



Response to Public Comments
Received on the Revised Draft Water-Efficient
Single-Family New Home Specification

December 9, 2009

Background

This document provides the WaterSense program's responses to public comments received on the *Revised Draft Water-Efficient Single-Family New Home Specification*, released on May 22, 2009. The actual comments can be viewed at www.epa.gov/watersense/nhspecs/homes_background.html.

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I. Comments on Scope and Objective

Version Control

- a. One commenter suggested that EPA reflect the version of the specification in the title.

Response: WaterSense agrees with this recommendation and has added the year that the specification is released to the title.

Estimated Benefits

- a. Some commenters questioned how EPA determined that WaterSense labeled new homes will use approximately 20 percent less water than standard new homes.

Response: EPA derived WaterSense's estimated 20 percent water savings by comparing the expected water usage associated with the required indoor water-efficiency features of the WaterSense labeled new home to usage estimates for those features in a standard new home. For example, 1.28 gallons per flush (gpf) for the toilets in a WaterSense labeled new home can save 4.2 gallons per day per household compared to 1.6 gpf for toilets in a standard new home. Details of these calculations can be found in EPA's *WaterSense Single-Family New Home Specification Supporting Statement* available at www.epa.gov/watersense/nhspecs/homes_background.html.

EPA anticipates that WaterSense labeled new homes will also use significantly less water outdoors compared to homes constructed without water-efficient landscaping and irrigation systems. However, because limited data are available on the expected outdoor water usage for single-family homes, EPA did not quantify the expected water savings for outdoor water usage. EPA calculated the estimated water savings based on indoor water usage.

- b. One commenter questioned whether EPA would provide revised water usage standards for commercial applications such as hospitals or restaurants.

Response: This specification only addresses single-family new home construction and does not address commercial or institutional applications. EPA is addressing commercial water use by labeling commercial products such as urinals and pre-rinse spray valves and is currently evaluating approaches for a WaterSense commercial and institutional program.

Builder Partners

- a. One commenter asked whether EPA would certify builders and supply a list of builders.

Response: Homebuilders may choose to become WaterSense partners by submitting a completed partnership agreement form and committing to build at least one home to the WaterSense criteria within one year of becoming a partner, and then one home every year afterward, to maintain their partnership with WaterSense. EPA does plan to provide a list of all WaterSense builder partners on its Web site.

It is important to clarify that WaterSense is not “certifying” builders. Through the *WaterSense New Home Certification System*, all homes built to the WaterSense criteria will be certified by EPA licensed certification providers to meet the criteria prior to receiving the WaterSense new home label certificate. Again, the homes, not the builders, will be certified.

Recognition of Plumbing Installers

- a. Some commenters recommended that EPA require that all plumbing installers meet applicable certification and/or state or local licensing requirements. Additionally, one commenter recommended that EPA require the use of professional plumbers with training in water-efficient installations.

Response: WaterSense agrees that plumbing and irrigation installers must meet applicable state and local licensing requirements and has specifically added this language to the final specification. WaterSense will continue to work with water-efficient plumber groups such as *GreenPlumbers USA* and review the feasibility of specifying the use of such professionals in future versions of the specification.

Stormwater Management

- a. Some commenters suggested that EPA be more proactive in managing stormwater at WaterSense labeled new home sites.

Response: WaterSense has worked with EPA’s stormwater staff to identify long-term stormwater management criteria that could be included in the specification and in the accompanying *Resource Manual for Building WaterSense Labeled New Homes*.

- b. Some commenters recommended that EPA prohibit the building of new homes in 100-year floodplains and wetlands and require builders to maintain the natural hydrology of the site.

Response: While WaterSense encourages builders to implement measures beyond those included in the specification to better manage stormwater, EPA believes some measures such as siting criteria are better left to local and state authorities. Other measures such as rainwater harvesting cannot be required in the specification on a national scale because of possible local/state restrictions on the practice and the uncertainty of supply due to variations in climate.

Program Costs

- a. One commenter stated that EPA’s estimated incremental costs associated with building a WaterSense labeled new home may adversely impact the affordability of these homes for middle-income households. This commenter recommended that EPA seek ways to minimize the administrative costs of the program that are unrelated to improving the actual water-saving performance of a home.

Response: WaterSense has sought to minimize the costs associated with building a WaterSense labeled new home. Specifically, WaterSense has limited its focus to criteria that

affect the water-saving performance of the home, minimized changes to typical building practices, and developed its certification system to work easily other green building programs (such as ENERGY STAR®).

Certification of Homes at Resale

- a. One commenter suggested that EPA develop a methodology to recertify homes that have earned the WaterSense label upon resale of the home.

Response: As is the case in most green building programs for new homes, WaterSense labeled new homes are certified to meet EPA criteria at the time they are built. EPA and its builder partners will provide homeowner education and outreach to ensure that owners of WaterSense labeled new homes can maintain the water-efficiency features of their homes and continue water-saving behaviors in the future.

Alignment With Other Green Building Programs

- a. Some commenters questioned the conflicting requirements for showerheads, pipe insulation, and hot water delivery systems in the WaterSense new homes criteria and the proposed 2011 ENERGY STAR New Homes guidelines and recommended that conflicts be resolved.

Response: WaterSense and ENERGY STAR are working together to coordinate criteria for products or systems that could be specified under both programs. Based on public comments, ENERGY STAR has removed its criteria for showerheads and hot water delivery systems from the 2011 proposed guidelines and both programs will continue to work together on future specifications.

- b. One commenter recommended that WaterSense align its program with other existing green building programs, including the International Code Council (ICC) 700 National Green Building Standard, created in partnership with the National Association of Home Builders (NAHB).

Response: WaterSense agrees with the commenter that national green building programs should align to the greatest extent possible. WaterSense developed its new homes specification with a goal of having it complement criteria in existing programs such as ENERGY STAR, NAHB's National Green Building Standard, and the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) for Homes.

II. Comments on Indoor Water-Efficiency Criteria

Water Meters

- a. Some commenters recommended that EPA require that water meters be installed in every WaterSense labeled new home to measure water consumption and maximize water conservation.

Response: WaterSense agrees that water meters can help homeowners measure their water consumption and in turn maximize the efficiency of their water use. However, at this time WaterSense has not conducted sufficient research to determine the cost implications of requiring water meters nor the technical implications associated with properly installing private water meters. WaterSense intends to conduct additional research and work with its utility partners to better understand the implications of developing criteria for water meters.

Sewer Meters

- a. One commenter suggested that EPA include sewer metering as a means of ensuring efficient usage of wastewater system resources.

Response: WaterSense acknowledges that comparing sewer meter readings to water meter readings can be useful to determine the amount of outdoor water used. However, because this information would be most helpful for utilities, EPA defers to local and state authorities for the collection and analysis of these data.

Leaks (Section 3.1)

- a. Some commenters stated that all leaks are not necessarily visible and recommended that EPA either conduct a leak check at the water meter or conduct a pressure loss test to identify any hidden leaks.

Response: WaterSense agrees with these commenters and revised the specification to add that there shall be no “detected” leaks. Leaks will be detected using a pressure loss test, whereby the inspector attaches a pressure gauge to an outside faucet and then shuts off the water supply. A loss of pressure indicates the presence of a leak. WaterSense has also instructed inspectors to visually inspect all water supply connections and valves for water-using fixtures, appliances, and equipment.

Service Pressure (Section 3.2)

- a. Some commenters questioned the purpose of specifying a maximum service pressure and its bearing on water efficiency. One commenter believed that WaterSense should set a maximum acceptable residual pressure for outlets and others questioned the relationship of the service pressure requirement to the pressure required for testing the faucets and showerheads.

Response: Ensuring that the pressure entering a WaterSense labeled new home does not exceed 60 pounds per square inch (psi) can result in significant water savings by reducing the amount of water coming out of the plumbing fixtures and reducing the likelihood of leaking water pipes and water heaters, dripping faucets, and catastrophic events such as the bursting of pipes, hoses, or component parts in a water-using product. Keeping the pressure at 60 psi also helps maintain the performance of fixtures and appliances, reduces dishwasher and clothes washer noise, and minimizes breakdowns in a plumbing system. Reducing the amount of hot water consumed will also reduce the amount of energy required to heat the water, resulting in energy savings. WaterSense has determined it is more efficient to set criteria for the water pressure entering the home rather than for each fixture in the home.

In the revised draft specification, WaterSense included the pressure requirement for manufacturer testing of faucets and showerheads in the home inspection. Because readers confused this information, which is not related to the WaterSense inspection, with the service pressure requirement in the specification, WaterSense has eliminated this extraneous information to minimize confusion.

- b. Some commenters suggested that the specification should be revised to state that a pressure reducing valve (PRV) is not required if (a) service pressure at the home is 60 psi or less at the time of inspection and (b) the public water supplier provides a statement that service pressure is unlikely to regularly exceed 60 psi at the home on a daily or seasonal basis. Other commenters stated that the requirement should be met by the utility and not by the homebuilder.

Response: WaterSense agrees with the commenters that a PRV should not be required if the pressure at the house is 60 psi or less at the time of inspection and the homebuilder obtains documentation in the form of a written statement from the public water supplier that the service pressure is unlikely to regularly exceed 60 psi at the home on a daily or seasonal basis. WaterSense has made this change to the specification.

- c. One commenter recommended that EPA remove the statement "Installation of a PRV creates a closed water service system. Thermal expansion may increase pressure in the system and should be controlled in accordance with local code." This commenter stated that since this is not related to water efficiency it should be removed from the specification itself.

Response: WaterSense agrees with the commenter and removed the language from the specification and included it in the *Resource Manual for Building WaterSense Labeled New Homes*.

- d. One commenter questioned whether a cold water valve should be opened somewhere in the system to relieve pressure from the thermal expansion tank prior to other testing so that inspectors can take a true reading downstream of the PRV.

Response: WaterSense determined that it is not necessary to open a cold water valve to get a true reading of the pressure of the water entering the home. To determine the "static" water pressure, all water-using fixtures must be turned off. Water flowing from a cold water valve will result in a false low reading.

Hot Water Delivery System (Section 3.3)

- a. One commenter recommended that EPA include a table identifying the volume of water in common piping materials to assist homebuilders in designing efficient hot water distribution systems.

Response: WaterSense agrees with the commenter and has included a table identifying the volume of water in piping materials as Appendix B to the specification and as part of the *Resource Manual for Building WaterSense Labeled New Homes*. This table was derived from the International Code Council's 2009 International Plumbing Code Table E202.1.

- b. Some commenters requested that EPA identify which types of hot water delivery systems are acceptable to meet the specification, as well as which ones are not acceptable.

Response: The criterion for hot water distribution systems is performance-based, meaning homebuilders may choose their own approach for designing a system that meets the criteria. The approach may vary depending on the layout of the home or climate of the area where the home is being built. Additional information on distribution systems that are commonly used to efficiently distribute hot water is provided in the *Resource Manual for Building WaterSense Labeled New Homes*.

WaterSense did identify two types of recirculating plumbing systems, timer- and temperature-based, that may *not* be used to meet the criteria. Research indicates that these systems use a large amount of energy to maintain the water temperature in the recirculating loop and are considered to be energy-inefficient. Because more efficient systems exist, WaterSense determined that inherently energy-inefficient systems should not be used to meet the specification.

- c. Several commenters requested that EPA include a definition of "hot water source," since the criteria specify the volume of water that can be stored in the piping between the hot water source and the hot water fixture.

Response: WaterSense agrees with the commenters and has included a definition of hot water source in the specification. The definition is "the container in which water is stored and/or heated such as a hot water heater or a demand-controlled recirculation loop."

- d. Some commenters questioned whether the 0.6 gallons mentioned in Section 3.3 referred to the amount of hot water that can be stored in the pipes between the hot water source and the hot water fixture or the amount of water that can be collected during the performance test before the temperature increases by 10 degrees Fahrenheit. Several commenters stated that at flow rates between 1.0 and 3.0 gallons per minute (gpm), there is an extra amount of water that must be wasted (1.25 times the actual volume in the pipe) before hot water is delivered.

Response: WaterSense agrees that the language in the revised draft specification was confusing. WaterSense changed the language in the final specification to clarify that the 0.6 gallons refers to the total volume of water that can be collected before hot water is delivered

during the performance testing and that 0.48 gallons, which has been rounded to 0.5, is the total volume of water that can be stored in the pipes between the hot water source and the hot water fixtures.

- e. Some commenters contend that EPA's performance measure of 0.6 gallons is too high, and that efficiently designed systems can deliver water with as little as 0.125 gallons of wasted water. They recommend that EPA set the criteria between 0.2 to 0.4 gallons. In contrast, one commenter stated that the performance measure was too low and recommended that EPA increase it to 0.8 gallons.

Response: WaterSense agrees that hot water delivery systems can be designed to be highly efficient. However, WaterSense determined that the majority of homebuilders are routinely designing efficient systems. Considering that one of the primary goals of the WaterSense program is market transformation, EPA must work together with the industry to shift behaviors and practices. With respect to hot water delivery systems, the first step is to encourage builders to routinely plan, design, and install water-efficient systems. WaterSense is attempting to achieve this goal with the criteria in the final specification. WaterSense will revisit the criteria as the new homes program matures.

- f. One commenter suggested that EPA require that the plumbing system be designed so that fixtures located near each other in the home allow for very rapid delivery of hot water when used consecutively.

Response: WaterSense agrees that there are water savings associated with systems designed to provide rapid delivery of hot water during consecutive uses and determined that most of the systems installed in WaterSense labeled new homes will achieve these savings. WaterSense will research this objective further when the specification is revisited in the future.

- g. One commenter recommended that EPA conduct performance testing on all of the hot water delivery systems in a home. Another commenter requested that EPA restrict the performance testing to bathroom faucets and showerheads and kitchen faucets only. This commenter recommended that tub spouts and faucets using minimal hot water such as those at bar sinks and laundry tubs need not meet the criteria.

Response: WaterSense agrees that all hot water distributions systems in a home should be tested to determine their compliance with the specification. WaterSense also has clarified that performance testing should be conducted only on bathroom sink faucets, kitchen sink faucets, and showerheads.

- h. Many commenters provided recommendations for revising the performance testing criteria for hot water distribution systems. Some commenters recommended that EPA specify a maximum time interval such as 30 seconds. Other commenters recommended that EPA specify a specific temperature such as 105 degrees Fahrenheit rather than require a 10-degree temperature difference.

Response: WaterSense decided not to change the performance testing methodology to require a time interval. Since plumbing systems are based on volume, EPA determined that

measuring the volume of water wasted while waiting for hot water is a better measure of the efficiency of the hot water distribution system.

WaterSense researched the idea of specifying a set temperature that should be met versus the 10-degree temperature difference to better standardize the testing methodology. During this research, WaterSense determined that the settings on water heaters and other hot water sources vary significantly, with few having digital settings and many having settings such as “normal” or “vacation.” In addition, WaterSense found that the set temperature for many hot water heaters can vary as much as 18 degrees above or below the setting.

Due to the difficulties in establishing a consistent baseline water temperature among homes being tested, WaterSense does not agree that setting a specified temperature for the compliance testing is a reasonable approach. After reviewing performance testing data from the WaterSense pilot homes built to the draft specification, EPA determined that its current performance testing methodology is reasonable and implementable. In the inspection guidance manual, WaterSense does specify that the inspector must ensure the water heater is “on” and set at the recommended normal heating setting to best represent expected conditions and that the testing be conducted on a faucet or showerhead.

- i. Some commenters supported EPA’s exclusion of the requirement for all hot water pipes to be insulated using R4 insulation. Other commenters recommended that EPA reinstate the requirement for insulation of hot water pipes.

Response: WaterSense encourages builders to insulate hot water pipes and agrees that, under proper circumstances, insulation can result in measurable energy and water savings. In other circumstances the additional water savings may be minimal. Additionally, a requirement for pipe insulation would require a second visit by the home inspector to determine compliance, increasing the cost of certification. WaterSense will continue to research this topic to gain a better understanding of the costs and benefits associated with requiring insulation in all homes, including whether there are specific situations in which insulation is more cost-effective and greater savings can be achieved.

Toilets (Section 3.4)

- a. One commenter recommended that EPA allow conventional 1.6-gpf toilets if the home is utilizing reclaimed water for toilet flushing.

Response: WaterSense is based on the premise that all water sources should be used efficiently and determined that requirements should not vary for different sources of water.

- b. Some commenters questioned whether houses that feature bidets and/or urinals can still qualify for the WaterSense label.

Response: Since WaterSense has in place a specification for flushing urinals, EPA has revised the new home specification to require that any urinal installed must be WaterSense labeled. The new home specification does not include any criteria restricting the type of bidets that can be installed.

Bathroom and Kitchen Faucets (Section 3.5)

- a. Some commenters questioned the performance testing requirement of the kitchen and bathroom sink faucets. One commenter questioned whether inspectors are required to conduct field testing of the actual flow rates from the fixtures, and, if so, recommended that EPA develop a better methodology for conducting the tests. Another commenter recommended that EPA test all kitchen faucets in the home because many homes have more than one kitchen sink.

Response: WaterSense has learned through discussions with builders and others involved in the construction industry that aerators are often stolen from faucets before the home is occupied. Because aerators are often not visible, EPA has required inspectors to test the faucets to ensure that an aerator is installed and the flow is restricted. This test is not designed to measure the actual flow rates and compare them to expected flow rates. WaterSense does agree that all kitchen and bathroom faucets should be tested and has added clarifying language to the specification and the *Inspection and Verification Guidance for WaterSense Labeled New Homes*.

- b. One commenter questioned whether homes seeking the WaterSense label could have laundry sinks, utility sinks, and/or wet bars.

Response: Homes seeking the WaterSense label can have utility sinks, laundry sinks, and wet bars. The faucets at the wet bars will be subject to the same criteria as kitchen faucets. WaterSense has not set any criteria for utility and laundry sinks.

Showerheads (Section 3.6)

- a. Some commenters supported the showerhead criteria restricting the total flow per shower compartment, while others did not. Those opposed to the criteria commented that the restriction is inconsistent with how WaterSense handled other recreational and therapeutic uses of water and that the use of multiple outlets simultaneously on a daily basis is very small. One commenter suggested that if multiple showerheads are installed, then the builder should be required to reduce water use in other areas.

Response: WaterSense agrees that the majority of homes constructed have only one showerhead per shower compartment. Therefore, WaterSense is confident that setting criteria that restrict the total flow of water from a shower compartment will not interfere with the current building practices for most builders. Also, EPA has determined that builders constructing “green” homes under WaterSense and other green building programs typically install only one showerhead per shower compartment. Some luxury spa type showers can use four to five times more water than a single showerhead. These homes could use significantly more water and energy than another home and may require multiple or larger water heaters to accommodate the high flow of hot water from the shower unit.

- b. Some commenters questioned the 2.5 gpm flow rate for showerheads and recommended that EPA set a lower flow rate to save more water.

Response: As stated in the specification, WaterSense is developing a specification for residential showerheads. After that specification is finalized and labeled products are available, WaterSense will revise the new home specification to require WaterSense labeled showerheads.

- c. One commenter questioned EPA's use of the term "potable water" to describe the total allowable flow rate, stating that this allows for the use of recirculating showers. This commenter recommended that EPA not allow recirculating showers, but, if allowed, recommended that EPA set criteria on the maximum capacity of recirculating shower reservoirs to reduce the amount of water used by these systems.

Response: Consistent with other areas of the specification, WaterSense determined that all water use, regardless of source, should be efficient and therefore eliminated the exception for recirculating showers.

- d. Some commenters supported the maximum shower compartment size included in the specification, while others stated that requiring a shower compartment not to exceed a floor area of 2,600 square inches (in²) is overly restrictive and arbitrary. One commenter maintained that there is no consensus on what area constitutes an appropriate delineation for single-person and two-person showers and recommended that the criteria be deleted.

Response: WaterSense agrees that there are a range of areas for shower compartments included in model codes and green building programs. EPA has revised the maximum shower compartment size in the final specification to 2,160 in². WaterSense is confident that 2,160 in² (36 inches x 60 inches) represents a reasonable maximum size for a single-person shower compartment, including roll-in showers that are large enough for a person in a wheelchair to remain in the chair to shower.

Dishwashers (Section 3.7.1)

- a. Some commenters recommended that EPA include a water factor in its criteria for acceptable dishwashers. Another commenter stated that ENERGY STAR qualified dishwashers are not necessarily water-efficient and recommended that WaterSense specify that dishwashers meet standards set by the Consortium for Energy Efficiency.

Response: At this time, there is no comprehensive list of ENERGY STAR qualified dishwashers that includes the models' water factors. Without a listing, builders are not able to identify models by their water factors. Because most of the energy savings from dishwashers come from reducing the amount of hot water used, WaterSense is confident that ENERGY STAR qualified dishwashers are also water-efficient. WaterSense will reevaluate its dishwasher criteria as additional dishwasher listings are developed that identify water factors.

Clothes Washers (Section 3.7.2)

- a. One commenter recommended that WaterSense delete the water factor criteria for clothes washers due to potential performance issues.

Response: WaterSense determined that specifying a water factor is necessary to ensure that installed clothes washers are both water- and energy-efficient.

Evaporative Cooling Systems (Section 3.8.1)

- a. One commenter stated that the reservoir discharge outlets on evaporative cooling systems may not be easily visible as they are often on the roof or in another inaccessible place. Therefore, the criteria that they be easily visible to allow the user to see when the refill valve is leaking may not be achievable.

Response: WaterSense agrees that these discharge outlets may not be easily visible and has removed this language from the specification. Leaks that may be occurring from these units prior to homeowner occupancy should be detected during the pressure loss testing. Also, WaterSense has developed some helpful guidance for homeowners about these units that is included in the template for the homeowner manual that is available to builders that partner with WaterSense.

Water Softeners (Section 2.3.2)

- a. One commenter recommended that EPA prohibit the use of salt-based (sodium or potassium chloride) water softening systems due to the high salt content of the discharged water. Another commenter recommended that EPA ensure that acceptable systems be able to use potassium chloride in lieu of sodium chloride due to water quality issues associated with the discharged water.

Response: WaterSense is confident that water softeners that comply with NSF/ANSI 44 Residential Cation Exchange Water Softeners, including the voluntary efficiency rating standards in Section 7 – *Mandatory testing for elective claims* for efficiency rated systems use water and salt more efficiently than their counterparts that do not meet the voluntary standard.

Drinking Water Treatment Systems (Section 3.8.3)

- a. Some commenters were confused by EPA's terminology that drinking water treatment systems must have an efficiency rating of not less than 85 percent.

Response: WaterSense agrees with the commenters that the language could be confusing and has changed the language in the specification to "systems shall yield at least 85 gallons of treated water for each 100 gallons of water processed." WaterSense has also listed the applicable NSF/ANSI standards for drinking water treatment systems in the specification and in the *Resource Manual for Building WaterSense Labeled New Homes* to help builders identify acceptable systems. Applicable NSF/ANSI standards are:

- NSF/ANSI 42 Drinking Water Treatment Units – Aesthetic Effects
- NSF/ANSI 53 Drinking water Treatment Units – Health Effects
- NSF/ANSI 55 Ultraviolet Microbiological Water Treatment Systems
- NSF/ANSI 58 Reverse Osmosis Drinking Water Treatment Systems
- NSF/ANSI 62 Drinking Water Distillation Systems

Additional Indoor Equipment Not Currently in the Specification

- a. One commenter recommended that EPA prohibit the installation of water-powered sump pumps or any other device that taps into the home's potable water source to pump out a basement sump pit. The commenter stated that pumps can waste between 10,000 and 32,000 gallons of potable water per year.

Response: WaterSense will conduct research on water-powered sumps, including their prevalence of use, to determine if they should be addressed in future revisions to the specification.

- b. One commenter recommended that EPA develop criteria for whole-house humidifiers.

Response: WaterSense will continue its research of water-efficient whole-house humidifiers. To date, WaterSense has only identified one manufacturer of whole-house humidifiers that could be considered water-efficient. Until multiple manufacturers of a given technology exist, WaterSense will not develop criteria for that product, even within the new home specification.

- c. One commenter recommended that EPA develop criteria to limit the capacity of bathtubs.

Response: EPA does not have sufficient data at this time to determine the expected water savings associated with the installation of bathtubs of specific sizes, because bathtubs can be used for many purposes and filled to various levels depending on their use.

III. Comments on Outdoor Water-Efficiency Criteria

General Outdoor Comments (Section 4.0)

- a. Some commenters requested that outdoor criteria be performance-based, allowing the professionals designing the landscape to determine the final details of the design.

Response: WaterSense has developed both a performance- and prescriptive-based approach for meeting the landscape design criteria and a performance-based approach for determining the effectiveness of irrigation systems. These criteria allow for flexibility in how the landscape and irrigation design reduce the amount of water required by and applied to the landscape. WaterSense has also developed a number of prescriptive criteria to shift the market toward more efficient practices. For example, a rain shutoff device is required on all irrigation systems. While these devices are currently installed on some irrigation systems, it is not yet a standard industry practice. EPA believes these devices are a key component of a water-efficient irrigation system and hopes to promote their use by requiring them in the new home specification.

- b. Some commenters stated that the outdoor criteria were not strong enough and requested an increase in stringency.

Response: WaterSense aims to increase water efficiency in the new home construction industry through incremental steps, gradually shifting the market toward more water-efficient products, services, and practices. The outdoor criteria included in the final specification provide great potential for saving water outside the home while at the same time making the program accessible to builders nationwide. As the market shifts toward greater water efficiency outdoors, WaterSense will reevaluate the criteria and consider additional efficiency measures.

- c. Some commenters stated that the outdoor criteria should be set based on region. A number of commenters recommended the use of the 10 EPA regions as a starting point.

Response: WaterSense is a national program and develops specifications that apply nationwide, while providing flexibility. Landscape design option 1, the water budget approach, provides a method to meet the criteria that includes regional climate data based on zip code. Due to limited data on regional and local irrigation parameters including plant water needs, EPA is not confident that a more regional approach can be developed at this time. As additional regional and local data become available, EPA will evaluate whether a more regional approach can be developed.

- d. Some commenters requested that EPA not move forward with the outdoor criteria until more research can be conducted and additional stakeholder input can be received. Other commenters supported the inclusion of the outdoor criteria and stated that a specification should not be released without an outdoor component.

Response: WaterSense is confident that it has developed a reasonable, flexible approach for addressing outdoor water use that may result in significant water savings across the country. WaterSense acknowledges that some industries would like EPA to develop a more detailed regional approach to outdoor water use and agrees that as more data are available, a more regional approach can be developed. Until that time, EPA has determined that the integrity of the WaterSense brand and the success of this specification could be jeopardized by *not* addressing outdoor water use in new homes, especially since up to 70 percent of a home's water use is outdoors in some parts of the country. Furthermore, the WaterSense goal of market transformation would be hindered if builders are not encouraged to consider their outdoor water usage when building a water-efficient home.

- e. One commenter was concerned that the program was regulatory in nature, while other commenters recognized that the specification is voluntary in nature, but stated that local governments could codify the specification, making it law.

Response: WaterSense is a voluntary market transformation program and participation is not required. WaterSense is not a program designed to develop mandatory standards or regulations, nor is it a program designed to work with local and state agencies to set standards. WaterSense only addresses products, programs, and practices that can benefit from the labeling program. Therefore, WaterSense may not address all of the components of a local or state standard or code and leaves that work entirely up to local and state agencies.

Due to the wide range of soil types, plants, and uses of outdoor space in housing developments within a given geographic area, WaterSense does not recommend that localities codify the specification's outdoor criteria. Until additional data are available on the water uses of all plants in all soil types under varying climate conditions, it would be extremely difficult to develop code for landscape design criteria.

- f. Some commenters expressed concern that the outdoor criteria are not based on science. Some commenters stated that the development process was not transparent and there was a perceived lack of inclusion and collaboration by EPA with the landscape and irrigation industries. Some commenters expressed concern that comments made on the first draft specification were not incorporated into the revised draft specification and requested an additional public comment period on the outdoor criteria.

Response: EPA used a combination of data and policy decisions to develop the new home specification. When available, EPA relied heavily on scientific research in developing the outdoor components of the specification. The WaterSense program is based on science and technology to estimate savings and identify efficient practices, as well as policy decisions to determine how best to implement a program that is compatible with other green building programs.

The process WaterSense used to develop the new home specification was transparent and involved two public comment periods lasting a total of six months, three in-person public meetings, two webinar public meetings, dozens of conference calls, and interactions with hundreds of stakeholders, including individuals from the landscape and irrigation industries.

EPA is confident that all stakeholders had sufficient opportunity to provide input into the development of the specification over the past three years.

Landscape Criteria (Section 4.1)

- a. Some commenters recommended that EPA revise the definition of landscape area. One commenter recommended that EPA change the applicability of the landscape design criteria from the “landscapable area” to the “builder-installed landscaped area,” instead of specifying front yard versus whole yard. Additionally, multiple commenters recommended that EPA exclude hardscapes and septic drainage fields from the definition.

Response: WaterSense agreed with many of the commenters and their recommendations and revised its approach for defining which areas must meet the criteria. The landscape criteria in the final specification apply to the front yard and other areas “improved upon” by the builder. This includes areas with vegetation beyond stabilization measures, irrigation systems, pools, spas, and/or water features. Landscaped area is defined as “the designed area of landscape excluding the footprint of the home and permanent hardscape areas such as driveways, sidewalks, and patios. Septic drainage fields and public right-of-ways should also be excluded from this definition.”

- b. Some commenters requested that irrigation systems, pools, spas, and water features installed in the back yard not require landscaping of the entire yard.

Response: WaterSense agrees that the requirement of whole-yard landscaping based on these features could limit builder participation in some markets and has removed the requirement. These features, however, are included as areas “improved upon” by the builder and are subject to the landscape criteria.

- c. Some commenters expressed concern that criteria may only apply to the front yard if the builder does not install a backyard landscape, leaving all landscape components of the back yard to the homeowner. Commenters requested that the criteria apply to the entire yard.

Response: WaterSense recognizes this concern and will consider requiring landscaping of the entire yard in future versions of the specification, but at this time is only requiring the front yard and other areas improved upon by the builder due to current builder practices and market barriers. It is the goal of the program to transform the market in incremental steps and, currently, the majority of builders do not landscape the entire lot. Homebuilders are required to include all relevant WaterSense materials on outdoor water use in the homeowner operating manual, which will help educate homeowners about efficient landscape practices.

- d. Multiple commenters questioned the need to exclude landscapes of less than 1,000 square feet from all landscape criteria. One commenter recommended that the exclusion should only apply to the landscape design criteria, not all landscape criteria. One commenter recommended that landscapes of less than 1,000 square feet have at least some percentage reduction in turf.

Response: WaterSense intended the exemption to only apply to the landscape design criteria and has clarified the specification language. WaterSense included this exemption to allow those landscapes that are very small in size to have a functional area of turfgrass.

- e. Multiple commenters requested clarification for, or recommended alternatives to, the definition of “front yard” in the specification.

Response: WaterSense revised the definition of front yard to include the portion of the lot extending across the full width of the lot between the front lot line and the front walls of the house. Local code definitions shall be used when available.

- f. One commenter recommended that WaterSense require that 80 percent of the landscapable area be planted using any plants selected by the builder/landscaper.

Response: WaterSense has determined that builders may be able to plant 80 percent of the landscape using a combination of plants and turfgrass using either of the landscape design options contained in the specification. WaterSense has not set a minimum nor maximum amount of plantings that shall be installed.

- g. One commenter requested that WaterSense clarify that installing an irrigation system is not required.

Response: WaterSense revised the specification language to clarify that the irrigation systems are not required.

Landscape Design Option 1 – Turfgrass Allowance (Section 4.1.1.1)

- a. Many commenters stated that the turfgrass allowance option is not regional in nature. Some commenters were concerned that 40 percent is too low for areas with ample rainfall. Other commenters were concerned that 40 percent was too high for arid regions.

Response: WaterSense set the turfgrass allowance at 40 percent to allow for a functional area of turfgrass, while reducing the amount that traditionally has been installed by builders. On an average-sized lot of 0.35 acres, the 40 percent allotment allows for approximately 2,500 square feet of turfgrass if both the front and backyards are landscaped to the specification. Significantly more turfgrass can be planted if only the front yard is landscaped in accordance with the specification. WaterSense is confident that this approach does not limit the homeowners’ ability to have functional areas of turfgrass in their landscaping. Furthermore, the water budget option, which can be used in lieu of the turfgrass allowance option, allows for regionally-appropriate amounts of turfgrass.

- b. Some commenters expressed concern that a turf allowance of 40 percent would not guarantee water savings, because the remaining landscape can be planted with high-water-using plants.

Response: If a builder installs a landscape with 40 percent or less turfgrass, any other type of planting, permeable hardscape, or non-vegetated softscape can be used in the remaining 60 percent of the landscaped area. WaterSense is confident that builders will not install

plantings that are inappropriate for the area, because it would decrease the marketability of the home. Over time, WaterSense will work to engage state governments, universities, and the landscape industry to establish and maintain easily accessible lists of the most commonly used landscape plants grouped into high-, medium-, and low-water-using plants for all regions of the country. After these data are compiled, WaterSense can revisit its landscape design criteria to determine if a more regional approach can be developed.

- c. Multiple commenters requested that WaterSense set a cap on the total amount of turfgrass that can be planted in the landscape.

Response: WaterSense agrees that large expanses of any type of irrigated landscape can consume significant amounts of water. However, WaterSense does not have sufficient data on the lawn sizes of single-family homes across the country to make this determination.

- d. Some commenters expressed concern that the turfgrass allowance is not based on turfgrass type and recommended multiple allowance amounts based on turfgrass variety.

Response: WaterSense recognizes that turfgrass varieties require different amounts of water, but developed this option as a simple means for meeting the landscape design goals. Turfgrass varieties and associated water needs are addressed in the water budget option, which can be used when more regional turfgrass allotments are desired. For example, a landscape could be designed to include more medium-water-using turfgrass than high-water-using turfgrass with the water budget tool.

- e. Many commenters requested that the turfgrass allowance option be removed from the outdoor criteria. Other comments supported the inclusions of the turfgrass allowance option.

Response: WaterSense is providing two options to meet the landscape design criteria to provide flexibility in meeting builders' needs. The turfgrass allowance option provides a simple method for ensuring that newly installed landscapes are more water-efficient than typical offerings. This approach also allows nationwide builders to meet the specification, regardless of the location of the homes. Additional information supporting this option can be found at www.epa.gov/watersense/nhspecs/nh_irr_materials.html. It is the goal of WaterSense to remove this option from future versions of the specification, after use of the water budget tool becomes more widespread.

- f. One commenter requested the addition of a definition for turfgrass.

Response: Due to the variety of turfgrasses, WaterSense is leaving this determination to landscape professionals familiar with vegetation common to their region.

Landscape Design Option 2 – Water Budget (Section 4.1.1.2)

- a. Many commenters requested a change in the evapotranspiration adjustment factor (ETAF). Some commenters requested a lower ETAF, such as 60 percent, either in the final specification or phased in through future versions. Other commenters requested a higher ETAF, such as 80 percent. Some commenters recommended that the ETAF be regionally based.

Response: WaterSense eliminated the ETAF term and revised the tool to calculate a baseline amount of water the landscape would require if watered at 100 percent of reference evapotranspiration (ETo). The water budget approach allows 70 percent of the calculated baseline amount of water to be used for the landscape designed under this approach. Regional variability is accounted for through the use of ETo and rainfall based on zip code.

- b. Some commenters expressed concern that the water budget tool is too complex for use by builders or landscape professionals.

Response: WaterSense has simplified the tool and included a new Water Budget Data Finder available at www.epa.gov/watersense/nhspeccs/wb_data_finder.html to aid builders and landscapers in the use of the tool. Users enter their zip code and the tool provides the peak watering month, ETo, and precipitation for that location. In addition, WaterSense has included an example of the tool in the *Water Budget Approach*.

- c. Some commenters expressed concern about the turfgrass allowances calculated by the water budget tool. Some believed too much turfgrass was allowed, while others expressed concern too little turfgrass was allowed. One commenter requested that more testing of the tool occur by stakeholders around the country.

Response: WaterSense has tested the tool by designing landscapes for dozens of locations across the country. No abnormalities in the tool were detected. In areas of the country where there is sufficient rainfall and the ETo is lower, e.g., Raleigh, North Carolina, a significant area of high-water-using plants including turfgrass could be planted. In regions of the country where there is little rainfall and ETo is high, e.g., San Diego, California, smaller areas of high-water-using plants could be installed. WaterSense intends to continually improve the tool as additional data become available and new methodologies are established. Revisions to the water budget tool may be made independently and more frequently than revisions to the new home specification.

Due to limited data, the water budget tool currently uses general classifications of plant types and water needs. Until more plant-specific data are available, WaterSense does not recommend that the water budget tool be codified by state and local agencies.

- d. Some commenters requested a clarification or incorporation of an establishment period into the water budget tool.

Response: WaterSense developed the tool to estimate the water needs of established landscapes. EPA recognizes that the grow-in period for plants requires more water than

established plants. The tool develops a conservative estimate of water needs for design purposes and should not be used for scheduling purposes.

- e. Some commenters recommended that the tool clarify that the user shall enter rainfall and ETo data for the same month.

Response: WaterSense agrees with the commenters and clarified this in Part 2 of the water budget tool.

- f. Multiple commenters requested the inclusion of a leaching fraction in the water budget tool.

Response: WaterSense acknowledges that the use of a leaching fraction may be appropriate in some areas of the country for irrigation scheduling, but did not include this adjustment in the water budget tool at this time. The tool develops a conservative estimate of water needs for design purposes and should not be used for scheduling purposes. Leaching fractions affect scheduling and, therefore, should not affect the results of the tool.

- g. Many commenters were not aware of the ETo Finder posted to the WaterSense Web site shortly after the publication of the revised water budget. Some expressed concern about the complexity of locating ETo, while others emphasized the importance of standardization of ETo data.

Response: WaterSense released the ETo Finder, which provides users with ETo approximations for each zip code based on the standardized Penman-Monteith equation. The ETo Finder is based on data from the International Water Management Institute. More information on these data can be found at www.iwmi.cgiar.org/WAtlas/Default.aspx. For the final specification, WaterSense has upgraded the tool to make the water budget simpler by providing peak watering month, ETo, and precipitation for each zip code.

- h. Some commenters noted that data from the ETo Finder are different from ETo data currently used in their area.

Response: WaterSense understands there will be some variation in ETo data from source to source, because weather networks across the country use various equations to calculate ETo. WaterSense agrees consistency is important and has confidence in the accuracy of the International Water Management Institute data used as the basis of the ETo Finder. WaterSense has determined that data from the ETo Finder is appropriate for designing a landscape and that local data may be more appropriate for scheduling.

- i. One commenter stated that effective rainfall should be based on feedback from climatologists in each region.

Response: WaterSense agrees that regionally-based effective rainfall is something to strive for in future versions of the water budget tool. Not all rainfall is considered to be “effective” or available to the plants. Rainfall that percolates below the root zone of the plants and that flows away over the soil surface as run-off cannot be used by the plants and is classified as not effective. Therefore, allowable rainfall that is tied to effective rainfall is less than actual rainfall amounts. At this time, WaterSense is using a conservative 25 percent of historical

rainfall in the water budget to design the landscape to withstand years of below-average rainfall.

- j. Multiple commenters noted that the link for the rainfall data was broken.

Response: WaterSense posted a revised link. In addition, the new Water Budget Data Finder now provides peak watering month, ET_o , and rainfall data by zip code.

- k. One commenter stated that rainfall should not apply to those areas of the landscape such as covered pools, spas, and other areas not exposed to rain.

Response: To keep the tool as simple as possible, WaterSense has not incorporated this change. EPA has conducted analyses on these parameters and determined that the impact of allowing rainfall on non-planted areas is minimal. WaterSense will consider these recommended changes as the tool is enhanced over time.

- l. Multiple commenters recommended that the runtime multiplier (RTM) be defined as $1/[.4+(0.6 \times DU_{LQ})]$.

Response: WaterSense agrees that RTM for scheduling purposes should be defined as $1/[.4+(0.6 \times DU_{LQ})]$. However, for conservative design purposes, EPA kept $1/DU_{LQ}$ in the calculation of LWR. The term "RTM" was removed to reduce confusion.

- m. Some commenters recommended that WaterSense publish a master list of low-, medium-, and high-water-using plants.

Response: WaterSense acknowledges that a master list of all plants sorted by their water requirements would be a very helpful tool. However, no list currently exists, and WaterSense does not have the resources to undertake such an effort at this time. For this version of the tool, users are encouraged to contact their local cooperative extension office, a nursery, or their utility for information on plant water use. WaterSense will update its information if a master list of plants sorted by water requirements becomes available.

- n. Some commenters requested that WaterSense provide specific landscape coefficients based on regional data.

Response: At this time, data for many landscape plants are not available. WaterSense encourages professionals to work with local resources to best determine the water use category of the plants being installed. WaterSense recognizes that the landscape coefficients used in the tool are based on data from California and have not been determined for other locations. However, these are representative numbers that are applied for design purposes. As research is conducted to identify appropriate coefficients across the country, WaterSense can update the water budget tool.

- o. One commenter asked why the landscape coefficient for pools, spas, and water features was based on water use for turfgrass instead of reference ET.

Response: WaterSense included the area of pools, spas, and water features in the landscape design criteria to account for their high water use. Because they are treated as turfgrass, they are assigned a landscape coefficient associated with turfgrass water use.

- p. One commenter stated that the landscape coefficients for turfgrasses are too high because there are treatments that can be applied to decrease the required amount of water. Some commenters requested that EPA incorporate landscape treatment technologies that can reduce water use into the water budget tool

Response: WaterSense agrees that there are treatments that can be applied to landscapes to decrease the water requirement. However, the landscape coefficients reflect a conservative estimate for designed plant use and do not account for treatments that may or may not be applied throughout the life of the landscape.

- q. Some commenters recommended a change in turfgrass coefficients to 0.5 for low-water use and 0.6 for medium-water use.

Response: Currently, the coefficients in the WaterSense tool are based on the USGBC's LEED for Homes tool to provide consistency between the two programs. WaterSense is confident that working closely with other green building programs to develop consistent tools will greatly benefit homebuilders that support more than one program. WaterSense will consider revisions to the tool when additional scientific, peer-reviewed plant coefficient data are available.

- r. One commenter recommended the addition of an error message if the designed landscape area does not equal the landscapable area.

Response: A message occurs on Part 3 of the tool if the areas are not equal.

- s. One commenter recommended that EPA provide more guidance for using the water budget tool when irrigation systems are not installed.

Response: WaterSense currently uses the methodology created by USGBC's LEED for Homes to address landscapes not requiring irrigation to better ensure compatibility between the two programs. The tool's conservative approach is based in part on the assumption that an irrigation system could be installed by the homeowner in the future. EPA will revisit its methodology as enhancements to the tool are made.

- t. One commenter requested that the tool include a tolerance for estimating curvilinear areas.

Response: WaterSense recognizes that some curved areas will have to be estimated and will let the user decide the tolerance levels.

- u. One commenter expressed concern that there is no sun/shade calculation in the tool.

Response: WaterSense acknowledges that calculating the amount of sun and shade in a landscape can impact its water needs and will evaluate methods for addressing this parameter as the tool is enhanced over time. WaterSense developed the tool to assist

homebuilders in recognizing the importance of the landscape to the home's overall water usage. This first version of the tool was intended to be as simple as possible, with future versions becoming more complex as homebuilders and landscape professionals begin to accept and adopt this approach.

Turfgrass Not Allowed on Strips Less than 4 Feet Wide (Section 4.1.2)

- a. Some commenters requested that WaterSense clarify that the criterion does not limit sod installation in strips less than 4 feet wide and that it does not pertain to small patches of grass in landscape features, e.g., grass between pavers. Some commenters requested that the requirement be increased from 4 feet to 8 feet wide, based on many municipal codes that use 8 feet. One commenter stated that the exclusion of turfgrass on strips of less than 4 feet wide should account for water usage based on turfgrass variety and decrease in width in relation to the monthly water usage of the installed turfgrass variety. Many commenters recommended that WaterSense remove the exclusion of turfgrass on strips less than 4 feet wide, but specify the type of irrigation, or state that overspray on surrounding areas shall not occur.

Response: WaterSense agrees that the concerns associated with turfgrass planted in narrow strips are based on the use of sprinkler irrigation on these strips, not the turfgrass itself. Therefore, WaterSense revised the criteria to restrict sprinkler irrigation on strips less than 4 feet wide. This allows for the installation of other types of irrigation, e.g., drip irrigation, that can efficiently water narrow strips of turfgrass. WaterSense did not increase the width to 8 feet because there are products on the market that can efficiently irrigate strips of turfgrass between 4 and 8 feet wide.

Turfgrass Not Allowed on Slopes Greater Than 4:1 (Section 4.1.3)

- a. Many commenters requested that turfgrass be allowed on steep slopes and provided alternatives for EPA's consideration. Recommended alternatives included prohibiting irrigation from these areas, allowing only microirrigation, retaining original plant communities if previously undisturbed, terracing, building retaining walls, using stabilization techniques, defining a maximum slope, and specifying irrigation design and scheduling techniques.

Response: WaterSense acknowledges that the purpose of this criterion is to prevent excessive runoff from steep slopes, particularly runoff from irrigation water. WaterSense included many of the commenters' recommendations in the *Resource Manual for Building WaterSense Labeled New Homes* and changed the criterion to prohibit sprinkler irrigation on slopes in excess of 4:1 and to require that the slopes be vegetated.

Mulching (Section 4.1.4)

- a. One commenter recommended revising the specification language concerning mulch to state that non-turf areas shall be mulched.

Response: WaterSense clarified the criterion to state that all exposed soil shall be covered with a 2- to 3-inch layer of mulching material.

- b. One commenter recommended that WaterSense specify only a minimum depth of mulch, due to inspection and compliance issues.

Response: EPA's research indicates that too much mulch can be damaging to the plants; therefore, WaterSense kept the maximum depth requirement in the specification. WaterSense is confident that inspectors can accurately measure mulch depth and minor corrections can be made quickly if the maximum depth exceeds the limit.

- c. One commenter stated that mulch releases carbon dioxide as it respire, without ever providing oxygen as vegetation does.

Response: EPA is aware that mulching is a common practice and provides benefits such as stabilizing the soil and reducing water loss from the soil. WaterSense is not recommending that mulch replace vegetation in the landscape, rather that mulch be used to cover bare areas of soil, for example in shrub beds. Additionally, if portions of the landscape are unplanted, then mulch shall be used in those areas as a means of erosion control.

- d. One commenter requested that the definition for mulching material be revised to clarify that the material itself should not have to be permeable nor allow for movement of oxygen, but its use must not restrict these qualities.

Response: WaterSense agrees with the commenter and revised the definition as follows: "A permeable arrangement of organic and/or inorganic materials that will retain soil moisture, suppress weeds, and allow free movement of oxygen into and out of the soil."

- e. One commenter requested that language be added indicating a preference of organic mulches over non-organic mulches.

Response: WaterSense is allowing landscape professionals to choose the type of mulch so the appropriate mulching material can be determined on a site-by-site basis.

Pools/Spas (Section 4.1.4)

- a. One commenter stated that pools and spas should not be considered part of the turfgrass allowance or landscapable area. Another commenter recommended that pools and spas be counted as hardscape because they are impervious to rainfall.

Response: WaterSense has determined that treating pools and spas as a high-water-using plant, such as turfgrass, is a reasonable approach for addressing their water usage. The installation of these water-using features limits the amount of high-water-using plants that can be installed in the landscape of these homes.

Ornamental Water Features (Section 4.1.5)

- a. Some commenters requested that WaterSense provide examples of beneficial uses required by the criterion.

Response: WaterSense has provided additional information on ornamental water features including their potential benefits in the *Resource Manual for Building WaterSense Labeled New Homes*. Some common examples are wildlife habitat, stormwater management techniques, and noise reduction.

- b. One commenter recommended the exclusion of these features, or additional requirements such as: features are only permitted where an offset area equal to 10 times the surface area of the feature is installed with low or no water use landscaping (not hardscape). This commenter recommended that beneficial use be defined as either providing designed stormwater retention or supporting defined aquatic or terrestrial fauna that live exclusively onsite. The commenter encouraged EPA to prohibit ornamental water features that have a permanent connection to a water supply and suggested that EPA set a maximum surface area on water features in addition to deducting such area from turf allowances.

Response: WaterSense will revisit the criteria for ornamental water features when considering revisions for future versions of the specification.

- c. One commenter requested that WaterSense ban auto fill valves.

Response: WaterSense is conducting research on the prevalence of auto fill valves in water features and will consider this recommendation in future revisions to the specification.

- d. One commenter requested that the criterion only apply to those features that use potable water and that features making exclusive use of graywater or rainwater should not be subject to the recirculation requirement. One commenter requested that water features using potable water should not be allowed in WaterSense labeled new homes. Some commenters requested that ornamental water features not be treated as turfgrass in the landscape design options.

Response: WaterSense is based on the premise that all water shall be used efficiently, regardless of its source and has chosen not to develop different criteria if different water sources are used. By treating water features in the same manner as pool and spas, all outdoor water-using features are addressed consistently in the specification. WaterSense is confident that treating these water features as a high-water-using plant, such as turfgrass, is a reasonable approach for addressing their water usage. The installation of these water-using features limits the amount of high-water-using plants that can be installed in the landscape of these homes.

General Comments on Irrigation System (Section 4.2)

- a. Some commenters requested that WaterSense remove the words “if installed” when referring to irrigation.

Response: WaterSense has revised the specification language on irrigation systems to “installed irrigation systems...” and stated in Section 2 of the specification that irrigation systems are not required.

- b. Multiple commenters expressed concern that WaterSense irrigation partners are no longer required for the installation and design of the irrigation system. Many commenters wanted the requirement to be reinstated while others recommended a phased in approach requiring WaterSense irrigation partners be used for the design and installation starting in one to two years from the release of the specification.

Response: WaterSense supports the use of its irrigation partners for all aspects of irrigation and has revised the specification to require the use of WaterSense irrigation partners to design or install *and* audit irrigation systems, when a sufficient number of these partners provide services to the area where the home is being constructed. However, WaterSense is still growing its irrigation partnership base, and while more than 800 irrigation partners are located across the country, not all areas have access to partners who design, install, and/or audit systems. Therefore, if there are an insufficient number of available irrigation partners with the proper certifications, homebuilders may obtain a waiver from the requirement(s) in the specification.

Appendix C of the specification describes the process that homebuilders must follow to determine if there are a sufficient number of irrigation partners in the area where the home is being built.

- c. One commenter recommended the requirement of a master shut-off valve.

Response: WaterSense conducted research on the inclusion of these devices and agrees that a master shut-off valve can provide additional benefits to an irrigation system in some, but not all, cases and has not added this requirement. Homebuilders and irrigation professionals are always able to install additional water-saving devices if they determine that the devices would be beneficial.

- d. Some commenters recommended the inclusion of automatic shut-off valves, installed upstream from each sprinkler head.

Response: WaterSense acknowledges that flow devices can be an additional feature to save water in the landscape and they may be installed by the homebuilder and irrigation professional if determined to be appropriate.

- e. Some commenters recommended the addition of a criterion on irrigation system water pressure due to the common occurrence of inaccurate operating pressure.

Response: WaterSense conducted additional research and agrees that pressure is an important aspect of efficient irrigation systems. EPA has added a criterion to the irrigation audit guidelines to address this concern. Auditors are instructed to verify that the station or zone pressure based upon emission device or product being used (spray head, rotor head, drip emitter) is within 10 percent of manufacturer-recommended operating pressure.

Post-Installation Audit (Section 4.2.1)

- a. One commenter requested that the specification reference the WaterSense inspection guidelines.

Response: WaterSense added language referencing the guidelines.

- b. Some commenters recommended that WaterSense partners who are certified as auditors conduct the post-installation audit, as opposed to any WaterSense partner.

Response: WaterSense agrees and has stated in Appendix C of the specification that partners who are certified designers or certified installers/maintenance professionals be used to meet the design and installation criteria and that partners who are certified auditors be used to audit the irrigation system.

- c. One commenter requested that WaterSense require all home inspectors involved in the program to become WaterSense irrigation partners in order to decrease the number of inspections and people involved in certifying the home.

Response: WaterSense has decided that all inspectors should be WaterSense irrigation partners as not all homes are installed with irrigation systems. By working within the existing green building program rating and inspection framework, WaterSense is minimizing the increased burden on builders who are seeking multiple labels and certifications for their homes (e.g., ENERGY STAR or LEED for Homes).

- d. One commenter asked if the requirement for using a WaterSense irrigation partner would be difficult to meet due to a scarcity of irrigation partners nationwide and recommended that those irrigation auditors certified by the Irrigation Association also be included as qualified individuals.

Response: WaterSense irrigation partners have taken additional steps to commit to water efficiency. Professionals who are certified auditors through WaterSense labeled programs are eligible to sign up as WaterSense partners and are encouraged to do so. To address the availability of WaterSense irrigation partners across the country, WaterSense will provide a waiver to homebuilders if there are an insufficient number of the appropriately-certified irrigation partners available to provide services to the area where the home is being constructed.

- e. Some commenters requested that a WaterSense irrigation partner who is uninvolved with the installation of the project be required to conduct the post-installation audit.

Response: WaterSense agrees that the partner conducting the post-installation audit should be separate from the installer and has recommended this practice in the irrigation audit guidelines. WaterSense expects its partners to act ethically when conducting the post-installation audit. EPA will conduct oversight of irrigation audits and can revoke partnerships if the audits are not conducted in accordance with the specification. WaterSense plans to revisit this issue in future versions of the specification.

- f. Some commenters recommended that all systems be visually inspected, but only a portion should undergo the distribution uniformity calculation.

Response: WaterSense has determined that the distribution uniformity must be calculated on all irrigation systems to ensure a minimum level of efficiency because of the site-specific variables affecting each irrigation system.

- g. One commenter recommended that the post-installation audit be conducted prior to backfill.

Response: WaterSense is providing flexibility to the WaterSense irrigation partner to identify the best time for conducting the post-irrigation audit.

Leaks (Section 4.2.2)

- a. One commenter recommended that in addition to no visible leaks, no movement should be detectable on a water meter when installed irrigation stations and indoor uses are turned off.

Response: WaterSense agrees with this recommendation and changed the specification to read, "There shall be no detectable leaks" and specified that a pressure loss test be conducted to determine if there are any leaks in the home, including in the irrigation system.

Runoff/Overspray (Section 4.2.3)

- a. Some commenters requested that WaterSense designate the minimum runtime operation during the verification of the absence of runoff or overspray.

Response: EPA's research indicates that establishing the time required to determine if there are runoff or overspray issues varies by soil type and landscape. Therefore, WaterSense has decided that minimum runtimes should be established by the WaterSense irrigation partner during the audit.

- b. One commenter requested clarification on the terms of runoff and overspray to consider situations in which a crown or side slope might be purposefully built into the hard surface specifically to direct water to a softscape area.

Response: The runoff/overspray criteria apply only to situations where runoff or overspray occur unintentionally.

- c. One commenter requested that some overspray and runoff be acceptable.

Response: While under certain operating conditions a small amount of runoff and overspray may occur, WaterSense expects the irrigation system to be designed, installed, and scheduled to avoid runoff and overspray during normal conditions.

Distribution Uniformity (Section 4.2.4)

- a. One commenter suggested changing the distribution uniformity lower quarter (DU_{LQ}) requirement to distribution uniformity lower half (DU_{LH}).

Response: WaterSense discussed the various methods of calculating distribution uniformity with irrigation industry professionals and learned that DU_{LQ} is currently the method used by most irrigation auditors. WaterSense strives to be consistent with industry practice and, therefore, did not move to DU_{LH} . If this becomes more widely used in the future, WaterSense will reevaluate this measurement.

- b. Many commenters expressed confusion about which areas of the landscape should be included in the DU_{LQ} measurement.

Response: WaterSense has clarified the specification by stating that DU_{LQ} shall be measured on the largest spray-irrigated area. While WaterSense recommends testing the uniformity of all zones, it is not included at this time. EPA has determined that the measurement from the largest spray-irrigated area should be representative of the system as a whole.

- c. Some commenters requested that the DU_{LQ} requirement of 70 percent be increased to 75 or 80 percent. One commenter requested that the DU_{LQ} requirement match the DU_{LQ} levels used in the WaterSense water budget tool. Other commenters requested lower DU_{LQ} values ranging from 55 percent to 65 percent.

Response: WaterSense reviewed the data and revised the DU_{LQ} requirement to 65 percent, measured on the largest spray-irrigated area. This change addresses concerns that 70 percent is difficult to achieve and also matches the distribution uniformity value for fixed spray irrigation in the WaterSense water budget tool. Current data show that existing systems average a DU_{LQ} of 53 percent¹. However, WaterSense agrees with some commenters that new irrigation systems can achieve a DU_{LQ} of 65% or greater. As system efficiencies improve, WaterSense will revisit this requirement.

- d. One commenter stated that the definition of DU_{LQ} is not consistent with the audit language.

Response: WaterSense revised the definition of DU_{LQ} to match language in the *Irrigation Audit Guidelines for WaterSense Labeled New Homes*.

Rainfall Shutoff Device (Section 4.2.5)

- a. One commenter inquired whether WaterSense would label rainfall shutoff devices and suggested adding language about specification development.

¹ Mecham, B. 2004. Northern Colorado Water Conservancy District. *A Summary Report of Performance Evaluations on Lawn Sprinkler Systems*.

Response: WaterSense is not currently developing a specification for this product category. If it does in the future, labeled products will be incorporated into the new home specification after appropriate notice, as planned for showerheads and controllers.

- b. One commenter recommended that the rain sensor have a water-resumption delay feature.

Response: The specification allows for a variety of technologies to be installed, and WaterSense is not specifying product features at this time.

- c. Some commenters recommended that soil moisture sensors be considered rainfall shutoff devices under this requirement.

Response: WaterSense has clarified language in criterion 4.2.5 to include soil moisture sensors.

Irrigation Controllers (Section 4.2.6)

- a. Many commenters recommended that EPA require the use of a weather-based or evapotranspiration-based controllers. Some commenters questioned many of the controller features listed in the specification.

Response: WaterSense recommends the installation of these products and will require WaterSense labeled weather-based controllers when available. The program is currently developing a specification for these products and expects labeled products to be available in 2010. At that time, the new home specification will be updated to require these products after an appropriate grace period. In lieu of labeled products, the requirements for irrigation controllers are based on a list of desired features developed by a working group consisting of irrigation industry and water utility professionals. This working group was formed during the WaterSense specification development period for weather- or sensor-based irrigation control technology.

WaterSense appreciates the comments on the controller features and requests that the commenters resubmit their recommendations during the public comment period for the draft specification for weather-based irrigation controllers.

Sprinkler Irrigation (Section 4.2.7)

- a. Some commenters recommended that WaterSense require no irrigation or drip irrigation on all planting beds.

Response: WaterSense has left the determination of whether irrigation is necessary to the builder and/or landscaper and has limited the use of sprinkler irrigation to turfgrass.

- b. One commenter recommended setting a maximum flow rate for sprinkler heads at 1 inch per hour.

Response: WaterSense will rely on the irrigation professional to choose the flow rate of the sprinkler heads and recommends that professionals follow industry-developed best management practices to guide system design and installation.

- c. One commenter recommended that only high-distribution uniformity spray heads be allowed in areas to maintain turfgrass. Another commenter requested that sprinkler heads have pressure regulation.

Response: WaterSense recommends the use of high-distribution uniformity spray heads and pressure regulation and discusses them in the *Resource Manual for Building WaterSense Labeled New Homes*. Although not specifying product type, WaterSense is confident that a performance requirement of a DU_{LQ} of 65 percent will encourage water-efficient spray heads.

- d. Multiple commenters requested changes to the pop-up height requirement of 4 inches. Some recommend the pop-up height requirement be removed. One commenter requested it be lowered to 3 inches. Another commenter requested a higher height on other plantings.

Response: WaterSense included a 4-inch minimum pop-up height to ensure that sprinkler heads clear grass to preserve the intended distribution uniformity. Because this is an important aspect of efficient irrigation, WaterSense has retained this requirement in the final specification.

- e. Some commenters requested that sprinkler irrigation be allowed on other plantings, not strictly limited to turfgrass areas.

Response: WaterSense has determined that microirrigation is more efficient than sprinkler irrigation in applying water to plantings other than turfgrass and has not revised the criterion. WaterSense supports microirrigation technologies and aims to increase market penetration of these systems.

Microirrigation (Section 4.2.8)

- a. Multiple commenters recommended an alternative definition for microirrigation, including a specified flow rate. Some commenters requested the exclusion of microspray devices, while others requested the inclusion of these devices. One commenter requested the addition of rotary spray nozzles as a choice to irrigate shrubs and beds.

Response: WaterSense set a maximum flow rate of 30 gallons per hour per emission device instead of specifying the types of microirrigation that are included or excluded in the definition. The new definition of microirrigation system is “the frequent application of small quantities of water on or below the soil surface as drops, tiny steams, or miniature spray through emitters or applicators placed along a water delivery line. Microirrigation encompasses a number of methods or concepts such as bubbler, drip, trickle, mist, or spray and subsurface irrigation. For purposes of this specification, microirrigation includes emission devices that have flow rates less than 30 gallons per hour (113.6 liters per hour).” This change is based on discussions with industry professionals and the American Society of Agricultural Engineers’ standard for the design and installation of microirrigation systems.

Schedule (Section 4.2.9)

- a. One commenter recommended that the irrigation schedule be divided into three schedules: initial grow-in, post-initial grow-in, and established landscape.

Response: WaterSense recognizes that additional schedules may be appropriate for some landscapes and encourages irrigation professionals to develop and leave these schedules with the homeowner. At a minimum, a schedule for grow-in period and a schedule for established landscapes that vary according to the seasons must be developed and supplied to the homeowner.

- b. Some commenters requested additional scheduling requirements. One commenter recommended that the schedule include application rates, projected run times, and projected reference evapotranspiration. Another commenter recommended the schedule be based on evapotranspiration.

Response: While these are good recommendations, WaterSense is allowing the irrigation professional to choose how to develop and document the watering schedule. WaterSense recommends that the professional use the Irrigation Association's methodology described in *Landscape Irrigation Scheduling and Water Management (2005)*.

- c. One commenter recommended that schedules be developed to comply with all local codes, provisions, or utility service rules designed to prevent water waste.

Response: WaterSense agrees with the commenter and included this language in the final specification.

- d. One commenter expressed concern that homeowners may fail to change the watering schedule from the grow-in period to the established period.

Response: WaterSense is requiring that the homeowner manual include information regarding this change in watering schedules. WaterSense believes that with homeowner education and consumer outreach activities, more people will understand the importance of using the correct irrigation schedule.

Additional Outdoor Criteria Not Currently in the Specification

- a. Some commenters requested the inclusion or promotion of alternative sources for irrigation water.

Response: WaterSense agrees that in many circumstances alternative water sources are a preferred alternative to potable water. However, laws regarding the sources vary by locality, and due to the national scope of WaterSense, alternative sources are not required. WaterSense discusses the use of alternative water sources in the *Resource Manual for Building WaterSense Labeled New Homes*.

- b. Some commenters requested the addition of criteria pertaining to soil conditions including site preparation and soil amendments.

Response: WaterSense agrees that soils must be properly prepared for plants to thrive. Due to the site-specific nature of soils and necessary amendments to enhance their capabilities, WaterSense has not developed national soil criteria in this specification. WaterSense discusses the importance of site preparation and soil health as a component of a water-efficient landscape in the *Resource Manual for Building WaterSense Labeled New Homes*. WaterSense will continue researching this topic for inclusion in future versions of the specification.

- c. Some commenters requested the addition of criteria pertaining to stormwater management.

Response: WaterSense has worked closely with EPA's stormwater management staff to identify appropriate measures for addressing stormwater runoff and management.

IV. Comments on Homeowner Education Criteria

- a. Many commenters supported the homeowner education criteria in the specification. One commenter recommended that EPA include additional information on checking for leaks, checking the water heater temperature, and checking pipe insulation. A different commenter recommended that EPA develop a template for builders while another recommended that EPA require builders to supply the homeowner with the manufacturer manuals for the products in their home.

Response: WaterSense agrees with these commenters and has expanded the list of areas that should be checked for leaks in the inspector guidance, has required the builders to supply the homeowner with appropriate manufacturer manuals, and has developed a homeowner manual template for builders that partner with WaterSense.

- b. One commenter recommended that EPA provide the homeowner with a list of acceptable landscape and irrigation options as well a list of water-saving appliances to better ensure that the homeowner maintains the water efficiency of the home. Another commenter questioned whether homeowners will be allowed to install additional turfgrass after they move into the home.

Response: WaterSense does require builders to provide the homeowner with an operating and maintenance manual for all water-using equipment or controls in the house and the yard, including all relevant WaterSense materials on indoor and outdoor water use. If clothes washers or dishwashers are not provided, the homebuilder must provide general information about water-efficient appliances.

WaterSense labeled new homes are required to meet the criteria in the specification at the time that the home is built and before homeowner occupancy. Through the homeowner education manual and additional outreach and education activities, WaterSense hopes that the homeowners will make water-efficient choices when modifying their homes.

- c. One commenter recommended that EPA develop an educational section for real estate agents since they are instrumental in selling and promoting new homes.

Response: WaterSense intends to conduct outreach to real estate agents to educate them about the benefits of WaterSense labeled new homes. However, this manual is designed for the education of homeowners.

- d. One commenter recommended that EPA specify that the record drawing of the irrigation system include an itemized list of irrigation components if they are not included in the manufacturer's manual associated with the irrigation system.

Response: WaterSense agrees with the commenter and has required that the builder provide the homeowner with an itemized list of irrigation components if an irrigation system is installed.