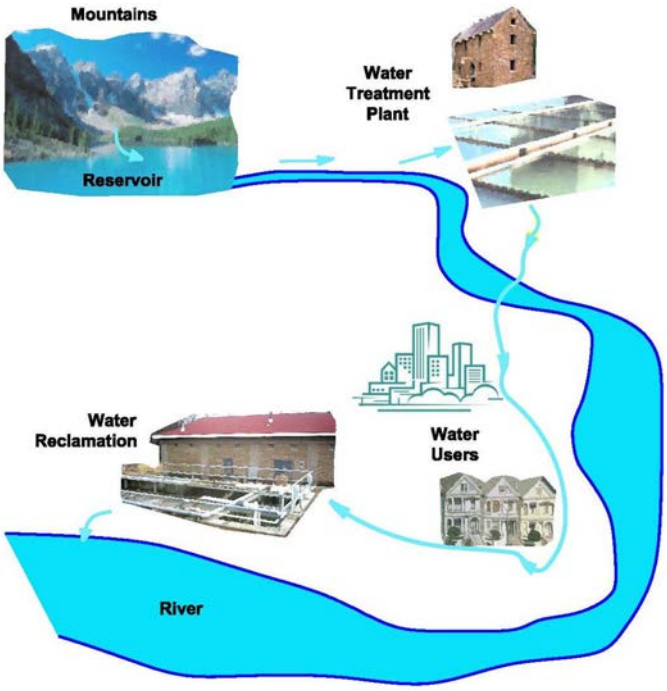
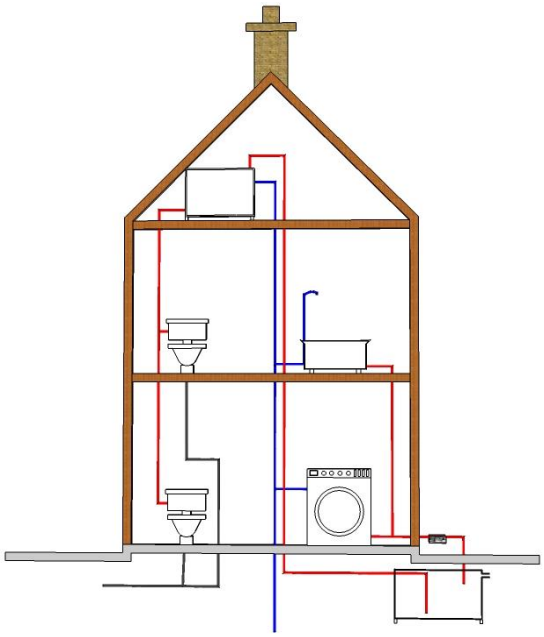
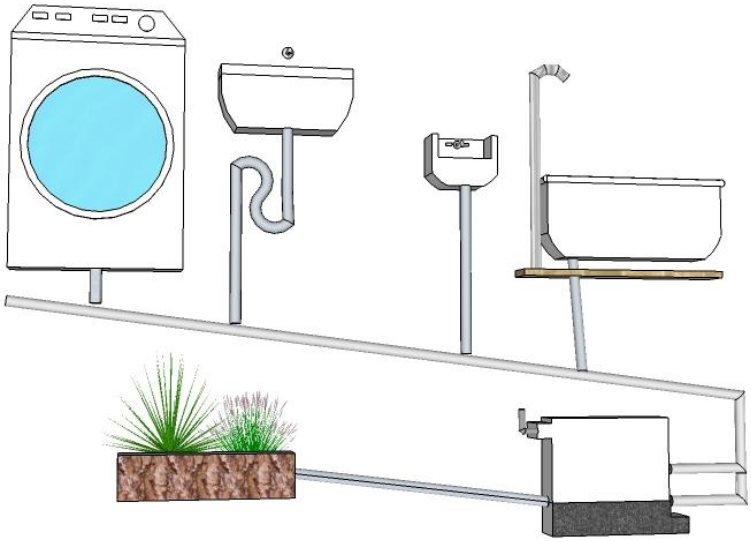
Feasibility of Graywater Use in Utah

Disrupting the flow to create a more sustainable future

2011







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Disrupting the flow to create a more sustainable future

2011

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Dennis J. Strong, Director

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INTRODUCTION

Utah is the third fastest growing state in the U.S. and if population trends continue there will be nearly 7 million people living in Utah by the year 2060 (Figure 1). As Utah's population blossoms, so will the demand for Utah's limited water resources. If Utah's municipal and industrial (M&I) water demands increase at the same rate as its population growth, the future demand will be much greater than existing developed supplies. There is not an infinite supply of fresh water in the state of Utah or anywhere. Water development projects have been constructed in the past in order to meet the population increase and its associated thirst for water. Projections have shown that Utah will have sufficient water for years to come; however, as we look further into the future, it is evident that water demands may surpass the supply of water. Figure 2 data show the future demands will still be larger than future supplies, even with the Utah Division of Water Resources' (DWRe) 25% water conservation goal. In order to meet future water demands, the existing M&I water supply will eventually need to be augmented. This simple idea can be very costly to all Utahns because the

FIGURE 1
Utah's Population History and Projection

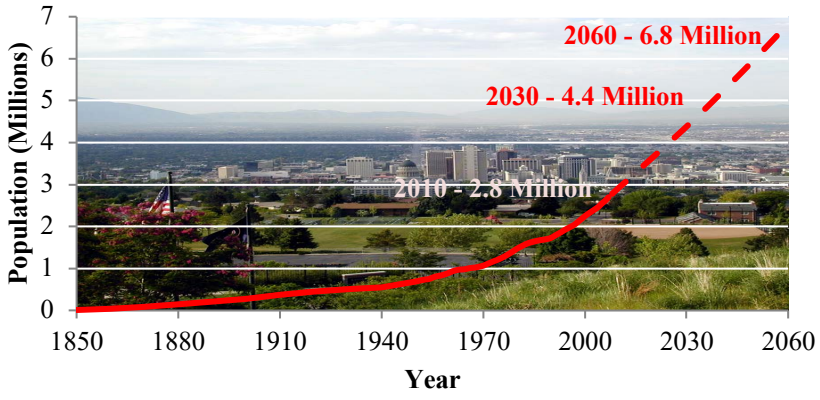
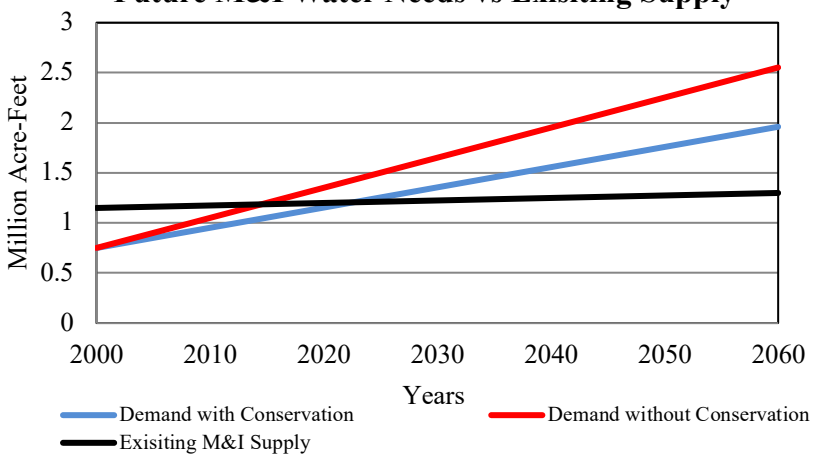
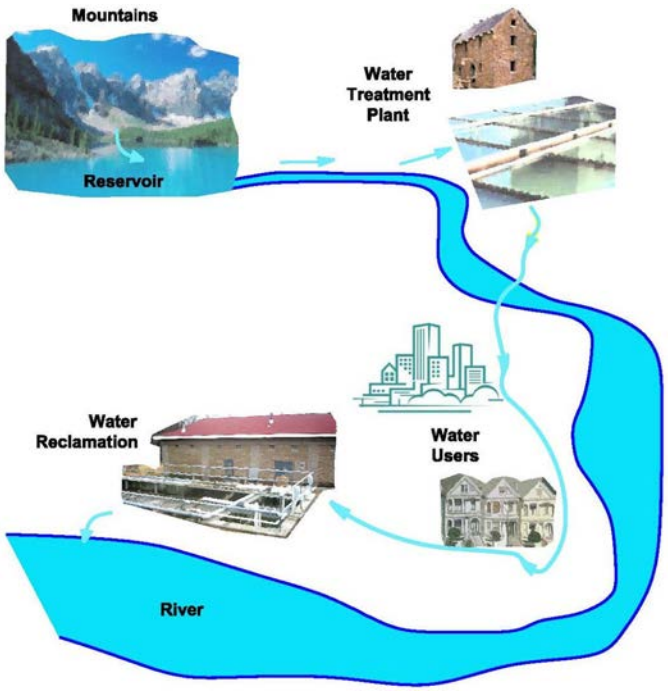


FIGURE 2
Future M&I Water Needs vs Exisiting Supply



development of water resources is very expensive. Traditional water development projects provide storage and conveyance facilities on new water sources. However, many states have begun to explore the idea of creating new water supplies by utilizing residential graywater use systems.

There is an old saying, "Use it up, wear it out, make it do, or do without." Often times when we think of waste, we think of garbage that we throw away or excessive consumption of resources. Rarely do people think about water as something that can be and is constantly wasted or thrown away. The current flow path of water in Utah is as follows: it flows from rivers and streams to underground aquifers or storage reservoirs and eventually to treatment facilities. From the treatment facility it is then delivered to various water users, who use the water (either potable or non-potable) for a designated use. Once the water is used it is sent to a water reclamation (sewage) facility. These facilities treat the water and send it downstream to the next water user. Several states and communities around the world, including communities in Utah, have begun to look at reusing water. Instead of diverting more water from current sources, these communities can look at water reuse as a way to augment current water supplies. Presently, these reuse operations are occurring only on a large scale. At one of the largest operations, in Orange County, California, the water is treated sufficiently so that it goes from sewage water back to potable water (toilet to tap). This water reuse is beneficial to augment the water supply of Orange County and has proven to be very successful; however, this method requires substantial amounts of energy to operate. This form of water reuse is known as ***centralized*** water reuse, meaning there is one large treatment facility that accepts and returns used water from a given area. In 2005 the DWRe



The current flow of water carries potable water from the source to a water treatment facility, then to the water user. From the user, it is carried a water reclamation facility, then discharged back into the river system.

published a report about water reuse entitled *Water Reuse in Utah,* which details what has been done in the past and what could potentially be done to reuse water in a centralized manner here in Utah.

The other option for water reuse is a ***decentralized*** approach. This technique involves reusing the potable water for non-potable uses within the residential or commercial building that actively uses the potable water. The term for the water that is being reused is graywater (grey-water, gray-water, or greywater are also common), and systems are typically implemented for a single building or small group of buildings. These systems reuse water drained from washbasins, bathtubs, showers, and washing machines and divert it for other household purposes such as irrigation and flushing toilets. **Water used in kitchen sinks, dishwashers, and toilets is not included in graywater use systems because water produced from these fixtures poses health risk if not properly treated prior to reuse.**

The Central Valley Water Reclamation facility reuses the treated effluent to irrigate an adjacent golf course and is a centralized reuse system.

The debate between decentralized and centralized has been a hot topic for years and there are valid arguments for both system designs. Graywater use systems are typically decentralized systems that only have effluent from household fixtures that do not produce blackwater. Blackwater is commonly referred to as wastewater or water from kitchen sinks, dishwashers and toilets. Blackwater can contain fecal matter, urine, higher counts of bacteria, and harmful bacteria. Current water reuse in Utah occurs at centralized locations and reuses blackwater only after treatment has occurred. Most centralized reuse systems in Utah utilize water effluent in parks and on golf courses near the treatment facilities. This is the limitation of a centralized system. In order to reuse the water at a residential level, it is necessary to pump the water back to the water users. This can be very costly; therefore, the cost benefit of a centralized

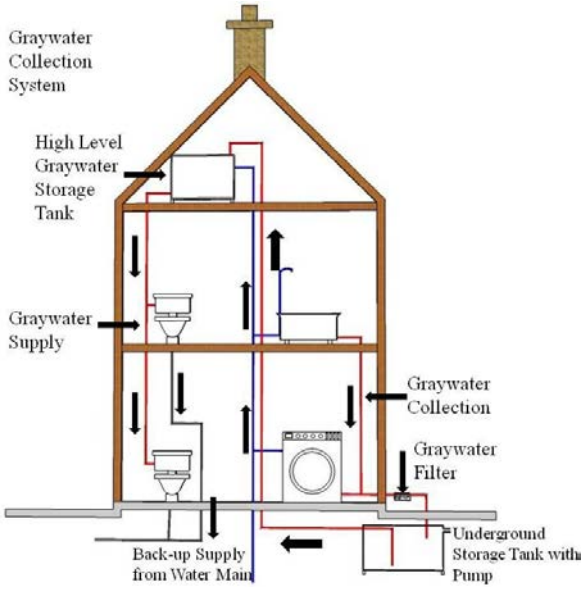
system is cost prohibitive. Often residents of a given area do not want to use water from a reclamation facility to irrigate landscapes, in which case a decentralized system could potentially be the answer. In a decentralized system those who want to reuse water on their own property can do so with little additional infrastructure. This report will review how graywater use systems (decentralized systems) could function in Utah.

GRAYWATER USE AND GRAYWATER USE SYSTEMS

In Utah, homeowners use 2/3 of their water outdoors to irrigate landscapes. Only the remaining 1/3 is used indoors. In addition, a large number of residents use water inefficiently. For these reasons, Utah has the second highest per capita water use in the U.S. (Other reasons are summarized in a report published by the DWRe entitled, *Municipal and Industrial Water Use in Utah,* 2010.) Through water conservation efforts, the DWRe is constantly attempting to reduce water consumption by educating the public on ways to improve their water habits. Graywater use is one of the potential water saving practices that could be utilized by the residents of Utah. Graywater systems reuse water from washbasins, showers, bathtubs, and washing machines. The water can be reused for any residential non-potable use, such as outdoor irrigation or toilet flushing (Figure 3). **Water from dishwashers, toilets, and kitchen sinks cannot be used in graywater systems and is classified as blackwater.**

FIGURE 3

Complex Graywater System with Indoor Reuse



Graywater use systems can be simple or complex. The above system is a complex system.

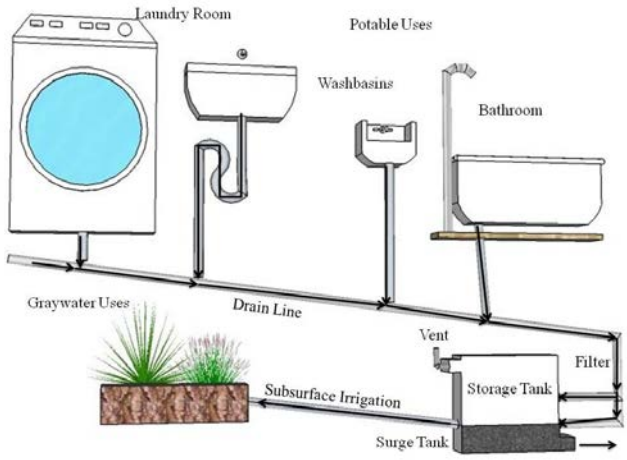
Graywater systems come in many shapes and sizes. An appropriate system should be designed on site specifications. Graywater systems can either be simple or complex. A simple graywater system requires little infrastructure in order for the system to work. The simplest system would involve a person using a bucket to collect water from a washbasin (bathtub, shower, or washing machine) and then using that water either outside or inside the house for any non-potable use. The most complex graywater system would involve a system that collects the maximum amount of water from all possible sources and uses the graywater for all potential uses. This system would require some level of treatment in order to remove bacteria.

Also, this system would require large storage devices, since the sources that produce graywater are rarely used in conjunction with the fixtures that will use the graywater.

A generic graywater system would require separate piping from the existing wastewater plumbing system in a building (Figure 4). The plumbing would lead to a storage device that would retain water, helping meet the water demands of the building. A surge tank would be required to help manage pressure changes. Surge tanks also prevent system failures, blowouts, and other problems that can occur during system operation. Prior to water entering the storage tank, a simple filtration system would need to be installed in order to filter out large particles and hair that may pass through the drains. The particles that pass into the tank would settle out in the bottom of the tank and be removed at a later time. All fixtures utilizing graywater, indoor and outdoor, would be connected to this storage device.

FIGURE 4

Legal Graywater System Schematic



In addition to graywater flowing into the storage tank, potable water would also be connected to the tank to ensure there is always water in the tank for the designated uses. Also, some type of bypass valve would need to be installed in order for the system to function properly. Every graywater system would be unique to the building or home in which it was installed, and special considerations would be taken to ensure the system functions at an optimal level.

UTAH'S REGULATION ON GRAYWATER USE

Currently, graywater use is legal in Utah. However, with the regulations that are currently in place, graywater systems can be very difficult to implement successfully. The current regulations state graywater can only be used for subsurface irrigation for single-family residences. This means graywater can only be used outside and has to be put into a drip irrigation system that cannot be above ground. In addition, graywater cannot be discharged directly into any storm sewer system or any waters of the state. All graywater systems in Utah require a permit from local health departments. Some local health departments have established more stringent rules for graywater systems than the state has specified in the water code. Local health departments can also require additional items, such as a third party to be in charge of operation, maintenance, and repairs of these systems. Any time the system is modified or repaired, it is required that the local health department be notified. All permitting requirements and regulations for graywater use systems are located in the Utah Code under R317-401(Appendix A). In order for local health departments to sign permits for graywater systems, they must be approved by the Utah Division of Water Quality Board to have a graywater use system program.

In addition to the health related regulations, potential graywater users have to consider water right rules with respect to downstream water users and senior water right holders. Utah water law requires that a valid water right be held by any party that puts water to any beneficial use. All water rights have diversion and depletion values that regulate how much water can be diverted and used. The diversion value limits the amount of water that can be diverted from a given source. The depletion value limits the amount of water that can be depleted or consumed. For example, in most parts of the state, if a person wants to irrigate a quarter-acre of vegetation, they are required to obtain a water right with a diversion value of one acre-foot (ac-ft) of water. Of that ac-ft, they can only deplete a quarter (0.25 ac-ft) of that one ac-ft. With this understanding of water right law, a potential graywater residence would also have to obtain diversion and depletion amounts that are associated with its water use. Since 95 percent of all residents in Utah live within a water service district that provides their water and holds the water right for their uses, the resident would need to get approval for their graywater use system from

that entity. This would be to ensure that the water provider is only depleting that which they are allowed to divert and deplete.

Currently, the way water right systems function, the water provider owns the water right. The customers within the service area of the provider use the water and then send the water that was not depleted or consumed to a water treatment facility. If a resident were to practice graywater use, the flow of wastewater is slightly disrupted. As previously discussed, the only water that will leave the house after a graywater system is utilized would be blackwater. This would impact downstream users of the treated wastewater. If a graywater use system is strictly for indoor use then there is no issue with depletion because theoretically the same amount of water is still going "downstream." It just takes more time to get there. This is because the water will eventually go to the reclamation facility once it is flushed down the toilet. The main concern of water right officials and downstream water holders is that the water that should be returned to a river system from the water reclamation facility will no longer make it to the river system. This issue would have to be addressed by some sort of a change or exchange of water rights from upstream water users to downstream water users. It would be required of a graywater user to calculate how much water they would be retaining on their property, and this amount of water would then be given to the downstream user to compensate for their loss of water.

OTHER STATES' REGULATIONS AND PRACTICES WITH GRAYWATER USE

In 2004 the Environmental Protection Agency (EPA) performed an assessment of each state's water reuse regulations. With the ever-growing demand for water across the country, graywater use could be a possible solution to water supply issues. Below is a table that shows a summary of all the 50 states and their regulations on graywater use. The table is followed by a brief summary of some of these states' regulations.

TABLE 1

Regulations and Guidelines on Graywater by State

State	Regulations	Guidelines	No Regulations or Guidelines	Unrestricted Urban Reuse	Restricted Urban Reuse	Agricultural Reuse Food Crops	Agricultural Reuse Non-Food Crops	Unrestricted Recreational Reuse	Restricted Recreational Reuse	Environmental Reuse	Industrial Reuse	Groundwater Recharge	Indirect Potable Reuse
Alabama		x			x		x						
Alaska	x						x						
Arizona	x			x	x	x	x		x				
Arkansas		x		x	x	x	x						
California	x			x	x	x	x	x	x		x	x	x
Colorado	x			x	x	x	x	x	x				
Connecticut			x										
Delaware	x			x	x		x						
Florida	x			x	x	x	x			x	x	x	x
Georgia		x		x	x		x						
Hawaii		x		x	x	x	x		x		x	x	x
Idaho	x			x	x	x	x						
Illinois	x			x	x		x						
Indiana	x			x	x	x	x						
Iowa	x				x		x						
Kansas		x		x	x	x	x						
Kentucky			x										
Louisiana			x										
Maine			x										
Maryland		x			x		x						
Massachusetts		x		x	x		x					x	x
Michigan	x					x	x						
Minnesota			x										
Mississippi			x										
Missouri	x				x		x						
Montana	x			x	x	x	x						

State	Regulations	Guidelines	No Regulations or Guidelines	Unrestricted Urban Reuse	Restricted Urban Reuse	Agricultural Reuse Food Crops	Agricultural Reuse Non-Food Crops	Unrestricted Recreational Reuse	Restricted Recreational Reuse	Environmental Reuse	Industrial Reuse	Groundwater Recharge	Indirect Potable Reuse
Nebraska	x				x		x						
Nevada	x			x	x	x	x	x	x				
New Hampshire			x										
New Jersey		x		x	x	x	x				x		
New Mexico		x		x	x	x	x						
New York		x					x						
North Carolina	x			x	x						x		
North Dakota		x		x	x		x						
Ohio		x		x	x		x						
Oklahoma	x				x	x	x						
Oregon	x			x	x	x	x	x	x		x		
Pennsylvania		x					x						
Rhode Island			x										
South Carolina	x			x	x		x						
South Dakota		x		x	x		x						
Tennessee	x			x	x		x						
Texas	x			x	x	x	x	x	x		x		
Utah	**x**			**x**	**x**	**x**	**x**	**x**	**x**		**x**		
Vermont	x						x						
Virginia			x										
Washington		x		x	x	x	x	x	x	x	x	x	x
West Virginia	x					x	x						
Wisconsin	x						x						
Wyoming	x			x	x	x	x						

Source: EPA 2004 "Guidelines for Water Reuse"

Arizona

The graywater use law has been a part of Arizona code for several years and many advocates of graywater use say that Arizona's law is the model to follow. Graywater systems in Arizona must meet the requirements set by current legislation. A complete listing of these requirements can be found in Arizona's Title 18 (Environmental Quality) Article 7 (Direct Reuse of Reclaimed Water) of the Arizona Administrative Code. Essentially, the code specifies the same items required in Utah's graywater use codes. Water cannot contain hazardous materials, and the graywater system should avoid standing water during outdoor applications. However, the Arizona law does not require the builder or homeowner to file for a permit, as long as the system uses less than 400 gallons per day (gpd). If the system uses over 400 gpd, the builder has to obtain a standard permit from the local health department. Even with the less than 400 gpd issue,

graywater use in Arizona has not really caught on in the highly populated areas of the state. However, in the southern, rural areas of Arizona residents have been reusing water for several years through graywater systems.

California

The California State Water Code states similar information to Utah's Water Code. In addition to the similarities, California's code refers potential graywater users to the California State Plumbing Code Chapter 16A. This section states that water can be reused at a residential level as long as the water is for non-potable uses. Much like Utah's regulations, all plans of simple graywater reuse systems need to be reviewed by the specified office. In California, the Department of Health Services holds the regulatory authority over water reuse systems per the California Water Code Section 13521. One item in California's code, however, is different from Utah's code: no permit is required if the reuse system only reuses water from a washing machine or a single fixture such as a shower. Graywater that is used outside has to be below ground and the public must be warned that graywater is being used.

Colorado

Graywater use can be implemented in Colorado only if a permit is issued by the local county health department. For municipal applications, most county health departments do not allow any graywater use if the lot is within 400 feet of a municipal or community sewage treatment facility service area. In rural areas of Colorado, a graywater system has to be permitted by the county health department and meet several other criteria similar to those of Utah and other states. The Colorado Department of Public Health and Environment (CDPHE) does not currently separate graywater from blackwater in its regulations; consequently, surface applications require permitting and monitoring. Application of graywater from systems discharging 2,000 gpd or more requires site location and design approval prior to construction of the graywater system and a discharge permit from the CDPHE. Smaller systems require a permit from the local health department.

Connecticut

Connecticut has established a pilot program for graywater use, limited to the use of treated graywater for public schools and municipal facilities in situations determined by the Connecticut Department of Health. Like other states, the reuse system will be approved as long as it does not negatively impact public health (Committee Bill 6414). Currently Connecticut does not have any regulations or guidelines established in its code.

Montana

In Montana, House Bill 259 allows a single-family residence to use graywater. This bill legalizes all systems installed before the legislation went into effect on October 1, 2007. The Montana bill uses a more liberal definition of graywater, adopting the European Union and Australian definition, which states that water from the kitchen sink can also be used as graywater. All systems in Montana must be permitted by the local health department and pose no threat to the health of the users or surrounding public.

Nevada

In Nevada, graywater may be used for underground irrigation if the reuse system has been approved by the administrative authority, but needs a permit when installed or altered. The system can only be installed for a single-family dwelling, but cannot be used if water percolates through the soil at a faster rate than 120 minutes per inch. Other specifications are similar to those mentioned in the regulations for Utah and other states.

New Mexico

Similar to Utah, graywater is limited to outdoor irrigation in New Mexico. One unique item about New Mexico's law is that it stipulates that graywater use has to be less than 250 gallons per day (gpd). New Mexico is currently looking at adopting a similar law to that of Arizona, which will allow more people to install graywater use systems without having to acquire a permit.

Oregon

In 2009 House Bill 2080 was signed into law stating that a resident of Oregon can use graywater for a beneficial use. The graywater use system needs to be permitted by the Oregon Department of Environmental Quality (ODEQ). In this law, the ODEQ and the Oregon Environmental Quality Commission (OEQC) are required to develop rules regarding graywater use within the state. ODEQ regulates the use of graywater, outdoor and indoor, and relies on the state's plumbing code to ensure that a system meets public safety requirements. At the end of 2010 the Graywater Advisory Committee released its recommendations on graywater treatment, disposal, and reuse. These regulations are similar to those of other states in that subsurface irrigation has to have at least two inches of cover. They also state that the system cannot store graywater for more than 24 hours. Much like Arizona, Oregon has a tier system to determine what type of permit is needed by the graywater user. The tier system in Oregon requires that graywater systems discharging up to 1200 gpd be issued a general permit; more than 1,200 gpd requires an individual permit. The permits issued are based on risk to the public health.

Texas

In Texas, the laws state that graywater use occurring at a private residence can only be less than 400 gpd, and the graywater has to originate from the same residence. Also, graywater must pass through two backwater valves or backwater preventers. Most other states merely require the graywater system to meet state plumbing codes. Builders of new homes in Texas are encouraged to install graywater systems to collect graywater from all allowable sources and install subsurface graywater distribution systems. These rules and regulations can be found in Chapter 210 of the Texas Commission on Environmental Quality. These rules were effective as of January 6, 2005. All installed systems must comply with the rules and regulations.

Washington

Like most other states, Washington only allows graywater use for subsurface irrigation and systems are permitted based on a tier system. The first tier can only use a maximum of 60 gpd, the second tier can use more than 60 gpd but less than 3,500 gpd, and the third tier can use a treatment component involving storage of graywater for more than 24 hours. In the third tier, the flow is the same as the second tier; however, the third tier can use blackwater and can apply the

water to areas that have high public access. Washington requires the landscaped area using graywater to be clearly marked to inform the public the water being used is for irrigation, and is not potable. In tiers 2 and 3, records have to be kept showing the location of the system, sources of the graywater, maintenance required, and who is the owner of the system. Under Washington rules and regulations, residents could potentially use substantial amounts of graywater.

FEASIBILITY OF GRAYWATER USE SYSTEMS IN UTAH

In order to assess the feasibility of any new idea, it is crucial to evaluate the benefits. For this report the DWRe assessed how effective graywater systems can be at conserving water while still maintaining a positive cost benefit. It has already been stated that reusing water is a beneficial way of conserving the water supply; however, in order for a graywater use system to be utilized, there must be a positive cost/benefit ratio. To calculate both the amount of water that can be conserved and the cost benefit, a spreadsheet method was created to estimate the pertinent values. This section will explain the spreadsheet, how the numbers were generated, and why the numbers used were included in the calculations.

The first set of numbers required for the spreadsheet is the water use values. These numbers represent the amount of water that could potentially be diverted into a given residence, and are typically broken up into two categories, indoor and outdoor. For this report, the numbers were broken up into *three* categories: indoor uses that produce reusable water (graywater producers), indoor uses that produce blackwater, and outdoor uses. Based on the most recent data collected by the DWRe (*Municipal and Industrial Water Supply and Use Studies*, *Statewide Summary*, 2005), residential water users in Utah use 64 percent of their water outdoors and the remaining 36 percent indoors. Since a portion of indoor water cannot be reused, it is necessary to further breakdown indoor uses. This was accomplished using the American Water Works Association (AWWA) Study, *Residential End Uses of Water* (1999), which provides a breakdown of how much water is used by various fixtures within a home. Table 2 shows the breakdown from the AWWA study with the percentage of use for each given indoor fixture. The gallons per capita per day (gpcd) numbers were adjusted to coincide with current water use data in Utah; however, the percentage-of-use numbers are directly from the AWWA study. Also, estimates were made to separate the kitchen sink from other faucets; therefore, the AWWA portion of faucet use was broken into two categories.

Another pertinent aspect of the data is to determine how much water is used outdoors during the irrigation season. Since per capita estimates are calculated over the entire year, the irrigation use was estimated and spread over the months of April to October. The distribution of percentages is base data collected by the DWRe and the Governor's Water Conservation Team

and is shown in Table 3. This method determined an estimate of how much water will be needed to meet the water demands of a typical Utah residence and how much water could potentially be reused.

TABLE 2
Residential Water Use Broken Into Categories

Type of Use and Fixture	Gallons per Capita per Day (gpcd)	Percentage of Use (%)
Reusable Indoor Uses		
Bath	1.3	0.7
Other Domestic	1.7	0.9
Leak	6.5	3.5
Faucet	5.2	2.8
Shower	12.6	6.8
Clothes Washer	11.8	6.4
Subtotal	40.1	21.1
Non-Reusable Indoor Uses		
Dishwasher	1.1	0.6
Toilets	20.0	10.8
Kitchen Sink	6.5	3.5
Subtotal	26.5	14.9
Outdoor Uses		
Irrigation	118.4	64
Total	185	100

TABLE 3
Percentage Distribution for
Residential Outdoor Water Use

Month	Outdoor Use Percentage
March	0.35
April	2.60
May	6.32
June	10.23
July	15.53
August	15.42
September	9.40
October	4.15
Total	64

With all input data calculated, it was possible to determine the feasibility of graywater systems in Utah. The feasibility was assessed in two ways: first, the assessment looked at how feasible a graywater system would be under current Utah legislation and, second, it looked at whether graywater systems could someday be used both indoors and outdoors. The feasibility analysis used a theoretical Utah home with four people residing there full time. Inputting the number of people into the spreadsheet, it was determined that, in order to collect all of the graywater produced, the residents would need to have a 5,000-gallon storage tank to collect the water. Because of Utah's climate and current graywater regulations, regardless of the storage tank size, graywater cannot be used in non-irrigation months. Table 4 shows the results of the first feasibility assessment. The key column numbers are "inflow without graywater use" and "inflow." The difference of these two numbers shows how much water can be saved. The total water savings for the first feasibility assessment was over 30,000 gallons (0.09 ac-ft) annually for a family of four with a 5,000-gallon storage tank. However, this amount of water only meets 18 percent of the total outdoor water demands.

TABLE 4

Feasibility Assessment of a Typical Graywater System under Current Utah Legislation

Month	**Inflow without Graywater Use**	**Inflow**	**Graywater Producer Demand**	Potential Storage	Actual Storage	Storage Overflow	Black Water Demand	Outdoor Demand	Outdoor Graywater Usage
January	**8,258**	**8,258**	**4,978**	4,231	4,231	0	3,280	0	0
February	**7,459**	**7,459**	**4,496**	8,053	5,000	3,053	2,963	0	0
March	**9,204**	**8,258**	**4,978**	9,231	5,000	4,231	3,280	945	945
April	**15,015**	**10,015**	**4,817**	8,149	5,000	3,149	3,175	7,023	5,000
May	**25,329**	**21,097**	**4,978**	4,231	4,231	0	3,280	17,070	4,231
June	**35,623**	**31,528**	**4,817**	4,095	4,095	0	3,175	27,631	4,095
July	**50,205**	**45,974**	**4,978**	4,231	4,231	0	3,280	41,947	4,231
August	**49,908**	**45,677**	**4,978**	4,231	4,231	0	3,280	41,649	4,231
September	**33,381**	**29,287**	**4,817**	4,095	4,095	0	3,175	25,389	4,095
October	**19,468**	**15,236**	**4,978**	4,231	4,231	0	3,280	11,209	4,231
November	**7,992**	**7,992**	**4,817**	4,095	4,095	0	3,175	0	0
December	**8,258**	**8,258**	**4,978**	8,326	5,000	3,326	3,280	0	0
Total	**270,100**	**239,040**	**58,612**	67,201	53,441	13,760	38,624	172,864	31,060

The second assessment was to determine how much more water could be saved if graywater use could occur indoors utilizing it in toilets. Using the same variables as the first assessment, with a family of four and a 5,000-gallon storage tank, it was determined that on an annual basis approximately 42,000 gallons (0.13 ac-ft) could be conserved. In this assessment, it is noted the graywater would be used to meet 100 percent of the indoor demands and eight percent of the outdoor demand. If graywater could be used indoors, then this family could save an additional 12,000 gallons (0.04 ac-ft).

TABLE 5

Feasibility Assessment of a Typical Graywater System under Altered Utah Legislation

Month	**Inflow w/out Storage**	**Inflow**	**Graywater Producer Demands**	Potential Storage Tank	Actual Storage	Storage Overflow	Toilets Demand	Kitchen Sink, Dishwasher Demand	Black Water Graywater Used	Outdoor Demands	Outdoor Graywater Usage
January	**7,318**	**4,840**	**4,840**	4,114	4,114	0	2,478	941	2,478	0	0
February	**6,610**	**4,372**	**4,372**	5,353	5,000	353	2,238	850	2,238	0	0
March	**8,263**	**4,840**	**4,840**	6,877	5,000	1,877	2,478	941	2,478	945	945
April	**14,104**	**9,104**	**4,684**	5,559	5,000	559	2,398	910	2,398	7,023	2,602
May	**24,388**	**20,274**	**4,840**	4,114	4,114	0	2,478	941	2,478	17,070	1,637
June	**34,713**	**30,731**	**4,684**	3,982	3,982	0	2,398	910	2,398	27,631	1,584
July	**49,264**	**45,150**	**4,840**	4,114	4,114	0	2,478	941	2,478	41,947	1,637
August	**48,967**	**44,853**	**4,840**	4,114	4,114	0	2,478	941	2,478	41,649	1,637
September	**32,471**	**28,490**	**4,684**	3,982	3,982	0	2,398	910	2,398	25,389	1,584
October	**18,527**	**14,413**	**4,840**	4,114	4,114	0	2,478	941	2,478	11,209	1,637
November	**7,082**	**4,684**	**4,684**	3,982	3,982	0	2,398	910	2,398	0	0
December	**7,318**	**4,840**	**4,840**	5,698	5,000	698	2,478	941	2,478	0	0
Total	**259,026**	**216,592**	**56,991**	56,003	52,516	3,486	29,171	11,074	29,171	172,864	13,263

How much water would potentially be saved if every resident of Utah were to incorporate graywater use into their homes? Using the percentage of outdoor water demand as the calibration, Utah could conserve over 21 billion gallons (65,000 ac-ft). This would be about 13 percent of the current residential use. If current legislation changed and Utahns were allowed to use graywater indoors as well, the state could conserve approximately 30 billion gallons (91,000 ac-ft) of water annually. This would be about 18 percent of the current residential water use.

With values like these, why aren't more water providers urging residents to utilize graywater use systems in their service areas? The answers could be many. Among the answers

are these three: the environmental impacts are not truly understood, there are water right implications, and the cost to install and maintain a graywater system can be much larger than the financial savings it produces. Since the environmental impacts are not fully understood, this report will only focus on the cost of a system compared to the financial savings of the graywater system.

Under current legislative rules, the amount of water that flows from residential homes to water reclamation facilities would be reduced by approximately 25 billion gallons (76,000 ac-ft). This could potentially impede downstream senior water right holders from using their full allocation of water. There will be water right issues that need to be addressed in order for graywater systems to become more feasible in Utah. These issues would have to be resolved on a watershed-by-watershed basis, since not every watershed is the same.

The cost of water in Utah is among the lowest in the nation. This is due to several factors, all of which are summarized in a report published by DWRe entitled, *The Cost of Water in Utah* (2010). In addition to this report, the Utah Division of Drinking Water (DDW) produces an annual report entitled, *Community Drinking Water Systems*, in which information about several aspects of Utah's drinking water systems is gathered, one of these being the cost of water. Both reports show that water is inexpensive in Utah, making it difficult to entice residents to implement costly measures to save water. The latest numbers (2006) from the DDW indicate average water costs in Utah are $1.34 per 1,000 gallons. This means annually, if a graywater system for a family of four saves 30,000 gallons of water, an average Utah home owner could save approximately $40 if they were to install a graywater use system. A small (less than 5,000 gallon storage), simple graywater system installs for approximately $2,000. This translates into more than 50 years for this type of graywater system to pay for itself.

Using this information, it can be determined that at this time, with water costs where they are and with graywater systems costs where they are, it is not economically feasible to install a graywater use system on a residential home in Utah. However, graywater use is still a viable option to conserve water and needs to be considered when planning for the future of Utah's water needs.

CONCLUSIONS

With an ever-growing population and the need to conserve water, it is crucial that Utahns look for ways to save as much water as possible. This can be accomplished in many ways. There are several simple and several complex ways to conserve water. This report discussed one complex way (installation of a graywater system) to save water. Residential graywater use in Utah is one of the options that can be utilized. If every Utahn were to implement a graywater system, the state could conserve over 21 billion gallons (65,000 ac-ft) of water. The cost to install a graywater system is significant when the cost of water is taken into account. Utah currently has one of the lowest average water rates per 1,000 gallons of water in the nation. Using the current state average price of water per 1,000 gallons, which is $1.34, it would take more than 50 years for a typical graywater system to pay for itself. As Utah progresses to the future and attempts to have sufficient water for an increasing population, graywater use on a residential level could be a viable option if the cost benefit were to become less of a burden on the user.

Additionally, there are water right issues that could impede the success of graywater systems in Utah. Also, the overall environmental impacts of a widespread graywater use network are not fully understood and, therefore, any full scale graywater application would require more data and research.

The DWRe has adopted several strategies to meet future water needs. These strategies include a 25 percent conservation goal, new water development projects, conversion of agricultural water to M&I water, water reuse, and conjunctive water use. This report is an analysis of one of those strategies, decentralized water reuse systems (graywater use).

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APPENDIX

Utah

R317-401 General

(a) This rule shall apply to the construction, installation, modification and repair of graywater systems for subsurface landscape irrigation for single-family residences.

(b) Nothing contained in this rule shall be construed to prevent the permitting local health department from:

(i) adopting stricter requirements than those contained herein;

(ii) prohibiting graywater systems; and

(iii) assessment of fees for administration of graywater systems.

(c) Graywater shall not be:

(i) applied above the land surface;

(ii) applied to vegetable gardens except where graywater is not likely to have direct contact with the edible part, whether the fruit will be processed or not;

(iii) allowed to surface; or

(iv) discharged directly into or reach any storm sewer system or any waters of the State.

(d) It shall be unlawful for any person to construct, install or modify, or cause to be constructed, installed or modified any graywater system in a building or on a given lot without first obtaining a permit to do such work from the local health department.

(e) The local health department may require the graywater system in its jurisdiction, be placed under:

(i) an umbrella of a management district for the purposes of operation, maintenance and repairs,

(ii) a third-party operation, maintenance and repair contract at the expense of the permittee with a requirement of notification by the permittee and the contractor to the local health department, of the termination of such services.

R317-401-2 Definitions

(a) "Graywater" is untreated wastewater, which has not come into contact with toilet waste. Graywater includes wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, laundry tubs, etc., and does not include wastewater from kitchen sinks, photo lab sinks, dishwashers, garage floor drains, or other hazardous chemicals.

(b) Surfacing of graywater means the ponding, running off, or other release of graywater to or from the land surface.

(c) "The local health department" means a city-county or multi-county local health department established under Title 26A, which has been given approval by the Utah Water Quality Board to issue permits for graywater systems within its jurisdiction.

(d) "Bedroom" means any portion of a dwelling which is so designed as to furnish the minimum isolation necessary for use as a sleeping area. It may include, but not limited to, a den, study, sewing room, sleeping loft, or enclosed porch. Unfinished basements shall be counted as a minimum of one additional bedroom.

R317-401- 3 Administrative Requirements

(a) The local health department having jurisdiction must obtain approval from the Utah Water Quality Board to administer a graywater systems program, as outlined in this section, before permitting graywater systems.

(b) The local health department request for approval must include a description of its plan to properly manage these systems to protect public health. This plan must include:

(i) Documentation of:

(1) the adequacy of staff resources to manage the increased work load;

(2) the technical capability to administer the new systems including any training plans which are needed;

(3) the Local Board of Health and County Commission support this request; and

(4) the county's legal authority to implement and enforce correction of malfunctioning systems and its commitment to exercise this authority.

(ii) An agreement to:

(1) advise the owner of the system of the type of system, and information concerning risk of failure, level of maintenance required, financial liability for repair, modification or replacement of a failed system and periodic monitoring requirements;

(2) advise the building permitting agency of the approved graywater system on the property;

(3) provide oversight of installed systems;

(4) record the existence of the system on the deed of ownership for that property;

(5) issue a renewable operating permit at a frequency not exceeding five years with inspection of the permitted systems before renewal; or, inspect annually the greater of 20 per cent of all installed system or the minimum of ten installed systems; and

(6) maintain records of all installed systems, failures, modifications, repairs and all inspections recording the condition of the system at the time of inspection such as, but not limited to, overflow, surfacing, ponding and nuisance.

R317-401- 4 Permitting or Approval Requirements

(a) Designer certified at Level 3, in accordance with the requirements of R317-11, shall design the graywater systems.

(b) The local health department may require the following information with or in the plot plan before a permit is issued for a graywater system:

(i) plot plan drawn to scale, completely dimensioned, showing lot lines and structures, direction and slope of the ground, location of all present or proposed retaining walls, drainage channels, water supply lines, wells, paved areas and structures on the plot, other utilities, easements, number of bedrooms and plumbing fixtures plan in each structure, location of onsite wastewater system and replacement area of the onsite wastewater system, or building sewer connecting to a public sewer, and location of the proposed graywater system;

(ii) a log of soil formations and identification of the maximum anticipated ground water level as determined by the minimum of one test hole, dug in close proximity, two feet below the bottom of the subsurface irrigation field or drip irrigation area together with a statement of types of soil based on soil classification at the proposed site. Soil and groundwater evaluations will be conducted by professionals fulfilling the requirements of R317-11;

(iii) details of construction necessary to ensure compliance with the requirements of this rule together with full description of the complete installation including installation methods, construction and materials, as required by the local health department; and

(iv) other pertinent information the local health department may deem appropriate.

(c) The installed graywater system shall be operated only after receiving a written approval or an authorization from the local health department after the local health department has made the final construction inspection.

(d) The local health department will require written operation and maintenance procedures including checklists and maintenance instructions from the designer.

(e) No graywater system, or part thereof, shall be located on any lot other than the lot which is the site of the building or structure which discharges the graywater unless, when approved by the local health department, a perpetual utility easement and right-of-way is established on an adjacent or nearby lot.

(f) Onsite wastewater systems existing or to be constructed on a given lot shall comply with the requirements of R317-4 or more restrictive local requirements. The capacity of the onsite wastewater system, including required future areas, shall not be decreased by the existence or proposed installation of a graywater system servicing a given lot.

(g) No potable water connection will be made to the graywater system without an air gap or a reduced pressure principle backflow prevention assembly for cross connection control, in accordance with R309-105.

(h) When abandoning a graywater system,

(i) the owner of the real property on which such system is located shall render it safe by having the surge tank pumped out only in a manner approved by the health department;

(ii) the surge tank shall be filled completely with earth, sand or gravel within 30 days;

(iii) the surge tank may also be removed within 30 days, at the owner's discretion;

(iv) the approving local health department shall be notified at least 30 days before the planned abandonment.

R317-401- 5 Design of Graywater Systems

(a) The basis of design for a graywater system shall be as follows:

TABLE A

Basis of Design

Number of Bedrooms	Flow, gallons per day
Minimum two bedrooms	120
Three bedrooms	160
Each additional bedroom	40

(b) No graywater system or part thereof shall be located at any point having less than the minimum distances indicated as follows:

TABLE B

Separation Distances

Minimum Horizontal Distance (in Feet) From	Surge Tank	Subsurface or Drip Irrigation Field
Buildings or Structures (1)	5 Feet (2)	2 Feet
Property line adjoining private property	5 Feet	5 Feet
Public Drinking Water Sources (3)	(4)	(4)
Non-public Drinking Water Sources		
Protected (grouted)source	50 Feet	100 Feet
Unprotected (ungrouted)source	50 Feet (5)	200 Feet (5)
Streams, ditches and lakes (3)	25 Feet	100 Feet (6)
Seepage pits	5 Feet	10 Feet
Absorption System and replacement area	5 Feet	10 Feet
Septic tank	None	5 Feet
Culinary water supply line	10 Feet	10 Feet (7)

Footnotes:
(1) Including porches and steps, whether covered or uncovered, but does not include carports, covered walks, driveways and similar structures.
(2) For above ground tanks the local health department may allow less than five feet separation.
(3) As defined in R309
(4) Recommended separation distances will comply with the
Source Water Protection requirements R309-600 and 605.
(5) Recommended separation distance may increase at the discretion of the local health department for adequate public health protection.

(6) Lining or enclosing watercourse or location above irrigation area may justify reduced separation at the discretion of the local health department.
(7) For parallel construction or for crossing requires an approval of the local health department.

(c) Surge Tank

(i) Plans for surge tanks shall include dimensions, structural, bracing and connection details, and a certification of structural suitability for the intended installation from the manufacturer.

(ii) Surge tanks shall be:

(A) at least 250 gallons in volumetric capacity to provide settling of solids, accumulation of sludge and scum unless justified with a mass balance of inflow and outflow and type of distribution for irrigation;

(B) vented to the surface with a locking, gasketed access opening, or approved equivalent, to allow for inspection and cleaning;

(C) constructed of structurally durable materials to withstand all expected physical forces, and not subject to excessive corrosion or decay;

(D) watertight;

(E) anchored against overturning;

(F) installed below ground on dry, level, well compacted soil; in a dry well on compacted soil; or above ground on a level, four-inch thick concrete slab;

(G) Permanently marked showing the rated capacity, and "GRAYWATER IRRIGATION SYSTEM, DANGER - UNSAFE WATER" on the unit;

(H) provided with an overflow pipe:

(I) of diameter at least equal to that of the inlet pipe diameter;

(II) connected permanently to sanitary sewer or to septic tank; and

(III) equipped with a check valve, not a shut-off valve - to prevent backflow from sewer or septic tank.

(I) provided with a drain pipe of diameter at least equal to that of the inlet pipe diameter;

(J) provided with a vent pipe in conformance with the requirements of the International Plumbing Code; and

(K) provided with unions and fittings for all piping in conformance with the requirements of the International Plumbing Code.

(d) Valves and Piping

(i) Graywater piping discharging into a surge tank or having a direct connection to a sanitary drain or sewer piping shall be downstream of an approved water seal type trap(s)

If no such trap(s) exists, an approved vented running trap shall be installed upstream of the connection to protect the building from any possible waste or sewer gases.

(ii) Vents and venting shall meet the requirements of the International Plumbing Code.

(iii) All graywater piping shall be marked or shall have a continuous tape marked with the words: DANGER - UNSAFE WATER.

(iv) All valves, including the three-way valve, shall be readily accessible.

(v) The design shall include necessary types of valves for isolation storage tank, irrigation zones and connection to a sanitary sewer or an onsite wastewater system.

R317-401- 6 Irrigation Fields

(a) Each irrigation zone shall have a minimum effective irrigation area for the type of soil and absorption characteristics.

(b) The area of the irrigation field shall be equal to the aggregate length of the perforated pipe sections within the irrigation zone times the width of the proposed trench. The required square footage shall be determined as follows:

TABLE C

Subsurface Irrigation Field Design

Soil Characteristics	Subsurface Irrigation Field area Loading, gallons of graywater per day per square foot
Coarse Sand or gravel	5
Fine Sand	4
Sandy Loam	2.5
Sandy Clay	1.6
Clay with considerable sand or gravel	1.1
Clay with sand or gravel	0.8

TABLE D

Drip Irrigation System Design

Soil Characteristics	Drip Irrigation System	
	Maximum emitter discharge, gallons per day	Minimum number of emitters per gallon per day of graywater
Coarse Sand or gravel	1.8	0.6
Fine Sand	1.4	0.7
Sandy Loam	1.2	0.9
Sandy Clay	0.9	1.1
Clay with considerable sand or gravel	0.6	1.6
Clay with sand or gravel	0.5	2.0

(c) No irrigation point shall be within two vertical feet of the maximum groundwater table. The applicant shall supply evidence of ground water depth to the satisfaction of the local health department.

(d) Subsurface drip irrigation system.

(i) Minimum 140 mesh (115 micron) filter with a capacity of 25 gallons per minute, or equivalent filtration, sized appropriately to maintain the filtration rate, shall be used.

(ii) The filter backwash and flush discharge shall be captured, contained and disposed of to the sewer system, septic tank, or, with approval of the local health department, in a dry well sized to accept all the backwash and flush discharge water. Filter backwash water and flush water shall not be used for any purpose. Sanitary procedures shall be followed when handling filter backwash and flush discharge of graywater.

(iii) Emitters recommended by the manufacture shall be resistant to root intrusion, and suitable for subsurface and graywater use.

(iv) Each irrigation zone shall be designed to include no less than the number of emitters specified in this rule.

(v) Minimum spacing between emitters should be 14 inches in any direction, or as recommended by the manufacturer.

(vi) The system design shall provide user controls, such as valves, switches, timers, and other controllers as appropriate, to rotate the distribution of graywater between irrigation zones.

(vii) All drip irrigation supply lines shall be:

(A) polyethylene tubing or PVC class 200 pipe or better and schedule 40 fittings;

(B) With solvent-cemented joints, inspected and pressure tested at 40 pounds per square inch and shown to be drip tight for five minutes, before burial; and

(C) buried at a minimum depth of six inches. Drip feeder lines can be polyethylene or flexible PVC tubing and shall be covered to a minimum depth of six inches.

(viii) Where pressure at the discharge side of the pump exceeds 20 pounds per square inch, a pressure-reducing valve able to maintain downstream pressure no greater than 20 pounds per square inch shall be installed downstream from the pump and before any emission device.

(ix) Each irrigation zone shall include a flush valve/anti-siphon valve to prevent back siphonage of water and soil.

(e) Subsurface Irrigation Field

(i) Perforated sections shall be a minimum three-inch diameter and shall be constructed of perforated high-density polyethylene pipe, perforated ABS pipe, perforated PVC pipe, or other approved materials, provided that sufficient openings are available for distribution of the graywater in the trench area. Material, construction and perforation of the piping shall be in compliance with the requirements of the International Plumbing Code.

(ii) Clean stone, gravel, or similar filter material acceptable to the local health department, and varying in size from 3/4 inch to 2 1/2 inches, shall be placed in the trench to the depth and grade required by this section. Perforated sections shall be laid on the filter material. The perforated sections shall then be covered with filter material to the minimum depth required by this section. The filter material shall then be covered with landscape filter fabric or similar porous material to prevent closure of voids with earth backfill.

(iii) No earth backfill shall be placed over the filter material cover until after inspection and approval of the local health department.

(iv) Subsurface Irrigation fields shall be constructed as follows:

TABLE E

Subsurface Irrigation Field Construction Details

Description	Minimum	Maximum
Number of drain lines per subsurface irrigation zone	1	---
Length of each perforated line, feet	---	100
Bottom width of trench, inches	6	18
Total depth of trench, inches	12	---
Spacing of lines, center to center, feet	4	---
Depth of earth cover on top of gravel, inches	4	---
Depth of filter material cover over lines, inches	2	---
Depth of filter material beneath lines, inches	3	---
Grade of perforated lines, Inches per 100 feet	Level	4

(f) Construction, Inspection and Testing

(i) Installation shall conform to the equipment and installation methods described in the approved plans.

(ii) The manufacturer of all system components shall be properly identified.

(iii) Surge tanks shall be filled with water to the overflow line prior to and during construction inspection. All seams and joints shall be left exposed and the tank shall remain watertight.

(iv) The irrigation field shall be installed in the area which has soils similar to the soils which have been evaluated, and has absorption rate corresponding to the given soil classification.

(v) A graywater stub-out may be allowed for future construction, provided it is capped prior to the connection to the installed irrigation lines and landscaping. Stub-out shall be permanently marked: GRAYWATER STUB-OUT, DANGER UNSAFE WATER.

(vi) A flow test shall be performed throughout the system, from surge tank to the point of graywater irrigation. All lines and components shall be watertight.

Arizona

R18-9-711. Type 1 Reclaimed Water General Permit for Gray Water

A. A Type 1 Reclaimed Water General Permit allows private residential direct reuse of gray water for a flow of less than 400 gallons per day if all the following conditions are met:
1. Human contact with gray water and soil irrigated by gray water is avoided;
2. Gray water originating from the residence is used and contained within the property boundary for household gardening, composting, lawn watering, or landscape irrigation;
3. Surface application of gray water is not used for irrigation of food plants, except for citrus and nut trees;
4. The gray water does 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;
5. The application of gray water is managed to minimize standing water on the surface;
6. The gray water system is constructed so that if blockage, plugging, or backup of the system occurs, gray water can be directed into the sewage collection system or on-site wastewater treatment and disposal system, as applicable. The gray water system may include a means of filtration to reduce plugging and extend system lifetime;
7. Any gray water storage tank is covered to restrict access and to eliminate habitat for mosquitoes or other vectors;
8. The gray water system is sited outside of a floodway;
9. The gray water system is operated to maintain a minimum vertical separation distance of at least five feet from the point of gray water application to the top of the seasonally high groundwater table;
10. For residences using an on-site wastewater treatment facility for black water treatment and disposal, the use of a gray water system does not change the design, capacity, or reserve area requirements for the on-site wastewater treatment facility at the residence, and ensures that the facility can handle the combined black water and gray water flow if the gray water system fails or is not fully used;
11. Any pressure piping used in a gray water system that may be susceptible to cross connection with a potable water system clearly indicates that the piping does not carry potable water;
12. Gray water applied by surface irrigation does not contain water used to wash diapers or similarly soiled or infectious garments unless the gray water is disinfected before irrigation; and
13. Surface irrigation by gray water is only by flood or drip irrigation.

B. Prohibitions. The following are prohibited:
1. Gray water use for purposes other than irrigation, and
2. Spray irrigation.

C. Towns, cities, or counties may further limit the use of gray water described in this Section by rule or ordinance.
And

A. A Type 3 Reclaimed Water General Permit allows a gray water irrigation system if:
1. The general permit described in R18-9-711 does not apply,
2. The flow is not more than 3000 gallons per day, and

3. The gray water system satisfies the notification, design, and installation requirements specified in subsection (C).

B. A person shall file a Notice of Intent to Operate a Gray Water Irrigation System with the Department at least 90 days before the date the proposed activity will start. The Notice of Intent to Operate shall include:
   1. The name, address and telephone number of the applicant;
   2. The social security number of the applicant, if the applicant is an individual;
   3. A legal description of the direct reuse site, including latitude and longitude coordinates;
   4. The design plans for the gray water irrigation system;
   5. A signature on the Notice of Intent to Operate certifying that the applicant agrees to comply with the requirements of this Article and the terms of this Reclaimed Water General Permit; and
   6. The applicable permit fee specified under 18 A.A.C. 14.

C. The following technical requirements apply to the design and installation of a gray water irrigation system allowed under this Reclaimed Water General Permit:
   1. Design of the gray water irrigation system shall meet the on-site wastewater treatment facility requirements under R18-9-A312(C), (D)(1), (D)(2), (E)(1), (G), and R18-9-E302(C)(1), except the septic tank specified in R18-9-E302(C)(1) is not required if pretreatment of gray water is not necessary for the intended application;
   2. Design of the dispersal trenches for the gray water irrigation system shall meet the on-site wastewater treatment facility requirements for shallow trenches specified in R18-9-E302(C)(2);
   3. The depth of the gray water dispersal trenches shall be appropriate for the intended irrigation use but not more than 5 feet below the finished grade of the native soil; and
   4. The void space volume of the aggregate fill in the gray water dispersal trench below the bottom of the distribution pipe shall have enough capacity to contain two days of gray water at the design flow.

D. The Department may review design plans and details and accept a gray water irrigation system that differs from the requirements specified in subsection (C) if the system provides equivalent performance and protection of human health and water quality.

California

California Department of Water Resources Initial Statement and Reasons for Proposed Changes to the 2009 Uniform Plumbing Code for the 2010 California Plumbing Code (5/13/09)

Background

The 2002 California Recycled Water Task Force was convened on April 3, 2002 by the California Department of Water Resources (DWR) as directed by Assembly Bill 331, passed by

the Legislature and signed by Governor Davis on October 7, 2001. The Task Force was chaired by the State Water Resources Control Board (SWRCB) member Richard Katz. The intent of the Task Force was to advise DWR on opportunities for and constraints to increasing the use of recycled water and to report to the Legislature no later than July 1, 2003.

Representatives of federal, state, and local agencies, private entities, environmental organizations, universities, concerned individuals and public-interest groups were appointed to the 40-member Task Force in April 2002. The Task Force included experts in the field of water recycling, including those involved in the production and use of recycled water, public health officials, world-renowned researchers, environmental organizations, and the general public. The Task Force established committees (workgroups) to focus on specific topics of concern and produce reports that served as a basis of Task Force decision-making. The

California Environmental Protection Agency, U. S. Bureau of Reclamation, California Building Standards Commission, California Department of Food and Agriculture, Department of Water Resources (DWR), the State and Regional Water Resources Control Boards, and the Department of Public Health (DPH) provided technical assistance to the Task Force and its workgroups.
The Task Force identified and adopted 26 issues with respective recommendations to address obstacles, impediments, and opportunities for California to increase its recycled water usage. Recommendations associated with thirteen of these issues were adopted as important key recommendations deserving of more immediate attention.

Among the key findings of the Task Force was the lack of an adopted California Plumbing Code addressing the dual-plumbing of buildings to flush toilets and urinals. Among the findings in the White Paper from the Plumbing Code and Cross Connection Control Workgroup:
"Portions of three California Codes have been identified as including impediments to recycled water use and are addressed in this white paper. They are the California Plumbing Code (CPC) Section 601.2.2 and 601.2.3 and Appendix J dealing with dual plumbed systems, Title 17 Section 7583 et seq. dealing with cross-connection control, and Title 22 Sections 60313-60616 dealing with recycled water dual plumbed systems. These codes pose problems because of their adoption status in some cases, inconsistencies between codes, and possibly unnecessarily restrictive requirements."

Based on these findings, the Task Force developed language specifically for adoption into the California Plumbing Code as a replacement to UPC Appendix J. Unlike the UPC language, the Task Force plumbing code language was developed in concert with the California agencies that have regulatory oversight with recycled water and other recycled water stakeholders. 2009 Uniform Plumbing Code

Since completion of the Task Force report, the California Legislature has directed the DWR to submit code language for adoption into the California Plumbing Code. This task is overdue and needs to be completed as soon as possible for inclusion in the next Triennial Code Cycle. The 2009 Uniform Plumbing Code (UPC) contains modified language from the former Appendix J which has been relocated to Chapter 16 Part II of the UPC. As was the case with Appendix J, the UPC language still has numerous conflicts with California regulation, has unnecessarily

restrictive requirements, and included no California recycled water stakeholders in its development.
Accordingly DWR and California recycled water stakeholders have updated the Task Force code language that address these deficiencies and is consistent with the findings of the Task Force and California regulations pertaining to recycled water and dual plumbing. The specific reason to modify the 2009 UPC language follows.

Section 1613.0 – Recycled Water Systems - General

The California Water Code has changed the term "reclaimed water" to "recycled water" and the correct term is used and changed throughout this document.

Local building officials are not authorized to pass judgment over the acceptable uses of recycled water in California. That is the domain of the DPH (formerly called the Department of Health Services or DHS) per the California Water Code Section 13521: "The State Department of Health Services shall establish uniform statewide criteria for each varying type of use of recycled water where the use involves the protection of public health." To fulfill the responsibility cited above, the DPH has established extensive and detailed regulatory criteria for Dual Plumbed Recycled Water Systems in Title 22, Article 5, Sections 60313 through 60316. The AHJ is not empowered to overrule or replace this authority.

The references to "irrigation, industrial processes, water features, and other uses approved by the Authority Having Jurisdiction" should be deleted. The Uniform Plumbing Code (UPC) and the California Plumbing Code (CPC) have limited scope which is governed by the definition of the term "plumbing systems". This definition does not include "irrigation, industrial processes, or water features". The details of this code were created specifically and exclusively for flushing water closets, urinals, and drain primers and should not be expanded to other applications, especially ones beyond the jurisdiction of the UPC and CPC. Contrary to the 2009 UPC, the California DPH regulations prohibits potable water to be connected as a back up supply to dual plumbed systems. Title 22 Section 60315 states: "The public water supply shall not be used as a backup or supplemental source of water for a dual-plumbed recycled water system unless the connection between the two systems is protected by an air gap separation which complies with the requirements of sections 7602 (a) and 7603 (a) of title 17, California Code of Regulations, and the approval of the public water system has been obtained."Section 1614.0 - Definitions

There are no federal requirements for recycled water and the recycled water quality does not need to be approved by the Authority Having Jurisdiction (AHJ). California Water Code Section 13521 empowers the California Department of Public Health (DPH) to "establish uniform statewide recycling criteria for each varying type of use of recycled water where the use involves the protection of public health." In Title 22, Chapter 3, Water Recycling Criteria, the DPH has already established that "disinfected tertiary recycled water" is the class of water required for flushing toilets and urinals. The AHJ has neither the technical expertise or authority to overrule the DPH in this area.

Section 1615.0 - Permit

Reclaimed water changed to recycled water.

Section 1616.0 – Drawings and Specifications

Like the previous UPC Appendix J, the 2009 UPC contains excessively severe requirements for recycled water dual plumbed systems compared to the drawings and specifications required for other types of plumbing. This was one of the items identified as obstacles and impediments in the California Recycled Water Task Force. The changes put recycled water on an equal footing with other types of plumbing design.

Section 1617.0 Pipe Material / Identification

Reclaimed water changed to recycled water.

Section 1617.1 – Pipe Materials

Reclaimed water changed to recycled water.

Section 1617.2 – Color and Information

Reclaimed water changed to recycled water. 2009 UPC only requires pipe labeling every 20 feet and requires marking to increase in size as pipe diameter increases. The pipe marking system agreed to in the California Recycled Water Task Force requires marking the entire length of the recycled water plumbing as a safeguard against cross connections. Purple adhesive Mylar PVC tape is routinely used to mark metallic pipe by wrapping it in a spiral fashion. This tape is a hard-to-find specialty item and only comes in one size: background (1-3/4 inch wide tape) with lettering one-half inch high. This system has been in successful use in California dual-plumbed systems for almost 20 years without problems.

Section 1618.0 – Installation

(A) The 2009 UPC prohibits hose bibbs for recycled water systems. DPH regulations allow hose bibbs to be used if quick couplers are also used. This change was made to be consistent with California recycled water regulations and practices.
(B) Slight wording changes needed to be compatible with code language from the California Recycled Water Task Force.
(C) Like the previous UPC Appendix J, the 2009 UPC contains excessively severe requirements for recycled water dual plumbed systems compared to that required for other non-potable piping systems. This was one of the items identified as obstacles and impediments in the California Recycled Water Task Force. The changes put recycled water on an equal footing with similar requirements for other non-potable plumbing in Sections 609.0 and 720.0 of the 2009 UPC.

Section 1619.0 – Signs

(A) Reclaimed water changed to recycled water
(B) Reclaimed water changed to recycled water

(C) Reclaimed water changed to recycled water. The language in the 2009 UPC is confused about the purpose of the signs. There is no need to place an unsightly label on the outside of a tank-type toilet (water closet). The purpose of the sign is to warn against drinking the water within the toilet tank, in case that water is used as an emergency supply.
(D) Reclaimed water changed to recycled water.
(E) The 2009 UPC has no section that describes the purpose and description of valve seals, although they are mentioned elsewhere in the 2009 UPC. This is an oversight and is corrected by including paragraph (E).

Section 1620.0 - Inspection and Testing

The wording in this entire section, taken from the 2009 UPC, should be deleted and replaced by the Inspection and Testing language developed by the California Recycled Water Task Force.
The feasibility and necessity for testing and inspection was one of the primary topics addressed by the Task Force, an 18-month public process that involved over 40 members that represented various California regulatory authorities and recycled water stakeholders. The California Department of Public Health (DPH), which has authority over Title 17, Backflow Prevention and Cross Connection Control regulations as well as Title 22, Recycled Water Regulations, cochaired the subcommittee that crafted and approved of this language from the task Force.
The DPH has also proposed amendments to Titles 17 and 22 which are designed to compliment the Inspection and Testing language from the Task Force.

Colorado

Graywater refers to the re-use of water from baths, showers, washing machines, and sinks (household wastewater excluding toilet wastes) for irrigation and other water conservation applications. Domestic graywater use replaces potable water used for landscape irrigation.

Graywater is most suitable for subsurface irrigation of nonedible landscape plants.

Practically speaking, the use of graywater systems is not viable for most homeowners in Colorado. Currently, the treatment, disposal, and potential use of graywater is regulated by the State of Colorado Guidelines On Individual Sewage Disposal Systems and applicable county Individual Sewage Disposal System (ISDS) regulations. The Colorado Department of Public Health and Environment (CDPHE) does not currently separate graywater from blackwater in its regulations. Consequently, surface applications require permitting and monitoring. Application of graywater from systems discharging 2,000 gallons or more per day requires a permit from the CDPHE; smaller systems require permits from your local health department.

If graywater is discharged below the soil surface and below the root zone in the manner of a leach field, a permit from the local health department is all that is required. If graywater is used to irrigate below the soil surface, but within the root zone (above frost line), a local permit plus monitoring is required. Many county ISDS regulations prohibit the issuance of any type of individual sewage disposal system permit for a lot within 400 feet of service by a municipal or community sewage treatment facility. Many municipalities have similar connection and usage requirements that technically prohibit the use of graywater in urban areas.

Graywater can be distinguished from warm-up water, or wasted potable water allowed to run down the drain before it reaches a desired temperature. Warm-up water that has not been used for bathing or dishwashing is generally free from bacteria and other pathogens if it is captured before it reaches the drain. Amounts of wasted warm-up water can be significant in homes where water heaters are located a considerable distance from showers or tubs and where no recirculation system is installed. Catching this water in a bucket and using it to water plants can contribute to home water conservation savings.

If graywater systems are used in conjunction where the source of water is from wells, other issues must be considered. Well permits are issued pursuant to Colorado statutes. The Colorado Division of Water Resources regulates well water permits to prevent well pumping from injuring other water users. Graywater use may not be a permissible use of water under a well permit and this must be clarified prior to installation of a graywater system. In some cases, the conditions of approval under which a permit was issued would not prohibit the capture and use of graywater. In other cases, the permit conditions would not allow it. Specifically, if the permit was issued for ordinary household purposes inside a single-family dwelling, with no outside uses, the capture and use of graywater for any use outside the dwelling (including lawn and garden irrigation) would not be allowed.

Well permits that were issued in areas of the state where the stream system is not over appropriated by senior vested water rights, may qualify for use of a graywater system. Old wells that are unregistered and were constructed prior to laws being enacted that required a well permit, may qualify for graywater systems if the historical uses included lawn and garden irrigation and 2 they can be late registered pursuant to section 37-92-602(5), CRS (2002). For wells operating under court-approved plans for augmentation, the terms and conditions of the decrees entered would have to be evaluated to see whether or not graywater systems would be allowed. In most cases, these plans for augmentation rely in part on the return flows generated by the individual well. In such cases, graywater systems might not be allowed.

Many of the permits issued throughout the state on parcels of less than 35 acres contain restrictions that would disallow the use of graywater. Permits issued on tracts of 35 acres or more with a return flow requirement could possibly utilize a graywater system if it could be demonstrated that the actual depletion to the stream system was not increased.

Connecticut

AN ACT CONCERNING A MUNICIPAL PILOT PROGRAM FOR GRAY WATER

Be it enacted by the Senate and House of Representatives in General Assembly convened: (NEW) (a) The Department of Environmental Protection shall, within available resources and in consultation with the Department of Public Health, establish a pilot program for the use of gray water from publicly owned treatment works. As part of the pilot program, the department may approve the use of such treated gray water in public schools and municipal facilities in manners determined by the department, provided such uses do not negatively impact public health. For the purposes of this section, "gray water" means domestic sewage that does not contain fecal material or toilet wastes.
(b) The Department of Environmental Protection may adopt regulations, in accordance with the provisions of chapter 54 of the general statutes, to carry out the purposes of this section. Such

regulations may (1) establish the criteria for the participation in the pilot program, and (2) determine the number of participants in the pilot program.

Montana

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MONTANA:

Section 1. Definitions. As used in this part, unless the context indicates otherwise, the following definitions apply:

(1) "Gray water" means wastewater that is collected separately from a sewage flow and that does not contain industrial chemicals, hazardous wastes, or wastewater from toilets.

(2) "Gray water reuse system" means a plumbing system for a private, single-family residence that collects gray water.

Section 2. Residential gray water reuse -- restrictions. (1) Gray water may not be used to irrigate plants to be consumed by humans.

(2) Gray water reuse systems may not be located within a flood plain, as defined in 76-5-103.

Section 3. Section 75-5-305, MCA, is amended to read:

"75-5-305. Adoption of requirements for treatment of wastes -- variance procedure -- appeals. (1) The board may establish minimum requirements for the treatment of wastes. For cases in which the federal government has adopted technology-based treatment requirements for a particular industry or activity in 40 CFR, chapter I, subchapter N, the board shall adopt those requirements by reference. To the extent that the federal government has not adopted minimum treatment requirements for a particular industry or activity, the board may do so, through rulemaking, for parameters likely to affect beneficial uses, ensuring that the requirements are cost-effective and economically, environmentally, and technologically feasible. Except for the technology-based treatment requirements set forth in 40 CFR, chapter I, subchapter N, minimum treatment may not be required to address the discharge of a parameter when the discharge is considered nonsignificant under rules adopted pursuant to 75-5-301.

(2) (a) The board shall establish minimum requirements for the control and disposal of sewage from private and public buildings, including standards and procedures for variances from the requirements.

(b) For gray water reuse systems in private, single-family residences, the board shall establish rules that:

(i) allow the diversion of gray water from wastewater treatment systems and limit the amount of gray water flow allowed by permit;

(ii) address the uses of gray water, including when and how gray water may be applied to land; and

(iii) include any other provisions that the board considers necessary to ensure that gray water reuse systems comply with laws and regulations and protect public health and the environment.

(3) An applicant for a variance from minimum requirements adopted by a local board of health pursuant to 50-2-116(1)(i) may appeal the local board of health's final decision to the department by submitting a written request for a hearing within 30 days after the decision. The written request must describe the activity for which the variance is requested, include copies of all documents submitted to the local board of health in support of the variance, and specify the reasons for the appeal of the local board of health's final decision.

(4) The department shall conduct a hearing on the request pursuant to Title 2, chapter 4, part 6. Within 30 days after the hearing, the department shall grant, conditionally grant, or deny the variance. The department shall base its decision on the board's standards for a variance.

(5) A decision of the department pursuant to subsection (4) is appealable to district court under the provisions of Title 2, chapter 4, part 7."

Section 4. Local gray water regulations. The requirements of 75-5-305 and [section 2] are minimum requirements and do not restrict a local governing body from adopting stricter or additional regulations for gray water reuse systems.

Section 5. Codification instruction. [Sections 1, 2, and 4] are intended to be codified as an integral part of Title 75, chapter 5, part 3, and the provisions of Title 75, chapter 5, part 3, apply to [sections 1, 2, and 4].

Section 6. Applicability. (1) [This act] applies to gray water systems that are installed after [the effective date of this act].

(2) [This act] and any rules or requirements adopted as a result of [this act] may not be imposed on a gray water system that was installed on or before [the effective date of this act].

Nevada

NAC 444.837 System utilizing graywater for underground irrigation: General requirements. (NRS 439.200**,** 444.650**)**

1. Graywater may be used for underground irrigation if approved by the administrative authority. A homeowner must obtain a permit to construct, alter or install a system that uses graywater for underground irrigation from the administrative authority before such a system may be constructed, altered or installed.

2. A system that uses graywater for underground irrigation:

(a) May be used only for a single-family dwelling.

(b) Must not be used in soils which have a percolation rate that is greater than 120 minutes per inch.

(c) Must consist of a three-way diversion valve, a holding tank for the graywater and an irrigation system.

(d) May be equipped with a pump or siphon, or may rely on gravity to cause the water to flow to the irrigation system.

(e) Must not be connected to a system for potable water.

(f) Must not result in the surfacing of any graywater.

3. A system that uses graywater for underground irrigation, or any part thereof, must not be located on a lot other than the lot which is the site of the single-family dwelling that discharges the graywater to be used in the system.

(Added to NAC by Bd. of Health by R129-98, eff. 3-25-99)

NAC 444.8372 System utilizing graywater for underground irrigation: Application to construct, alter or install system; design criteria. (NRS 439.200**,** 444.650**)**

1. An application to construct, alter or install a system that uses graywater for underground irrigation must include:

(a) Detailed plans of the system to be constructed, altered or installed;

(b) Detailed plans of the existing and proposed sewage disposal system; and

(c) Data from percolation tests conducted in accordance with NAC 444.796 to 444.7968, inclusive.

2. A holding tank for graywater must:

(a) Be watertight and constructed of solid, durable materials that are not subject to excessive corrosion or decay.

(b) Have a minimum capacity of 50 gallons.

(c) Have an overflow and an emergency drain. The overflow and emergency drain must not be equipped with a shutoff valve.

3. A three-way diversion valve, emergency drain and overflow must be permanently connected to the building drain or building sewer and must be located upstream from any septic tanks. The required size of an individual sewage disposal system must not be reduced solely because a system that uses graywater for underground irrigation is being used in conjunction with the individual sewage disposal system.

4. The piping for a system that uses graywater for underground irrigation which discharges into the holding tank or is directly connected to the building sewer must be downstream of any vented trap to protect the building from possible sewer gases.

5. The estimated discharge of a system that uses graywater for underground irrigation must be calculated based on the number of bedrooms in the building, as follows:

(a) For the first bedroom, the estimated discharge of graywater is 80 gallons per day; and

(b) For each additional bedroom, the estimated discharge of graywater is 40 gallons per day.

6. The absorption area for an irrigation system that includes a system that uses graywater for underground irrigation must be calculated in accordance with the following table:

Percolation Rate (minutes per inch)	Minimum Square Feet Per 100 Gallons Discharged Per Day
0-20	20
21-40	40
41-60	60

New Mexico

20.7.3.810 GRAYWATER DISCHARGES: Graywater discharge of less than 250 gallons per day of private residential graywater originating from a residence for the resident's household flower gardening, composting or landscaping irrigation shall be allowed if:

A. a constructed graywater distribution system provides for overflow into the sewer system or on-site wastewater treatment and disposal system;

B. a graywater storage tank is covered to restrict access and to eliminate habitat for mosquitos or other vectors;

C. a graywater system is sited outside of a floodway;
D. graywater is vertically separated at least five feet above the ground water table;
E. graywater pressure piping is clearly identified as a nonpotable water conduit;
F. graywater is used on the site where it is generated and does not run off the property lines;
G. graywater is discharged in a manner that minimizes the potential for contact with people or domestic pets;
H. ponding is prohibited, discharge of graywater is managed to minimize standing water on the surface and to ensure that the hydraulic capacity of the soil is not exceeded;
I. graywater is not sprayed;
J. graywater is not discharged to a watercourse;
K. graywater use within municipalities or counties complies with all applicable municipal or county ordinances enacted pursuant to Chapter 3, Article 53 NMSA 1978;
L. graywater is not stored longer than 24 hours before being discharged;
M. graywater use for purposes other than irrigation or composting is prohibited, unless a permit for such use is issued by the department;
N. graywater is not used to irrigate food plants except for fruit and nut trees;
O. graywater is discharged to a mulched surface area or to an underground irrigation system;
P. graywater is not discharged closer than 100 feet to a watercourse or private domestic well, or closer than 200 feet to a public water supply well;
Q. graywater does not create a public nuisance;
R. for residential units using an on-site liquid waste system for blackwater treatment and disposal, the use of a graywater system does not change the design, capacity or absorption area requirements for the on-site liquid waste system at the residential unit, and the on-site liquid waste system is designed and sized to handle the combined blackwater and graywater flow if the graywater system fails or is not fully used; and
S. graywater does 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.

Oregon

Be It Enacted by the People of the State of Oregon:
SECTION 1. ORS 468B.015 is amended to read:
468B.015. Whereas pollution of the waters of the state constitutes a menace to public health and welfare, creates public nuisances, is harmful to wildlife, fish and aquatic life and impairs domestic, agricultural, industrial, recreational and other legitimate beneficial uses of water, and whereas the problem of water pollution in this state is closely related to the problem of water pollution in adjoining states, it is hereby declared to be the public policy of the state:
(1) To conserve the waters of the state through innovative approaches, including but not limited to the appropriate reuse of water and wastes;
(2) To protect, maintain and improve the quality of the waters of the state for public water supplies, for the propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial, municipal, recreational and other legitimate beneficial uses;
(3) To provide that no waste be discharged into any waters of this state without first receiving the necessary treatment or other corrective action to protect the legitimate beneficial uses of such waters;
(4) To provide for the prevention, abatement and control of new or existing water pollution; and

(5) To cooperate with other agencies of the state, agencies of other states and the federal government in carrying out these objectives.

SECTION 2. ORS 454.607 is amended to read:

454.607. It is the public policy of the State of Oregon to encourage:

(1) Improvements to, maintenance of and innovative technology for subsurface and alternative sewage disposal systems and nonwater-carried sewage disposal facilities consistent with the protection of the public health and safety and the quality of the waters of this state; and

(2) The appropriate reuse of gray water for beneficial uses.

SECTION 3. ORS 454.605 is amended to read:

454.605. As used in ORS 454.605 to 454.755, unless the context requires otherwise:

(1) "Absorption facility" means a system of open-jointed or perforated piping, alternate distribution units or other seepage systems for receiving the flow from septic tanks or other treatment units and designed to distribute effluent for oxidation and absorption by the soil within the zone of aeration.

(2) "Alternative sewage disposal system" means a system incorporating all of the following:

Enrolled House Bill 2080 (HB 2080-A) Page 1(a) Septic tank or other sewage treatment or storage unit; and

(b) Disposal facility or method consisting of other than an absorption facility but not including discharge to public waters of the State of Oregon.

(3) "Construction" includes installation, alteration or repair.

(4) "Contract agent" means a local unit of government that has entered into an agreement with the Department of Environmental Quality pursuant to ORS 454.725.

(5) "Effluent sewer" means that part of the system of drainage piping that conveys treated sewage from a septic tank or other treatment unit into an absorption facility.

(6) "Governmental unit" means the state or any county, municipality or other political subdivision, or any agency thereof.

(7)(a) "Gray water" means shower and bath waste water, bathroom sink waste water, kitchen sink waste water and laundry waste water.

(b) "Gray water" does not mean toilet or garbage wastes or waste water contaminated by soiled diapers.

[(7)] (8) "Local unit of government" means any county or municipality.

[(8)] (9) "Nonwater-carried sewage disposal facility" includes, but is not limited to, pit privies, vault privies and chemical toilets.

[(9)] (10) "Public health hazard" means a condition whereby there are sufficient types and amounts of biological, chemical or physical, including radiological, agents relating to water or sewage which are likely to cause human illness, disorders or disability. These include, but are not limited to, pathogenic viruses, bacteria, parasites, toxic chemicals and radioactive isotopes.

[(10)] (11) "Septic tank" means a watertight receptacle which receives the discharge of sewage from a sanitary drainage system and which is so designed and constructed as to separate solids from liquids, digest organic matter during a period of detention and allow the liquids to discharge to another treatment unit or into the soil outside of the tank through an absorption facility.

[(11)] (12) "Sewage" means domestic water-carried human and animal wastes, including kitchen, bath and laundry wastes from residences, buildings, industrial establishments or other places, together with such ground water infiltration, surface waters or industrial waste as may be present.

[(12)] (13) "Sewage disposal service" means:

(a) The construction of subsurface sewage disposal systems, alternative sewage disposal systems or any part thereof.
(b) The pumping out or cleaning of subsurface sewage disposal systems, alternative sewage disposal systems or nonwater-carried sewage disposal facilities.
(c) The disposal of materials derived from the pumping out or cleaning of subsurface sewage disposal systems, alternative sewage disposal systems or nonwater-carried sewage disposal facilities.
(d) Grading, excavating and earth-moving work connected with the operations described in paragraph (a) of this subsection.
[(13)] (14) "Subsurface sewage disposal system" means a cesspool or the combination of a septic tank or other treatment unit and effluent sewer and absorption facility.
[(14)] (15) "Zone of aeration" means the unsaturated zone that occurs below the ground surface and the point at which the upper limit of the water table exists.
SECTION 4. ORS 454.610 is amended to read:
454.610. [(1) As used in this section "gray water" means any domestic sewage other than toilet and garbage wastes, including shower and bath waste water, kitchen waste water and laundry wastes.]
(1) A person may not construct, install or operate a gray water reuse and disposal system without first obtaining a permit from the Department of Environmental Quality. A gray water reuse and disposal system for which a permit has been issued under this section is exempt from the requirements of ORS 454.655. The Environmental Quality Commission shall adopt rules for permits issued under this section. In adopting the rules, the commission shall:
(a) Consider the recommendations of an advisory committee appointed by the department pursuant to ORS 183.333;
Enrolled House Bill 2080 (HB 2080-A) Page 2(b) Minimize the burden of permit requirements on property owners; and
(c) Prescribe requirements that allow for separate systems for the treatment, disposal or reuse of gray water. These requirements must ensure the protection of:
(A) Public health, safety and welfare;
(B) Public water supplies; and
(C) Waters of the state, as that term is defined in ORS 468B.005.
(2) [Nothing in ORS 454.605 to 454.755 except] Subject to ORS 454.645, [shall] the rules adopted by the commission under this section may not prohibit the discharge of gray water if:
(a) Soil and site conditions for such gray water conform to the rules of the department [of Environmental Quality] regarding standard subsurface sewage disposal systems or alternative sewage disposal systems, except that such systems may use two-thirds the normal size surface area for a drainfield and shall be preceded by a treatment facility such as, but not limited to, a septic tank; or
(b) Such gray water is discharged into an existing subsurface sewage disposal system or alternative sewage disposal system [which] that is functioning satisfactorily, or a public sewage system [which] that serves the dwelling from which such gray water is derived.
SECTION 5. ORS 454.615 is amended to read:
454.615. The Environmental Quality Commission shall [by September 1, 1975,] adopt [by rule standards which] rules that:
(1) Prescribe minimum requirements for the design and construction of subsurface sewage disposal systems, alternative sewage disposal systems and nonwater-carried sewage disposal

facilities or parts thereof including grading, excavating and earth-moving work connected therewith, and allow for use of alternative systems and component materials consistent with the minimum requirements. Requirements prescribed under this section may vary in different areas or regions of the state.
(2) Prescribe minimum requirements for the operation and maintenance of subsurface sewage disposal systems, alternative sewage disposal systems and nonwater-carried sewage disposal facilities or parts thereof.
(3) Prescribe requirements for the pumping out or cleaning of subsurface sewage disposal systems, alternative sewage disposal systems and nonwater-carried sewage disposal facilities or parts thereof, for the disposal of material derived from such pumping out or cleaning, for sewage pumping equipment, for sewage tank trucks and for the identification of sewage tank trucks and workers.
[(4) Prescribe requirements for handling kitchen, bath and laundry wastes as opposed to human and animal wastes which recognize the possibility for separate treatment of different types of waste.]
SECTION 6. This 2009 Act being necessary for the immediate preservation of the public peace, health and safety, an emergency is declared to exist, and this 2009 Act takes effect on its passage

Texas

SUBCHAPTER H: TREATMENT AND DISPOSAL OF GREYWATER
§285.80, §285.81
§285.80 Treatment and Disposal of Greywater
(a) Graywater is defined as wastewater from:
(1) showers;
(2) bathtubs;
(3) handwashing lavatories;
(4) sinks that are not used for disposal of hazardous or toxic ingredients;
(5) sinks that are not used for food preparation or disposal; and
(6) clothes-washing machines.
(b) Graywater does not include wastewater from the washing of material, including diapers, soiled with human excreta or wastewater that has come in contact with toilet waste.
(c) Construction of a graywater system, including storage and disposal systems, must comply with this chapter and any more stringent requirements of the local permitting authority. For the purposes of this subchapter, a graywater system begins at the graywater stub-out of a single family dwelling.
12204 §285.81 Criteria for Disposal of Graywater
(a) Permits and inspections are not required for the domestic use of less than 400 gallons of graywater each day if:
(1) the graywater originates from a single family dwelling;
(2) the graywater system is designed so that 100% of the graywater can be diverted to the owner's on-site sewage facility (OSSF) system during periods of non-use of the graywater

system. A graywater system may only be connected to the OSSF system if the following requirements are met.
(A) The connection must be in the line between the house stub-out for the OSSF and the OSSF treatment tank.
(B) The discharge from the graywater system must enter the OSSF system through two backwater valves or backwater preventers;
(3) the graywater is stored in tanks and the tanks: Texas Commission on Environmental Quality
On-Site Sewage Facilities
(A) are clearly labeled as nonpotable water;
(B) restrict access, especially to children;
(C) eliminate habitat for mosquitoes and other vectors;
(D) are able to be cleaned; and
(E) meet the structural requirements of the 2004 American Water Works Association standards;
(4) the graywater system uses piping clearly identified as a nonpotable water conduit, including identification through the use of painted purple pipe, purple pipe, pipe taped with purple metallic tape, or other methods approved by the commission;
(5) the graywater is applied at a rate that will not result in ponding or pooling or will not cause runoff across the property lines or onto any paved surface; and
(6) the graywater is not disposed of using a spray distribution system.
(b) No reduction in the size of the OSSF system will be allowed when using a graywater system.
(c) Builders of single family dwellings are encouraged to:
(1) install plumbing in new housing to collect graywater from all allowable sources; and
(2) design and install a subsurface graywater system around the foundation of new housing to minimize foundation movement or cracking.
(d) Graywater from a graywater system as described in subsection (a) of this section may only be used:
(1) around the foundation of new housing to minimize foundation movement or cracking;
(2) for gardening;
(3) for composting; or
(4) for landscaping at a single family dwelling.
(e) All aspects of the permitting, planning, construction, operation, and maintenance for any proposed graywater system that does not meet the requirements of subsection (a) of this section must meet the requirements of the remainder of this chapter.
(f) The installer of the graywater system must advise the owner of basic operating and maintenance procedures including any effects on the OSSF system.
(g) Graywater use must not create a nuisance or damage the quality of surface water or groundwater. If graywater use creates a nuisance or damages the quality of surface water or groundwater, the permitting authority may take action under §285.71 of this title (relating to Authorized Agent Enforcement of OSSFs).

(h) Homeowners who have been discharging wastewater from residential clothes-washing machines, otherwise known as laundry graywater, directly onto the ground prior to the effective date of this rule, may continue this discharge under the following conditions.
(1) The disposal area shall not create a public health nuisance.
(2) Surface ponding shall not occur in the disposal area.
(3) The disposal area shall support plant growth or be sodded with vegetative cover.
(4) The disposal area shall have limited access and use by residents and pets.
(5) Laundry graywater that has been in contact with human or animal waste shall not be discharged on the ground surface and shall be treated and disposed of according to §285.32 and §285.33 of this title (relating to Criteria for Sewage Treatment Systems and Criteria for Effluent Disposal Systems, respectively).
(6) Laundry graywater shall not be discharged to an area where the soil is wet.
(7) The use of detergents that contain a significant amount of phosphorus, sodium, or boron should be avoided.
(8) A lint trap shall be required at the end of the discharge line.
(i) Graywater systems that are altered create a nuisance, or discharge graywater from any source other than clothes-washing machines are not authorized to discharge graywater under subsection (h) of this section.

Washington

Section B - Greywater Systems

1. Introduction to Greywater Systems
Greywater systems are virtually the same as combined-wastewater on-site sewage systems.
Gravity flow greywater systems consist of a septic tank and a subsurface drainfield. Pressurized greywater systems consist of a septic tank, a pump chamber or vault, and a subsurface drainfield. Other types of sewage technologies, pre-treatment methods and drainfield design and materials options may also be incorporated in greywater systems.
The primary distinction between a greywater system and a combined wastewater system is the lower volume of wastewater. As a result the size of the septic tank and the subsurface drainfield is smaller compared to a system that treats and disposes of all the household wastewater (combined) through a septic tank and drainfield.
To help assure that future household fixture and/or plumbing changes do not overload the greywater treatment and dispersal system, the household and system plumbing must be clearly identified GREYWATER ONLY - NOT FOR COMBINED WASTEWATE).
In addition to the water conserving nature of waterless toilets / greywater systems, the greywater system drainfield can be designed and located to reuse greywater for subsurface irrigation. Drainfield designs (methods and materials) which place the distributed wastewater in close proximity to the root zone of turf grasses, plants, shrubs and trees may be used to enhance the reuse potential of greywater as it is treated in the soil, assuring public health protection. A relatively new piping method and material is presented in the Recommended Standards and Guidance for Subsurface Drip Systems as a design option for the dispersal / reuse of greywater.

When greywater systems are designed, installed, and operated & maintained to maximize their potential as a greywater re-use irrigation system, various items should be considered. Among these are plant water and nutrient needs and limits, salt tolerances, depth of root zones, etc. The development of a landscape plan is recommended. Information about these issues is presented in the Appendix.

2. Performance Standards
2.1. Greywater treatment & dispersal / reuse systems must provide treatment and dispersal at least equal to that provided by conventional on-site sewage systems.

3. Application Standards
3.1. All permitting, installation and inspection requirements are the same as required in Chapter 246-272A WAC. Water Conserving On-site Wastewater Treatment Systems - Recommended Standards and Guidance
3.2. Greywater on-site sewage systems may be used with new residential construction and existing dwellings. Internal household plumbing may be modified (consistent with local plumbing code) to route any portion of the household greywater to the greywater on-site sewage system.
3.3. Greywater on-site sewage systems may be located anywhere conventional or alternative on-site sewage systems are allowed. Site conditions, vertical separation, pretreatment requirements, setbacks and other location requirements are the same as described in Chapter 246-272A WAC.
3.4. Greywater on-site sewage systems must provide permanent, year-round treatment and dispersal of greywater unless this is already provided by an approved on-site system or connection to public sewer (see Section 4.3 "Seasonal vs. Year-Round Greywater Reuse).
3.5. Greywater on-site sewage systems must be installed with an approved waterless toilet or other means of sewage treatment for blackwater approved by the local health officer.
3.6. Greywater systems are intended to treat and dispose "residential strength" greywater. Greywater exceeding typical residential strength must receive pre-treatment to at least residential strength levels.

4. Design Standards
4.1. Design requirements for greywater on-site sewage systems, unless otherwise noted here, are the same as the requirements for combined wastewater systems presented in Chapter WAC 246-272A.
4.1.1. Minimum daily design flows and wastewater tank sizes for greywater systems serving single family residences are listed in text.
4.1.2. For residential facilities other than single family residences daily design flow must be at least 60 GPD per bedroom with a minimum design flow of 150 GPD per dwelling unit. Septic tank volume must be a minimum of 1.5 times the daily peak design flow with a minimum capacity of 1000 gallons.
4.2. Enhancing Subsurface Irrigation Potential
4.2.1. Greywater may be used for subsurface irrigation of trees (including fruit trees), shrubs, flowers, lawns and other ground covers but must not be used for watering of food crops or vegetable gardens, any type of surface or spray irrigation, to flush toilets/urinals or to wash walls, sidewalks or driveways.

4.2.2. The soil dispersal component of a greywater treatment system may be designed to enhance the potential for subsurface irrigation. The efficiency of greywater reuse Water Conserving On-site Wastewater Treatment Systems - Recommended Standards and Guidance
via subsurface irrigation depends upon the proximity of the drainfield to the rootzone of plants, shrubs, trees or turf, and the method of distribution. This may be enhanced by:
4.2.2.1. Installing narrower-than-normal trenches shallow in the soil profile (state rules do not have a minimum trench width; minimum trench depth is six inches).
Gravel and pipe size may limit how narrow a "conventional" trench may be. It is recommended that at least 2 inches of gravel be provided between the sides of the distribution pipe and trench sidewalls. Smaller gravel size (no less than ¾ inch) is recommended for narrow trenches.
4.2.2.2. Using pressure distribution to reduce the height of the trench cross-section to enable shallow trench placement, and to assure even distribution.
4.2.2.3. Using subsurface drip system (SDS) technology for shallow system placement and equal distribution in close proximity to plant, shrub, turf and tree roots.
4.2.3. Some agronomic issues that should be considered with greywater reuse are the water needs and salt tolerance of plants to be irrigated (see Appendix for related information). In many cases the volume of greywater generated may not meet the water needs of the landscape plantings. If potable water is used to augment greywater for irrigation within the same distribution network, a method of backflow prevention approved by the local health officer is required.
4.3. Seasonal vs. Year-Round Greywater Reuse - In some geographical and climatic areas, the frost-protection needs of an SDS or a conventional drainfield trench system may be counter-productive to effective greywater reuse via subsurface irrigation (distribution piping may be too deep for plant root systems). In these areas local health officers may permit seasonal systems where year-round treatment and dispersal is provided by an approved sewage system and seasonal subsurface irrigation with greywater is provided by a separate system with a shallow drainfield or SDS. Where seasonal systems are allowed various administrative and design issues must be addressed.
4.3.1. Both drainfields must meet state & local rule requirements, including soil application rates, to assure treatment and dispersal at least equal to that provided by gravity or pressure on-site sewage systems according to Chapter 246-272A WAC.
4.3.2. Municipal sewer systems may provide year-round sewage dispersal in conjunction with seasonal greywater treatment and dispersal systems designed to enhance greywater reuse via subsurface irrigation. Water Conserving On-site Wastewater Treatment Systems - Recommended Standards and Guidance
4.3.3. Seasonal greywater treatment and dispersal / reuse systems must include a three way diverter valve to easily divert greywater to the year-round dispersal field or sewer when needed (when freezing is a problem).
4.4. Special Case / Laundry Wastewater
4.4.1. Local health officers may permit "laundry wastewater only" greywater dispersal or reuse systems for single family residences for either year-round or seasonal use. Greywater systems limited only to laundry wastewater (including laundry sinks) may differ from other greywater systems presented in this document according to the following:
4.4.1.1. A single compartment retention / pump tank, with a minimum liquid capacity of 40 gallons may be used in lieu of the tank recommendations in Table 1. The tank must be warranted by the manufacturer for use with wastewater and meet requirements listed in Appendix G of the 1997 edition of the Uniform Plumbing Code (UPC).

4.4.1.2. Minimum design flow for "laundry wastewater only" systems (for the purpose of drainfield sizing) must be based on the number of bedrooms in the residence and must be no less than 30% of the minimum greywater system design flows listed in Table 1. (see Appendix B).
4.4.1.3. A wastewater filter or screen (with a maximum size opening of
1/16 inch) must be provided in an accessible location conducive to routine maintenance.

5. Operation and Maintenance Standards
5.1. Homeowners are responsible for proper operation and maintenance of their greywater systems.
5.2. Operation and maintenance (O&M) requirements for greywater systems are similar to the O&M requirements of other comparable (combined wastewater) on-site sewage systems. Specific requirements will vary according to the county where the system is located and the specific type of system. See your local health jurisdiction for local system O&M requirements.
5.3. Operation and maintenance requirements of subsurface drip systems are unique and are outlined separately in the Recommended Standards and Guidance for Subsurface Drip Systems.
5.4. Effluent filters must be cleaned with a minimum frequency in accordance with manufacturer's recommendations