Item 17
Submitted by staff

MONTEREY COUNTY

DEPARTMENT OF HEALTH

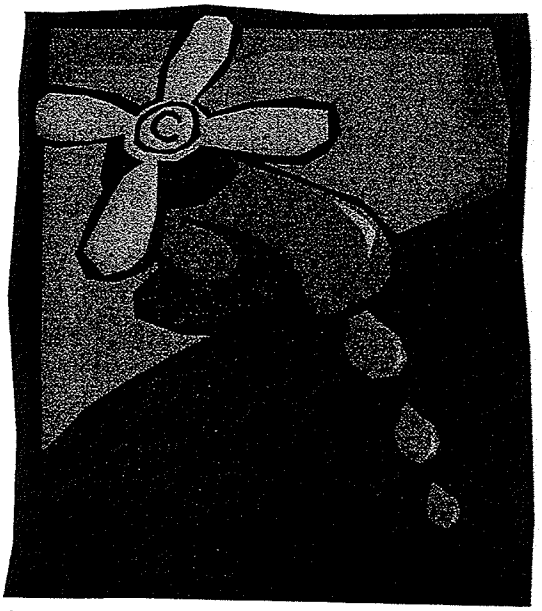
ANIMAL SERVICES
BEHAVIORAL HEALTH
CLINIC SERVICES
EMERGENCY MEDICAL SERVICES
ENVIRONMENTAL HEALTH
PUBLIC HEALTH
PUBLIC ADMINISTRATOR/PUBLIC GUARDIAN

GRAYWATER IRRIGATION SYSTEMS

Permitting Process and Design Criteria

INTRODUCTION

Properly installed graywater systems can provide a safe drought proof supply of irrigation water and impart the environmental benefit of conserving drinking water supplies. Graywater is untreated wastewater from bathroom sinks baths/showers and clothes washers. Wastewater from toilets, kitchen sinks and dishwashers is blackwater and must be disposed into a sanitary sewer or an onsite wastewater treatment system. California has recently adopted new standards for outside use (i.e. irrigation). These new standards ease the design criteria; increase the type of graywater dispersal systems that can be used; and exempts a specific type of system (i.e. clothes washer systems) from a construction permit.



The Monterey County Environmental Health Bureau (EHB) is the Administrative Authority for the oversight and permitting of onsite wastewater treatment systems (OWTS), which include graywater systems, in the unincorporated areas of Monterey County. City building departments may choose to be the permitting agency for properties within their jurisdiction, however Monterey County EHB will be the permitting agency for all properties served by wells and/or septic systems.

PURPOSE

Graywater systems are onsite wastewater treatment systems (OWTS) designed to collect graywater and transport it out of the structure for distribution in an irrigation or disposal field. A graywater system may include tanks, valves, filters, pumps or other appurtenances along with the piping and receiving landscape. OWTS can discharge pollutants to groundwater and are therefore regulated by California Water Code. California Water Code Section 13282 allows the RWQCB to authorize a local public agency to issue permits for and to regulate OWTS "to ensure that systems are adequately designed, located, sized, spaced, constructed and maintained".

The regulations for designing and installing a graywater system are found in the California Code of Regulations Title 24, Part 5 (California Plumbing Code), Chapter 16A Part I – Nonpotable Water Reuse Systems.

The objectives of this guidance document are:

- To make the criteria for the design, installation, operation and maintenance of graywater systems easily accessible to the public.
- To ensure that graywater irrigation/disposal systems will not contaminate groundwater, surface water, or create a public health hazard.
- To explain the permitting procedures and inspection of graywater systems installed within Monterey County.

WHAT CONSTITUTES GRAYWATER

Pursuant to Health and Safety Code Section 17922.12, "graywater" means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes but is not limited to wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.

TYPES OF GRAYWATER SYSTEMS

Chapter 16A-1 of the Plumbing Code recognizes four types of graywater systems:

Clothes washer system	A graywater system utilizing only a single domestic clothes washing machine in a one- or two-family dwelling.
Simple system	A graywater system serving a one- or two-family dwelling with a discharge of 250 gallons (947 L) per day or less. Simple systems exceed a clothes washer system and/or a single fixture system.
Complex system	Graywater systems that discharge over 250 gallons (947 L) per day.
Treated graywater system	Nonpotable water collected and treated on-site suitable for direct beneficial use.

THE PERMIT PROCESS

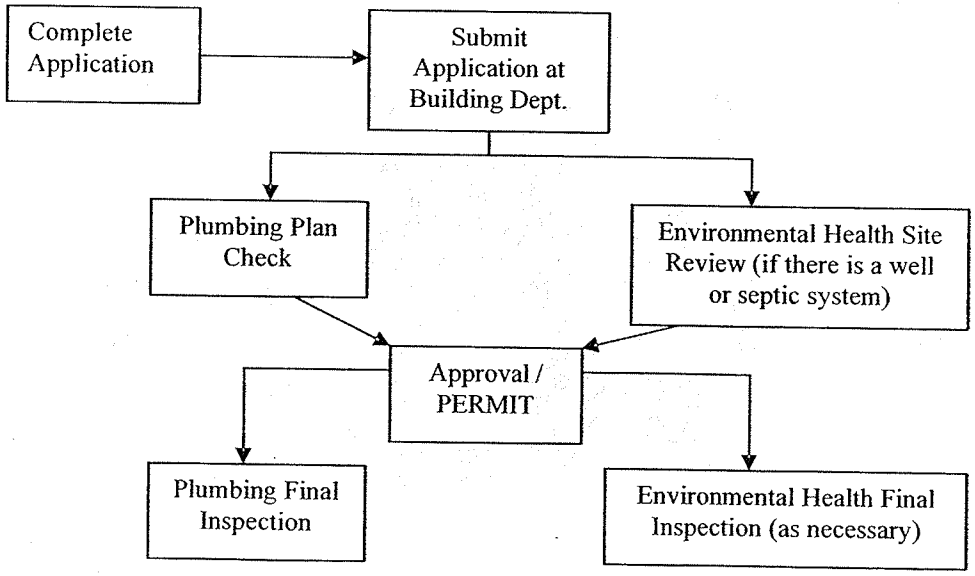
TYPE OF SYSTEM	PERMIT REQUIRED
Clothes washer system	No permit required
Simple and Complex Systems	Submit application and fees to Monterey County Building Dept. Salinas- 168 Alisal St. (831)755-5027 Marina- 2620 1st Ave. (831)883-7500

1. Clothes washer systems: A construction permit is not required. However, the property owner is not exempt from complying with design, installation, and maintenance standards in Chapter 16A of the California Plumbing Code. If there is a complaint investigation that verifies a violation of the applicable standards, then the property owner will be subject to cost recovery and any fines resulting from the investigation. (See Design Criteria on page 5 below)

2. Simple and Complex Systems: A construction permit is required. An application can be obtained at Monterey County Building Dept. The Environmental Health portion can be downloaded at http://www.co.monterey/health/EnvironmentalHealth/review.htm and completed at home (See Design Criteria on page 5 below).

Prior to submitting any fees or completing any work, it is recommended that the contractor or property owner contact EHB to determine what information is available for the subject property. Property owners or their representatives are encouraged to call or meet with EHB staff to discuss any concerns or questions and to prevent any unnecessary delays or costs when designing or installing a graywater system.

The permit process is outlined below:



REQUIRED APPLICATION MATERIALS

Please review the section below for the information and plot map requirements for the application process. In order to process your application as quickly as possible, the application and plot map must contain the following:

1. Property owners name, home address and telephone number, and Assessor's Parcel Number (APN) of the property, if available.
2. Sketched outline of the property, giving dimensions and the direction of north. Any septic tank and septic system drainfield on the property must be indicated.
3. Identification of all plumbing fixtures that will be draining into the graywater system.
4. Plot plan showing the proposed layout of the entire system, including its connection to any other piping system on the property (see Table 1 on page 7 of this document).
5. Cross-sectional drawing of the graywater disposal field (see Table 3 on page 9). Location and design of backflow prevention air gap separation between make-up (top-off) fresh water supply and the graywater system.
6. A calculation of the maximum expected waste volume per day: Use the typical graywater flows set forth in Section 1606A.0 9 of the California Plumbing Code to estimate wastewater volume per day (see example on page 6 below).
7. A calculation of the required disposal area for your system (see Table 2 on page 8).
8. Location of any existing well, whether domestic or irrigation, and whether in use or abandoned, either on the property or within one hundred (100) feet of the property.
9. Location of any existing or proposed embankments with slopes exceeding thirty (30) percent or any existing or proposed downhill cuts whether natural or manmade. Any proposed manmade cuts or excavations depicting height, length and/or area must also be shown (e.g. road cuts, pool/spa excavations, basements, pad cuts etc).
11. Location of ocean, lakes, sloughs, streams, springs, water channels, water courses, reservoirs, water supplies or any other body of water on or adjacent to the property.
12. Location of all recorded easements.
13. Such additional data as may be necessary, in the judgment of the Director, to insure that the proposed method of graywater disposal will not endanger health and sanitation.
14. Depth to groundwater, if known.

DESIGN CRITERIA

Anyone seeking a permit for a residential graywater system should review Chapter 16A-1 of the California Plumbing Code (CPC) for design, installation, and maintenance requirements. Regulations for installation of a washing machine or simple system are summarized below:

1. Graywater can be obtained from clothes washers, showers, bathtubs and hand washing sinks only. Kitchen sinks and dishwashers shall not be connected to a graywater system.
2. The design shall allow the user to direct the flow to the irrigation or disposal field or the building sewer. The direction control of the graywater shall be clearly labeled and readily accessible to the user. The system shall have an overflow pipe which is permanently connected to the building sewer.
3. The installation, change, alteration or repair of the system does not include a potable water connection or a pump and does not affect other building, plumbing, electrical or mechanical components including structural features, egress, fire-life safety, sanitation, potable water supply piping or accessibility.
4. Graywater systems using tanks shall be designed to minimize the amount of time graywater is held in the tank and shall be sized to distribute the total amount of estimated graywater on a daily basis.
5. All storage tanks, pipes, and spigots shall be clearly labeled "Non-potable Water – Do Not Drink".
6. The graywater shall be contained on the site where it is generated.
7. Graywater shall be directed to and contained within an irrigation or disposal field.
8. Ponding or runoff is prohibited and shall be considered a nuisance.
9. Graywater may be released above the ground surface provided at least two (2) inches (51 mm) of mulch, rock, or soil, or a solid shield covers the release point. Other methods which provide equivalent separation are also acceptable.
10. Graywater systems shall be designed to minimize contact with humans and domestic pets.
11. Water used to wash diapers or similarly soiled or infectious garments shall not be used and shall be diverted to the building sewer.
12. Graywater shall not contain hazardous chemicals derived from activities such as cleaning car parts, washing greasy or oily rags, or disposing of waste solutions from home photo labs or similar hobbyist or home occupational activities.
13. Exemption from construction permit requirements of this code shall not be deemed to grant authorization for any graywater system to be installed in a manner that violates other provisions of this code or any other laws or ordinances of the Enforcing Agency.
14. An operation and maintenance manual shall be provided. Directions shall indicate the manual is to remain with the building throughout the life of the system and indicate that upon change of ownership or occupancy, the new owner or tenant shall be notified the structure contains a graywater system.

Procedure for Estimating Graywater Discharge.

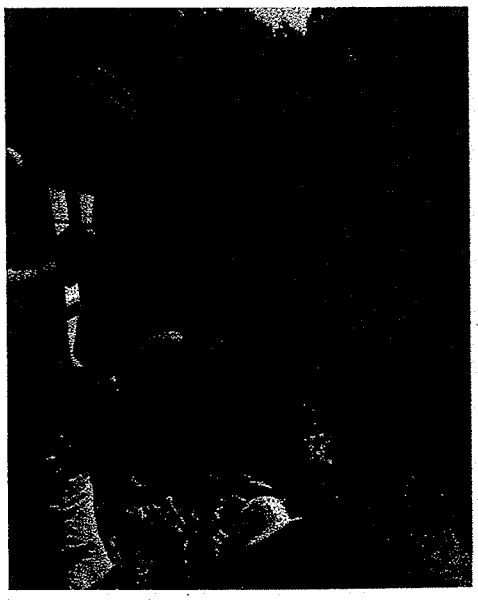
The graywater discharge for single family and multi-family dwellings shall be calculated by estimates of graywater use based on water use records, calculations of local daily per person interior water use, or the following procedure:

Table 1. Calculation of daily flow.

The number of occupants of each dwelling unit shall be calculated as follows:	
First Bedroom	2 occupants
Each additional bedroom	1 occupant
The estimated graywater flows of each occupant shall be calculated as follows:	
Showers, bathtubs, and wash basins	25 GPD/occupant
Laundry	15 GPD/occupant
The total number of occupants shall be multiplied by the applicable estimated graywater discharge as provided above and the type of fixtures connected to the graywater system. Example: *A 3 bedroom house is considered to have 4 occupants. Four occupants taking a daily shower will be expected to generate 100 gallons/day.*	

DISPOSAL FIELD LOCATION AND CAPACITY

The disposal field location must take into account other structures on the property, such as building foundations, property lines, septic systems, wells, and domestic water lines. They must also be sized according to the type of soil present on the property, as soil type defines the ability of the soil to absorb and percolate water and prevent ponding.



Tables 16A-1, 16A-2, 16A-3, and 1611A-3 of the California Plumbing Code are provided for reference below. These tables should be used to locate the system on the property and calculate the size of the disposal field and the number of lines and emitters required.

Table 2. 16A -1 Location of Graywater System

Minimum Horizontal Distance Required From:	*Tank*	*Irrigation Field*	*Disposal Field*
	Feet	*Feet*	*Feet*
Building structures[1]	5[2]	2	5
Property line adjoining private property	5	1.5	5
Water supply wells[3]	50	100	100
Streams and lakes[3]	50	50[4]	100[4]
Sewage pits or cesspools	5	5	5
Sewage disposal field	5	4[5]	4[5]
Septic tank	0	5	5
Onsite domestic water service line	5	0	0
Pressurized public water main	10	10[6]	10[6]

See footnotes below.

[1] Building structures does not include porches and steps, whether covered or uncovered, breezeways, roofed porte cocheres, roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.

[2] Underground tanks shall not be located within a 45 degree angle from the bottom of the foundation, or they shall be designed to address the surcharge imposed by the structure. The distance may be reduced to six (6) inches (153 mm) for aboveground tanks when first approved by the Enforcing Agency.

[3] Where special hazards are involved, the distance required shall be increased as directed by the Enforcing Agency.

[4] These minimum clear horizontal distances shall also apply between the irrigation or disposal field and the ocean mean higher high tide line.

[5] Plus two (2) feet (610 mm) for each additional foot of depth in excess of one (1) foot (305 mm) below the bottom of the drain line.

[6] For parallel construction or crossings, approval by the Enforcing Agency shall be required.

Required Area of Irrigation or Disposal Fields

Irrigation or disposal fields may have one or more valved zones. Each zone must be of adequate size to receive the graywater anticipated in that zone. No irrigation or disposal field shall extend within three (3) vertical feet of the highest known seasonal groundwater, or to a depth where graywater contaminates the groundwater, ocean water or surface water. The applicant shall supply evidence of groundwater depth to the satisfaction of the Enforcing Agency.

Note: The absence of groundwater in a test hole three (3) vertical feet below the deepest irrigation or disposal point shall be sufficient to satisfy this section unless seasonal high groundwater levels have been documented to rise to within this area.

Table 2. 16 A-2 Design Criteria of Six Typical Soils

Type of Soil	Square Feet	Gallons	Square Meters	Liters
	Minimum square feet of irrigation/leaching area per 100 gallons of estimated graywater discharge per day	**Maximum absorption capacity in gallons per square foot of irrigation/leaching area for a 24-hour period**	**Minimum square meters of irrigation/leaching area per liter of estimated graywater discharge per day**	**Maximum absorption capacity in liters per square meter of irrigation/leaching area for a 24-hour period**
Coarse sand or gravel	20	5.0	0.005	203.7
Fine sand	25	4.0	0.006	162.9
Sandy loam	40	2.5	0.010	101.8
Sandy clay	60	1.7	0.015	69.2
Clay with considerable sand or gravel	90	1.1	0.022	44.8
Clay with small amounts of sand or gravel	120	0.8	0.030	32.6

Table 3. 1611A.3(C) Disposal fields shall be constructed as follows:

	Minimum	Maximum
Number of drain lines per valved zone[1]	1	—
Length of each perforated line[1]	—	100 ft.
Bottom width of trench[1]	12 in.	24 in.
Spacing of lines, center to center[1]	4 ft.	—
Depth of earth cover of lines	2 in.	—
Depth of filter material cover of lines	2 in.	—
Depth of filter material beneath lines[1]	3 in.	—
Grade of perforated lines	level	3 in./100 ft.

[1] Manufactured leaching chambers shall be installed in compliance with the manufacturer's installation instructions.

(D) When necessary on sloping ground to prevent excessive line slopes, disposal lines shall be stepped or installed on the contour lines of the slope. The lines between each horizontal leaching section shall be made with approved water-tight joints and installed on natural or unfilled ground.

Table 4. 16A-3 Subsurface Drip Design Criteria of Six Typical Soils

Type of Soil	Maximum emitter discharge (gal/day)	Minimum number of emitters per gpd of graywater production
1. Sand	1.8	0.6
2. Sandy loam	1.4	0.7
3. Loam	1.2	0.9
4. Clay loam	0.9	1.1
5. Silty clay	0.6	1.6
6. Clay	0.5	2.0

Use the daily graywater flow calculated in Section 1606A.0 to determine the number of emitters per line.