS FIXTURE IS REUSED. CHEMICALS, EXCRETA, PETROLEUM OILS AND HAZARDOUS MATERIALS MUST NOT BE DISPOSED DOWN THE DRAIN";~~
  - ~~b. Each room that contains graywater treatment works components must have a sign that says "CAUTION GRAYWATER TREATMENT WORKS, DO NOT DRINK, DO NOT CONNECT TO THE POTABLE DRINKING WATER SYSTEM. NOTICE: CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM."; and~~
  - ~~c. Each toilet and urinal must have a sign that says: "TO CONSERVE WATER, THIS BUILDING USES TREATED NON-POTABLE GRAYWATER TO FLUSH TOILETS AND URINALS."~~~~
- ~~5. Category D graywater treatment works that use graywater for subsurface irrigation may divert graywater prior to the disinfection and dye process. The subsurface irrigation system design must meet:
  - ~~a. For mulch basin systems, the mulch basin design must meet design criteria in sections 86.12(D)(3) and 86.12(D)(4).~~
  - ~~b. For dispersed subsurface irrigation systems, the dispersed subsurface irrigation system must meet the design criteria in sections 86.12(D)(3) and 86.12(D)(4), except 86.12(D)(4)(g).~~~~
- ~~6. For graywater treatment works that have a capacity to receive greater than 2,000 gallons per day, the design must be prepared under the supervision of and submitted with the seal and signature of a professional engineer licensed to practice engineering in the State of Colorado in accordance with the requirements of the Colorado Department of Regulatory Agencies (DORA) — Division of Registrations.~~

### **86.13 Operation and Maintenance Manual**

All graywater systems must have an O&M manual. The O&M manual must include the following items:

- ~~A. A graywater treatment works description including: equipment list, design basis data including but not limited to, design volumes, design flow rates of each component and service area, system as-built drawing, and process description.~~

- ~~B. Maintenance information for the graywater treatment works including but not limited to: component maintenance schedule, instructions for component repair, replacement, or cleaning, replacement component source list, testing and frequency for potable containment device, and instructions for periodic removal of residuals.~~
- ~~C. Operational ranges for parameters including but not limited to: disinfectant concentration levels, filter replacement parameters, pressure ranges, tank level, and valve status under normal operation.~~
- ~~D. Step-by-step instructions for starting and shutting down the graywater treatment works including but not limited to: valve operation, any electrical connections, cleaning procedures, visual inspection, and filter installation.~~
- ~~E. A guide for visually evaluating the graywater treatment works and narrowing any problem scope based on alarm activations, effluent characteristics, system operation, and history.~~
- ~~F. A list of graywater control measures in which the graywater treatment works must be operated.~~

**86.145 Certified Operator**

A graywater treatment works must be operated by qualified personnel who meet any applicable requirements of Regulation #100, the Water and Wastewater Facility Operators Certification Requirements.

**86.156 - 86.20 Reserved**

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## **WATER QUALITY CONTROL DIVISION PROPOSED**

### **86.22 STATEMENT OF BASIS, SPECIFIC STATUTORY AUTHORITY, AND PURPOSE; NOVEMBER 9, 2015 RULEMAKING, EFFECTIVE DECEMBER 30, 2015**

The provisions of sections 25-8-202(1)(c) and 25-8-205(1)(g), C.R.S., provide the specific statutory authority for the Graywater Control Regulation adopted by the Water Quality Control Commission (commission). The commission has also adopted, in compliance with section 24-4-203(4), C.R.S., the following statement of basis, specific statutory authority, and purpose.

#### **BASIS AND PURPOSE**

The commission stated in the statement of basis and purpose language in section 86.21 that, “[t]he commission anticipates future reviews of this regulation to include a review for improved organization and readability.” In the November 9, 2015 rulemaking the Commission reorganized Regulation #86 and, in some cases, clarified the language. These changes to Regulation #86 are not substantive and are not intended to create any new or different requirements for graywater systems. The revisions are intended to make Regulation #86 easier to understand, comply with, and implement.

In an effort to provide clarity the following revisions were made:

- Section 86.9 - clarified which of the local graywater program requirements must be adopted under an ordinance or resolution and which requirements may be adopted under rule,
- Section 86.11 - created a new independent section for graywater treatment works – flow projections in section
- Section 86.12 - reorganized the graywater treatment works design criteria in section into: subsurface irrigation graywater treatment works design criteria and indoor and urinal flushing graywater treatment works design criteria, rather than design criteria for each use category,
- Section 86.13 - moved the operation and maintenance manual requirements to section 86.13,
- Section 86.14 - moved the control measure requirements to section 86.14, and
- Minor editorial changes for clarity throughout.