EPA WaterSense[SM]

Comments on the May 2009 Revised Draft Specification for Water-Efficient Single-Family New Homes

July 30, 2009

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Commenter: Michael Cudahy
Affiliation: Codes and Training, PPFA
Comment Date: May 12, 2009

Topic: Hot Water Distribution System Design

Comment: The following table can be used by designers to assist them in determination of hot water line volumes and in selecting an optimal layout as required in section 3.3, "Hot Water Delivery System".

Rationale: A tool in the appendix will assist designers to conserve water and energy and is a good addition to the document.

Suggested Change (or Language): add the following table;

TABLE 3.3

Volume of Water Distribution Tubing Materials

Ounces of water per foot length of hot water tubing							
Nominal Size (inch)	**Copper M**	**Copper L**	**Copper K**	**CPVC CTS SDR 11**	**CPVC SCH 40**	**PEX-AL-PEX ASTM F 1281**	**PEX CTS SDR 9**
3/8"	1.06	0.97	0.84	NA	1.17	0.63	0.64
1/2"	1.69	1.55	1.45	1.25	1.89	1.31	1.18
3/4"	3.43	3.22	2.90	2.67	3.38	3.39	2.35
1"	5.81	5.49	5.17	4.43	5.53	5.56	3.91
1 1/4	8.70	8.36	8.09	6.61	9.66	8.49	5.81
1 1/2	12.18	11.83	11.45	9.22	13.20	13.88	8.09
2"	21.08	20.58	20.04	15.79	21.88	21.48	13.86

Conversions: **1 gallon = 128 ounces**
1 ounce = 0.00781 gallons
0.6 gallons = 76.8 ounces

Thank you for listening and changing the proposal to a better arrangement which includes water features as well.

Commenter: Maeneen Klein
Affiliation: Water Conservation Manager, Charlotte Mecklenburg Utilities
Comment Date: May 12, 2009

I strongly endorse your efforts to establish Water Sense minimum standards of design, construction and outfitting. Low flow, high efficiency devices such as toilets and shower heads can have significant impacts on reducing water waste in the home. Excess water use to flush toilets and operate showers is the number one target for water conservation efforts in our communities. Our Low flow shower head swap program in Charlotte has produced dramatic savings. We only use Water Sense certified shower heads in our program.

Landscape water use is highly impactful, especially in the spring and summer and should be minimized where possible. The most helpful and reliable tools for this purpose are smart controllers. Any and all attempts to quantify and certify smart controllers will be welcome to the conservation community. Our utility is currently initiating a study of smart controller performance on urban landscapes and local parklands.

These efforts and other similar attempts to quantify water savings with efficient technologies should be funded with stimulus money or green technology funding sources.

Commenter: Steve Williams
Affiliation: Rainwater and Stormwater Management
Comment Date: May 12, 2009

Topic: Outdoor Criteria – Earthworks

Comment: I believe that one area totally left off of the discussion is the topography of the land. I find most urban landscapes having the impervious areas, side walks and drives to be below the landscaping, allowing rain or irrigation to drain off and be lost. By incorporating rain garden type features, basins and berms, the water can be used more efficiently even in more humid climates. Of course they should be monitored.

Rationale: Rainwater Harvesting for Drylands and Beyond Vol. II by Brad Lancaster

Topic: Outdoor Criteria – Design, Installation, and Auditing of Irrigation Systems

Comment: This is ridiculous. If someone wants to use the label and be certified, they need to get the training. Conservation or BEING GREEN usually costs more upfront. If you are to lazy or cheap to take the class or get certified too bad

Rationale: Many builders are just out to make a buck

Topic: Outdoor Criteria - Rainwater Harvesting

Comment: This needs to be put into irrigation some how. It makes WATER SENSE Rationale: There is no reason that new construction cannot require Rainwater harvesting for irrigation. It reduces stormwater runoff and is a better source of water for plants then municipal water or well water.

Topic: Outdoor Criteria – Ornamental Water Features

Comment: Eliminate the deduction for pools, spas and ornamental water features.

Rationale: The lose water from evaporation, allow a credit if in the shade. They produce no benefit except pleasure. Allow if supplemented by rainwater to be deducted

Suggested Change (or Language): The water surface area shall not be deducted from the turfgrass allowance under Landscape Design Option 1 and have its own evaporation factor.

Commenter: Trent Ryan
Affiliation: President of Turffalo Brand Turfgrass and Grower Committee Representative for Texas Nursery and Landscape Association
Comment Date: May 12, 2009

Attached is my comment sheet for the Revised Draft Water-Efficient Single-Family New Home Specification.

I am very glad to see the landscape design criteria section – as the lawn will influence the water usage of the home much more than all of the other water consuming features of the home combined. Because of this relative importance, it is also important for this section to be as meaningful as possible. Therefore, it is critical to not only recognize that different turfgrasses will have different levels of water usage, but also clearly define any restrictions based upon this reality. As the draft now stands, with one option far too restrictive and a second option that is poorly constructed, it is certain to cause confusion.

Topic: Revised Draft Water-Efficient Single-Family New Home Specification – Section 4.1.1.1 Landscape Design Option 1

Comment: It is not right to limit turfgrass to 40% of the landscapable area without defining the water usage of the grass.

Rationale: Different varieties of turfgrass may use as much as 10 inches of water per month or as little as 2 inches per month. So any option that does not take that into account should not limit the area that turfgrasses should cover.

Suggested Change (or Language): Allow the percentage of landscapable area covered by grass to increase based on the monthly water usage of that grass and provide a list of grasses with their associated water usage.

Topic: Revised Draft Water-Efficient Single-Family New Home Specification – Section 4.1.1.2 Landscape Design Option 2

Comment: The water budget tool is not user-friendly and I was not able to even find a tool for calculating the evapotranspiration – which is critical.

Rationale: I'm usually pretty good with spreadsheet since we use them for budgeting and calculating quotes, but I found this one so awkward to use that I finally gave-up.

Suggested Change (or Language): Any tool should be simple, with easily determinable inputs, all information readily available in a clear/concise format, and does not require switching between pages of a spreadsheet. For example: enter the zip code for the project and have the tool calculate the ET and avg. monthly rainfall automatically.

Topic: Revised Draft Water-Efficient Single-Family New Home Specification – Section 4.1.2 Turfgrass

Comment: It does not make sense to create a blanket rule for all turfgrass, such as limiting strips to 4 feet wide, without taking the water usage of different grasses into consideration.

Rationale: Different varieties of turfgrass may use as much as 10 inches of water per month or as little as 2 inches per month. So any option that does not take that into account should not limit the area that turfgrass should cover.

Suggested Change (or Language): Allow the minimum width of the grass strip to decrease along with the monthly water usage of the grass selected.

Commenter: Jim Davis, RLA/CID
Affiliation: Midwest Specification Manager, The Toro Company
Comment Date: May 12, 2009

Please consider incorporating the following comments into the "Revised Draft for the Irrigation Audit Guidelines for WaterSense Labeled New Homes":

- Paragraph B; third bullet-point: "The rain-sensor shall also have a water-resumption delay feature that allows for longer time-periods between sensor dry-out and resumption of normally scheduled operations."
- Paragraph B; fourth bullet-point (Irrigation controllers): "The controller shall be weather, or ET-based, deriving it's data from one of three sources: localized N.O.A.A. weather-station network, on-site weather-stations, or on-site soil-moisture sensors."
- Paragraph B; sixth bullet-point (sprinklers & nozzles): "… and matched precipitation rate nozzles, with rates not exceeding 1" per hour."

Commenter: Kalen Jones
Affiliation: IA CID, WaterSense partner
Comment Date: May 12, 2009

Topic: Revised Draft Water-Efficient Single-Family New Home Specification 4.2.7, sprinkler irrigation

Comment: Prohibition on sprinklers for non-turf grass irrigation, while a step in the right direction, is not specific enough to achieve water conservation to justify the irrigation design restriction.

Rationale: One alternative, microirrigation, may or may not provide greater efficiency than sprays. As the draft water budget tool, and other industry standards indicate, micro-sprays are equivalent to rotors/stream sprays in DU. My personal experience with microsprays is that they require much more maintenance than rotors/sprays to maintain proper functioning, and hence, efficiency, and their small droplet size renders them much more sensitive to wind. Non-turfgrass plantings where sprinklers may be desired include perennial cover crop plantings in home orchards, and shallow substrate green roofs.

Suggested Change (or Language): "4.1.1.1 Option 1 –Turfgrass and spray irrigation shall not exceed 40 percent of the landscapable area." This provides the designer and/or owner the option of using the permitted spray irrigation as they see fit, w/o limiting them to turfgrass. **AND** 4.2.7 Sprinkler irrigation ~~–Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass.~~ Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles. Pressure regulation shall be provided, if needed, so that sprinklers operate within manufacture recommended pressure range.

Commenter: Ike Casey
Affiliation: Executive Vice President, PHCC – National Association
Comment Date: May 12, 2009

WaterSense and EPA have ignored all efforts to include some mention of using professional installers of water efficient products on indoor plumbing. This is unacceptable. You can have handy men and ill trained workers installing water efficient products who do not understand the overall plumbing system and end up with a mess. PHCC will not sit back and let this specification stand as it is. Suggested wording was submitted early on in this process.

Commenter: Bill Klaproth
Affiliation: Glentronics, Inc.
Comment Date: May 13, 2009

Topic: Water-Powered Sump Pumps (3.0 INDOOR WATER-EFFICIENCY CRITERIA)

Comment: The installation of a water-powered sump pump is not addressed in the revised edition of the Water-Efficient Single Family New Home Specification – although it should be included.

As you note "The intent of this specification is to reduce indoor and outdoor water usage in new residential homes, thereby lowering consumer utility bills and encouraging water and wastewater infrastructure savings."

That's why I'm alerting you to this plumbing product that wastes <u>millions</u> of gallons of <u>fresh drinking water</u> every year – water-powered sump pumps.

As I understand it, The WaterSense partnership with the EPA exists to help Americans save water and save the environment. That's why I wanted to make you aware of these wasteful pumps, and I hope you can language into the new home specification BANNING the installation of water-powered sump pumps.

Rationale: Here's how it works: During rainstorms, groundwater beneath people's basements builds up, and is funneled into basins called "sump pits." From there, a sump pump, pumps this dirty groundwater outside the house. The problem occurs when the power goes out and the primary sump pump (that's plugged into the wall) no longer works. That's when people turn to their water- powered sump pump to get the rising water out of their sump pit before it overflows – flooding and potentially creating heavy damage to a homeowner's basement.

Water-powered sump pumps connect directly to the fresh drinking water supply line of a house, or in some circumstances, homeowners connect the pump with a rubber garden hose to their kitchen faucet. These pumps operate by taking the energy in municipal-supplied water at full pressure, run through a venturi device, positioned on the bottom of the sump pit in a basement. When the pump is activated, approximately 600 gallons of fresh drinking water per hour is released in the sump pit. Most of these models then pull up 1 gallon of waste water, for each gallon of fresh water used, and deposit the water outside, right down the sewer.

Depending on how often a *water-powered sump pump is activated to pump rainwater out of a basement sump pit, it can waste between 10,000 and 32,000 gallons of our precious fresh drinking water per year!*

There are no official records on how many of these water-powered pumps are in operation in the United States, estimates range from 20,000 to 100,000 units. If we split the difference and say 60,000, and on average each one wastes 15,000 gallons per year, that's 90 million gallons of water wasted: 90 million gallons!

The EPA says that the average person must consume 2.5 quartz of water per day to maintain health, which equals 228 gallons per year. If you take 90 million gallons of water wasted, divided by 228, that equals 394,736 people. That's enough fresh drinking water to supply Minneapolis, MN with clean drinking water every year!!

And you know, we're in a water crisis, someone has to in act language to ban the installation of these wasteful pumps.

Suggested change (or language): Under section 3.8 Other Equipment: 3.8.? Water-Powered Sump Pumps – water-powered sump pumps or any other device that taps into the home potable water source, to pump out a basement sump pit, is prohibited from installation. A suitable battery powered backup should be considered as an alternative.

Commenter: DeVille Hilton Hubbard
Affiliation: Landscape and Irrigation Contractor, North Texas
Comment Date: May 16, 2009

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment: The requirement of 40 percent is not considerate of the turfgrass type.

Rationale: Option 2 is flexible to turf type. Low water demand trufgrass requires less water than shrubs or groundcover and in most areas can be turned off in the summer months. Proper water scheduling saves more water than properly designed landscapes that are overwatered.

Suggested Change (or Language): Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area for high water demand grass, 70 percent of the landscapable area for medium water demand grass or 90 present for low water demand grass.

Topic: 4.1.2 Turfgrass- Turfgrass shall not be installed in strips less than 4 feet wide.

Comment: Drip irrigation works fine in areas less than 4 feet wide. I believe developers will increase these areas to more than 4 feet and plant turf . The 4 foot wording allows shrubs and groundcover to be planted in these areas. 4.1.2 will not reduce water consumption or prevent runoff.

Rationale: Trying to regulate a design component is not as easy as regulating the desired results. Stating that there can be no runoff in areas under 4 feet wide achieves your goal.

Suggested Change (or Language): All landscaped areas in strips less than 4 feet wide must be irrigated with drip irrigation.

Topic: 4.2 Irrigation System – Irrigation systems, if installed, shall meet the following criteria:

Comment: The wording is poorly composed.

Rationale: The current wording inserts an opposing comment into the sentence. If the irrigation system is not installed of course it will not need to meet the following criteria.

Suggested Change (or Language): All installed irrigation systems shall meet the following criteria;

Topic: 4.2.4 Distribution Uniformity – irrigation systems shall achieve a low quarter distribution (DUlq) of 70 percent or greater. Distribution uniformity will be measured during the post – installation audit

Comment: This criteria as stated will eliminate the use of the spray nozzle in the platform of riser or spray head.

Rationale: The (DUlq) computes the lowest (DU) percentage. The spray nozzles used in these pop-up heads and risers are reliable and effective but generally will not score a 70% under a (DUlq) audit. An irrigation system with a very high (DU) that is improperly scheduled looks great on paper but will not conserve water.

Suggested Change (or Language): Distribution Uniformity – irrigation system shall achieve a low quarter distribution (DUlq) of 55 percent or grater. Distribution uniformity will be measured during the post – installation audit.

Topic: 2.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigaion system , shall not be used to water plantings other than the maintained trufgrass. Sprinkler heads shall have a 4- inch or greater pop-up height and matched precipitation nozzles.

Comment: The wording is poorly composed.

Rationale: The wording is poorly composed.

Suggested Change (or Language): Sprinkler irrigation heads must have a pop- up height of 4 inches or greater using matched precipitation nozzles and can only be used in turfgrass applications. Microirrigation or drip applications must be used in all other applications. Fire barrier and dust control system are exempt from all restrictions.

Topic: 4.2.9 Schedule – Two water schedules, developed by the WaterSense irrigation partner as part of the post –installation audit shall be posted at the controller. One schedule shall be designed to address the initial grow in phase of the landscape and the second schedule shall be designed to address on established landscape. Both schedules shall be seasonal in nature.

Comment: All irrigation schedules need to be based on evapotranspriation factors.

Rationale: If you do not base the irrigation schedule on evapotrranspriation factors there is no foundation for the math.

Suggested Change (or Language): 4.2.9 Schedule – Two water schedules, developed by the WaterSense irrigation partner as part of the post –installation audit shall be posted at the controller. One schedule shall be designed to address the initial grow in phase of the landscape and the second schedule shall be designed to address on established landscape. Both schedules shall be seasonal in nature and be based on local evapotransporiation factors for plants and historical or real-time rainfall.

Topic: Revised Draft water – Efficient Single Family New Home Specification : Water Budget Tool

Comment: Overall this tool is dramatically better. Consider lowering the landscape coefficient (Kl) for Turfgrass – Low water Requirement at .6 and Turfgrass – Medium water requirement at .7.

Rationale: In the southern states we use (Kl) .6 for Bermuda grass which is a medium water requirement grass.

Suggested Change (or Language): Change the (Kl) for Turfgrass- Low water requirement to .5 and Turfgrass – Medium water requirement to .6

Commenter: Gail Donaldson
Affiliation: Water Conservation Manager, City of Allen
Comment Date: May 21, 2009

On 4.2.4 portion of the new homes draft, it states an irrigation system must meet a Lower Quarter DU of 70%. This will mean no home will be allowed to use spray heads on their system, because NO spray head system can meet this qualification. I have attached a report/paper from Brent Mecham on the facts that spray systems are usually in the 50-60% range, even when installation is exact. If you want a minimum of 70%, then you will limit irrigation to drip; rotors; or MP rotators to achieve this. Just need to know that spray heads cannot achieve this no matter what you do.

Commenter: Jason Cohen
Affiliation: No affiliation
Comments offered as an interested public member and government consultant who is a Plumbing/Process Piping Engineer specializing in Biocontainment laboratory, healthcare, and public-health-sensitive facilities along with plumbing systems in general. I can be reached at 301-908-5163 if beneficial for any clarifications.
Comment Date: May 21, 2009

Topic: Water Pressure, Item 3.2

Comment: What is the point of specifying a maximum static service pressure? This in itself has no viable bearing on water efficiency.

Rationale: What matters is the service pressure at the outlet; therefore the requirement should be something more along the lines of a maximum acceptable residual pressure at any outlet (rather than at a service entrance). This would also promote a better correlation with other Water Sense requirements. 60 PSIG is certainly reasonable for residential use following the 3-story limitation of the scope of this document. In reality, one could argue that if the listing of a pressure-compensating device ensured the maximum flow rate at 80 PSIG (or whatever) were was within the intent of this document; then there would be no need for this provision at all (unless the attempt here is to reduce loss due to leakage…in which case this is the wrong approach).

Suggested Change (or Language): "The maximum residual water pressure at any plumbing fixture outlet shall not exceed 60 PSIG".

Topic: 0.6 Gallons Hot water in Piping, Item 3.3

Comment: Maximum 0.6 gallons of hot water in the piping is very poor criteria and can have significant limitations on very large residences where pipe diameters and runs could exceed the criteria.

Rationale: This premise appears to be based upon an assumption of water loss while waiting for hot water at a user outlet. Therefore, a much better solution to achieve the appropriate result would be to specify a maximum time interval. I would suggest 30 seconds be the maximum limitation for waiting for hot water. This combined with the low flow outlets achieves essentially the same thing, but in a much more appropriate manner; and leaves flexibility of methods of achieving this to the architects, engineers, or plumbers who may be designing the system. (It is important to remember that establishing the desired performance (rather than the specific and only accepted means to achieve that goal are hallmarks of a well-written technical standard. If a specific methodology is to be mandated, it is important to also allow for altering means of meeting the intent. In this case, there is not problem in having more than 0.6 gallons of water in a pipe…the pipe is merely an extension of the water heater tank (albeit unfired). The problem (or concern) is that water being wasted (and presumably the associated waste of energy…which in turn likely required water to produce). With regards to approaches to achieve this result, it should not be permitted to purge hot water into cold water distribution systems. Such an approach can result in delays to achieve desired cold water at other outlets (thus negating the benefit) and can also be undesirable from the standpoint of bacterial colonization in distribution systems that are not maintained "cold" or "hot", respectively.

Suggested Change (or Language): "Hot water distributions systems shall be designed so as to limit the time delay required to achieve hot water to at any use outlet to a maximum of 30 seconds without requiring usage of other hot water outlets to achieve this criteria. Hot water shall not be purged from the hot water piping system into the cold water system to achieve this requirement".

Topic: Water Sense High Efficiency Toilets, Item 3.4

Comment: Disagree with the blanket requirement; it does not allow for alternative approaches that can also net the desired water savings but may otherwise be preferred.

Rationale: If a home is utilizing water reclamation for toilet flushing, then there is really no reason to preclude that home from using water closets of conventional 1.6 GPF, (or even 3.5 gpf for that matter). Conceivably, large developments could eventually utilize gray water distribution systems for flushing and other purposes; though private systems are certainly feasible in some applications.

Suggested Change (or Language): "Water Sense high efficiency toilets are required, except that conventional water closets may be utilized where flushing water is entirely obtained from approved reclaimed sources, such as gray water systems".

Topic: Item 3.6 Shower/Body Sprays maximum 2.5 GPM

Comment: The limitation should allow for exclusion where the body sprays utilize a recirculating design

Rationale: A recirculating system is basically a vertical whirlpool tub. The quantity of water used would only be that in the reservoir. Unless EPA intends to prohibit the use of tubs, there is no reason to preclude the use of body sprays that can do so without wasting excessive water to drain. There is no doubt the use of such a device would utilize more water than a conventional shower (discounting time parameters); however the issue appears to extend beyond the scope presented. If a criteria was established for acceptable volume in a tub (and this needs to account for factors such as number of users and specialty tubs that may be required for persons with disabilities or injuries); then it may be reasonable to attach such a limitation on body sprays as a whole. Otherwise, the suggestion below is recommended:

Suggested Change (or Language): "Body-sprays which obtain their water supply such that not more than 2.5 GPM of water is discharged to drain in a once-through manner per shower area are exempted from this requirement".

Topic: 2.5 GPM Shower Flow Limitations, Item 3.6

Comment: It is my opinion that the current 2.5 GPM flow rating as currently required by EPACT 1992 limitation is very reasonable, and should not be mandatorily reduced. There are better areas to achieve water savings with a far greater impact environmentally and with less consequence to users.

Rationale: Preference, public satisfaction. There are other less-obtrusive ways to achieve water savings (especially in industrial sectors).

Suggested Change (or Language): Maintain language just as proposed, but do not revise the shower flow rate below the 1992 EPACT requirements.

Topic: Clothes washers, Item 3.7

Comment: I would prefer to see exclusion to the water consumption limitation for a single "normal volume" water cycle that could be used for "heavy" applications; with a higher limit (such as an average of what conventional washer cycles of each type might more typically use.

Rationale: Have not been satisfied with the performance of two different high-end clothes washers. While this will undoubtedly affect anything, I'll enter a comment stating my own public dissatisfaction with (at least some) of the units available to date and question if the water usage limitation has been appropriately set in consideration of acceptable performance levels. Some items (for example dog bedding) needs to be washed multiple times. Clothes rinsing has been especially poor. I would prefer more work be done on the standard and water usage parameter in cooperation with the product manufacturers and the public before establishing the standard, or alternatively allow a "higher volume" cycle that would utilize what has been historically an average heavy or normal cycle water usage for each clothes washer type.

Suggested Change (or Language): "Each washing machine may provide one "heavy-usage" cycle; which utilized a maximum water consumption of xxx gallon for front-load machines and xx gallons for top-load machines. This cycle shall be especially marked to indicate that the cycle is not "Water Sense" compliant".

Topic: Irrigation Systems, Item 4.1

Comment: The stated limitations should not apply if the irrigation system water supply is entirely from a reclaimed water source, whether that be permitted gray water, recovered storm water, etc.

Rationale: If the water usage is not "once-through"; the relevant savings and effect is not as this document appears to assume and should not prohibit alternative landscaping approaches.

Suggested Change (or Language): "These limitations do not apply if the irrigation water supply is entirely obtained from an approved reclaimed water source; such as permitted gray water plumbing systems, recovered rain water, or other approved sources".

Topic: Water Sense Urinals

Comment: Add alternatives to the 0.5 GPF flush urinal program; that can also be utilized as compliant with the Water Sense Program.

Rationale: The language mandating 0.5 GPF flush does not allow for alternative approaches that may in some cases be preferable yet offer comparable (or potentially better) water saving and sanitary performance.

Suggested Change (or Language): Add

a. "1.0 GPF urinals may be utilized where the flushing water source is from an approved gray water supply system".

b. "1.0 GPF urinals may be utilized where an automatic time-interval flush mechanism that limits the maximum number of flushes to a required programmed value for each occupied facility is provided, but no more than would be utilized if 0.5 GPF single use flush urinals were utilized. The maximum daily water consumption for time-interval based flushing shall not exceed 75 gallons per day per urinal".

Topic: General Water Sense/ EPA Water Saving Comment as Pertaining to Plumbing Fixture Water Usage

Comment: I did not see parameters for revising commercial water closet flushing standards or flow rates of faucets in commercial applications. Hopefully the current exemptions allowed under EPACT 1992 will be maintained and not removed; but I'll take the opportunity to offer a comment:

EPA should keep in mind that there are very limited applications where the deletion of such exemptions could be detrimental (for example the increased water flow rates necessary for hand washing in biocontainment labs, clearing secondary-trap water closets in biocontainment labs, hand washing in hospitals and for hand washing serving rest rooms and kitchens for food service preparation and healthcare providers) as such can potentially be attributed to causing a safety or health issue (cross contamination risks) in these special applications. The degree of flexibility left to the government regulators and design engineers for healthcare facilities, research laboratories, and perhaps a few other industries that is provided in the 1992 EPACT exemptions should be maintained as this is necessary for safety and public health; yet removal of such provisions would have an insignificant effect on the assumed intention of this document (to maximize water savings without adversely affecting public health and safety).

Commenter: Mark Peters
Affiliation: North Carolina Green Industry Council
Comment Date: May 26, 2009

Topic: General Response

Comment: We are surprised how poorly this draft document shows an understanding of the complexity of responsible water use for the managed landscape. It appears to be a "one size fits all "approach. Water use and needs are as varied as the sites themselves. Landscape architects, landscape contractors and other green industry professionals that work from the Caribbean to northern New England provide a different reality than is conveyed in this "water management" policy.

Topic: Water Budgets/Turf Limitation

Comment: Water budgets are good, but- based upon the calculation format proposed- not a lot of builders are going to participate, so… they will opt for …
Option 1- Turf Limitation. This is over-simplistic and flies in the face of a professional design and installation discretion. <u>In many cases turf grass is the most cost and environmentally effective way to protect water quality</u> on a wide range of sites. For example; the pastures of the world are a very important part of protecting natural water systems as are individual lawns in the mitigation of storm water runoff and prevention of soil erosion.

Topic: Overall Approach

Comment: The overall approach is not plant centric. Matching pipes to plants' water needs should be the goal. Efficient irrigation system design that provides for the initial establishment of the landscape and supplemental use of water during periods of environmental stress will protect the investment in landscape, help preserve the environment and reduce water use in the managed landscape.

Topic: Site Analysis

Comment: There is <u>no mention of site analysis and soil preparation</u>, a well recognized practice BMP that can result in water use reductions far in excess of the stated goal of 20%.

Topic: 4-1 Slope Section Goal

Comment: The 4-1 slope section goal is vague and confusing, especially as to appropriate plant type- including turf varieties. Many piedmont and most mountain sites naturally support turf grasses on slopes of 30% or more.

Topic: Sun/Shade Calculation and Design

Comment: There is <u>no mention</u> of sun/shade calculation and design, which has tremendous impact on ET rates in parts of the landscape.

Topic: Plant Maturation and Succession

Comment: There are no provisions for plant maturation and succession, which greatly changes water demand if properly designed and analyzed especially over time as the landscape establishes and matures.

Topic: Limits on Turf Areas

Comment: Water Wise design considers the intended use of the area. Placing limits on plant varieties, i.e. "turf" is arbitrary, and doesn't allow for responsible design, nor guarantee water use efficiency or reduction.

Topic: Use of California climate and ET data

Comment: It irresponsible to just "default" to California data, in the absence of other data. In the East we have been held hostage to this mentality for decades. Our weather, soils, climate, plants and people are different than California. Although California's, range of climates and microclimates is significant, they by no means represent the conditions that occur in others parts of the country. It is a huge error to use this approach.

Topic: Closing Comments

Comment: Bottom line here, is if this approach is too complicated, uses foreign data for standards, doesn't allow for professional judgment, and uses % as a surrogate for proper professional analysis and design, then- as a Federal initiative it will interfere with local, regional and/or state efforts at achieving similar goals. Much more knowledge exists to assist in formulating a water management policy than appears to have been used to prepare this draft.

Commenter: Maeneen Klein
Affiliation: Water Conservation Manager, Charlotte Mecklenburg Utilities
Comment Date: May 26, 2009

We fully support and encourage the actions of EPA to develop the water sense new home designation for water efficient devices and systems. Our utility has adopted the water sense standard and product list for our low flow shower head exchange program as well as the retrofit kits we distribute. Since the program's inception our single family households have reduced their monthly consumption by 30% (2003 – 2008).

Continued actions to create a sustainable living and building standard is a most appropriate activity for EPA and we support this effort.

Commenter: Emile Monette
Affiliation: No More Geysers
Comment Date: May 26, 2009

To Whom It May Concern:

New water conserving devices for sprinkler irrigation systems have come into the market since the draft specification was revised which bear consideration by the drafters.

Therefore, No More Geysers, LLC, respectfully submits the below proposed change to the subject specification:

[insert the following new subparagraph in section 4.0 at the designated location]

"4.2.7.1 Automatic shut-off valves – All sprinkler irrigation systems shall incorporate automatic shut-off valves, upstream from each sprinkler head, which stop the flow of water between the water supply line and the sprinkler head, when the head breaks away or the riser is broken."

The following products, among others, could be used to meet the requirement:

1. No More Geysers (http://www.nomoregeysers.com/www.nomoregeysers.com) – a sprinkler riser with an internal automatic shut-off valve
2. Sprinkler Guard (http://www.waterca.com/www.waterca.com) – a similar product to No More Geysers
3. Rain Bird 1800 PRS series heads (page 9 of the 2009 catalog)
4. Toro X-Flow heads (there are about 9 different head configurations available, page 15 of the 2009 catalog)

Commenter: Ken Hoffmann
Affiliation: Unknown
Comment Date: May 26, 2009

I find it difficult to understand how you can include any salt-based (sodium or potassium chloride) water softening system in you list of approved products as these systems are harmful to the environment and the health of their users. Please explain.

Commenter: Bob Hutslar
Affiliation: National Sales Manager, Plumbing and Heating, Laing Thermotech
Comment Date: May 26, 2009

I noticed in your draft that you are only approving “demand” hot water recirculation systems. This greatly limits the customers choices in selecting a hot water recirculation system, not to mention the additional cost.

A timer and temperature controlled hot water recirculation system can provide the same energy and water savings as a demand system plus they are much less expensive and provide instant hot water to all fixtures rather than just the fixture where the device is installed.
I suggest that side by side testing of the two types of systems be conducted to show that both types of systems can save water and energy.

Commenter: Paul Coburn
Affiliation: Permit Coordinator for D. R. Horton Homes, New Mexico Division
Comment Date: June 4, 2009

Topic: Definition of landscapable area

Comment: The provision, "Buildable lot area is the portion of a sit where construction can occur." , would seem to exclude the setback areas which are mandated by law in which no building can occur. In our city, the home often occupies all this area, and therefore the allowable sod area would be 40% of zero.

Suggested Change (or Language): Buildable area is that portion of the site not under roof, or covered by paving, excluding septic drain fields and easements.

Commenter: David Widelock
Affiliation: Landscape Architect, CA LA#3577
Comment Date: June 9, 2009

Topic: 4.2.7

Comment: This paragraph effectively mandates the use of drip or microirrigation for all shrub and groundcover areas. Drip is very fragile and I have designed many renovations where the drip system was broken and leaking and/or abandoned. for “emitter at each plant” technique, It does not deliver water to the drip line of mature plants unless renovated after installation (the location of emitters has to change and new ones added), which is almost never done. As for micro-irrigation, it is less uniform than conventional spray or rotor (not really MPR heads), and also more fragile.

Suggested Change (or Language): Eliminate this paragraph. Stick with performance standards.

Commenter: Shane Griffith
Affiliation: UW - Madison
Comment Date: June 9, 2009

To whom it concerns,

Though the intentions of the proposal, water savings, is an admiral goal, this is not the way to accomplish it. Turfgrass planted on a 4:1 slope accounts for a large portion of total turfgrass plantings. What benefit does this have? Planting of any other crop on this land will result in much more erosion leading to increase sediment loading in our sewers and eventually our lakes. As far as limiting the amount of landscaped area planted to grass, turfgrass competes well when compared to other 'native prairie plants' in terms of water use efficiency. If proper species are selected, dormancy can allow the crop to survive long periods of drought. What needs to be changed is not the amount of area planted to turfgrass but the quality of management of that area. When turf is properly mowed, fertilized, and irrigated, it simply provides the best possible landscape. It protects from sediment erosion, allows for water filtration and purification, provides area for sports and recreation, and is also visually appealing. Please listen to what university researchers, who are experts in the field of turfgrass care, have to say on this topic before making a potentially devastating decision to a very important industry across the nation.

Commenter: Jacob Johnson
Affiliation: Austin Water Utility Water Conservation
Comment Date: June 10, 2009

Topic: 4.1 Landscape

Comment: Landscapes use a vast amount of water. Changing the requirements to benefit homebuilders decreases the significance of the WaterSense label and allows water intensive landscapes to be planted in the backyard, no matter the size.

Rationale: Depending on the climate, landscapes can comprise over half of a city's daily water demand.

Suggested Change (or Language): The entire yard must be landscaped to meet the requirements.

Topic: 4.1.1 Landscape Design

Comment: Limit landscape design to option one.

Rationale: The science behind option two is still being discussed and is a more complex option than option one. Option one is easy to understand, easy to follow and will result in large water savings.

Suggested Change (or Language): Eliminate option two.

Topic: 4.1.6 Ornamental Water Features

Comment: There is no mention of auto fill valves which can hide leaks for long periods of time.

Rationale: Ornamental water features can be prone to leaks which may go undetected if an auto fill valve is operational.

Suggested Change (or Language): Ban auto fill valves on fountains.

Topic: 4.2.1 Post Installation Audit

Comment: The post installation irrigation audit does not contain information on the system's operating pressure. According to the requirements all homes should have a pressure regulator set to 60 psi or below and all fixture connections have to be made downstream of the PRV. Does this include irrigation cross connections?

Rationale: High pressure in an irrigation system wastes water through misting.

Suggested Change (or Language): Require hydraulic design plans to be submitted for irrigation systems including pressure loss charts and actual head pressure or a separate PRV to be installed on irrigation mainlines.

Commenter: Paul Diegnau
Affiliation: Oakdale, MN
Comment Date: June 10, 2009

To Whom It May Concern:

I understand that these regulations are being proposed to save water. Water is a precious resource…BUT who gives EPA the authority to MANDATE these regulations? How was the 40% number arrived at? How was the 60% ET replacement arrived at and how could that possibly work in all areas of the country with different soils and different turfgrass species?

This government control spree has got to stop! Let the people whose homes and landscape will be affected by such drastic measures VOTE on these regulations. If the people of the U.S. feel such regulation is worthy then it will pass.

I am so disappointed in the nanny-state nature of our current government!

Commenter: Gary Blocker
Affiliation: President - Minnesota Turf Association
Comment Date: June 10, 2009

Dear sirs,

With all of the proven benifits of quality turfgrass and all the scientific documentation that is available to prove these benifits, we feel that the proposed water sense regulations for single family homes landscapes is not applicable to cool season turf areas of the country, or warm season areas that have sustainable water resources. This should not be a blanket policy for the entire country, as we need as much turf as the local water supply can sustain to provide the landscape every chance to reduce carbon, clean and filter the air and soil, reduce wind and soil eroision and polution, and cool the atmosphere, (just to name a few of the many benifits of turfgrass).

We as turfgrass growers are in strong disagreement with the proposed policy. This policy will have a negative impact on many peoples lives and actually harm the environment in the process.

The turf industry along with breeders and researchers are developing more "water sense" varieties of turf that require less water along with the continued education efforts on water saving techniques and proper turf maintenance that reduce water usage. We realize that we all have to work on this issue together, but please be carefull as not to go too far that is 'detrimental' to the environment.

As far as banning turfgrass on slopes greater than 4:1, we have to disagree with that also as turfgrass has been proven time and time again to be the best natural instant eroision control product available, especially on slopes.

Please reconsider your thinking as a blanket policy and allow turfgrass to do its part in helping the environment where sustainable water is available.

Does it make sense to promote the mulch industry that requires logging and elimination of more carbon sequestors and oxygen producers (trees) and does not provide the environmental benefits of turf once applied to the landscape?

So again, please look at the facts that the turf industry and science provides before going ahead with this policy as currently drafted.

See Appendix C for a copy of the comments submitted.

Commenter: Sheryl Glasgow
Affiliation: Turf Master Industries, Inc.
Comment Date: June 10, 2009

The EPA WaterSense landscape specifications are a train wreck for the homeowners nationwide but especially for areas that are challenged with limited or reduced water supply. The problem is no allowances are made based on the location of the landscape — the same option applies to states with the least or most amount of rainfall or areas that have warm season or cool season cultivars.

As a green industry business, limiting turf grass to 40% of a homeowners landscape is denying the freedom we should have for our individual property ownership. Turf grass produces oxygen by absorbing carbon dioxide! You want to fight nature and yet you want lower carbon dioxide amounts in the atmosphere? Many homeowners in the midwest have acres of property they keep. It is VERY expensive to landscape and maintain areas with shrubs and trees so homeowners choose to install just rock. Turf is by far the easiest & cheapest to maintain and it contributes significantly to lowering temperatures as proven in measuring downtowns verse the suburbs.

The amount of turf in an individuals yard should be their decision!

Commenter: Doug Bennett, Conservation Manager
Affiliation: Southern Nevada Water Authority (SNWA)
Comment Date: June 10, 2009

June 12, 2009
Dear EPA WaterSense Program:

The Southern Nevada Water Authority wishes to submit the accompanying formal comments regarding the draft WaterSense New Home Specification of May 08, 2009.

The Authority believes that the proposed program requirements may produce homes that, on average, use about as much water as an unlabeled home. We are most concerned that the specification includes provisions and definitions that can be exploited to result in a landscape with unlimited turf and/or water features. Unless these loopholes are closed, the integrity of the label is wholly at the mercy of how participating builders choose to apply it.

Preliminary findings from an EPA-funded study on water use of new homes show landscape design is the single most critical factor in household water use in the west. In fact, in many study cities, turf intensive landscapes quickly consmed any savings derived from efficient fixtures and appliances.

Of vital importance is to revisit the definition of landscapable area such that it doesn't include driveways and parking. During the mid-1990's most southern Nevada jurisdications had a code that limited turf to 50 percent of the front yard. Because the definition of "front yard" included area occupied by driveways, sidewalks and patios, a builder who accurately interpreted the code could install 100 percent turf landscape in the plantable areas and still be in compliance. The WaterSense standard contains a similar loophole.

Furthermore, homes that are inspected with only front yard landscaping should be held to a turf limitation of 40 percent of the installed landscape area, not the entire landscapeable area. Since homebuyers are not beholden to WaterSense requirements, this change is necessary to assure labeled homes are not developed with all-turf landscapes.

Unless these critical issues are addressed, WaterSense risks labeling homes that do not produce meaningful savings, damaging the integrity of the brand and alienating the community of stakeholders who are helping to build the program.

If any of our comment require clarification, please call me at 702-862-3777 or email me at doug.bennett@snwa.com

Comment: Water Meters - There is no specification in this draft that homes served by a municipal water system be required to have water meters.

Rationale: Research has indicated that appropriate metering is vital to maximizing conservation of water.

Suggested Change (or Language): We recommend the following or similar language be added to a General Requirements section: “If connected to a municipal water system, the home must have a water meter, regardless of local utility billing structure. If the water provider does not have a standard for metering, the builder shall install a private meter using equipment and methods in accordance with the standards of the American Water Works Association (AWWA)."

Comment: Section 3.1 – The draft states that there should be "no visible leaks from any water-using fixtures, appliances, or equipment." While a logical first step, this is insufficient to assure there are no leaks at the property.

Rationale: As written, this ignores the potential that many leaks in new construction are hidden.

Suggested Change (or Language): We recommend this also state that "and there should be no evidence of a leak as revealed by movement of a leak indicator at the water meter."should EPA accept the above recommendation to require a water meter. If no meter is available, the plumbing should be checked for leaks by conducting a pressure loss test, whereby the technician attaches a pressure gauge to an outside faucet and then shuts off the municipal supply. A loss of pressure indicates an unseen leak.

Comment: Section 3.2 - The section states that the PRV shall be downstream of the water meter, further suggesting that a water meter requirement specification is needed. In many circumstances this may be unnecessarily burdensome.

Rationale: In general, it would seem that a PRV should only be required where (1) static pressure as determined by the local water purveyor is greater than 60 PSI or (2) static pressure is unknown.

Suggested Change (or Language): Only require a PRV in either of these cases.

Comment: Section 3.2 – The section includes this text: "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." The section does not seem to be related to water conservation.

Rationale: There are any number of necessary practices that need to be followed in piping and it seems strange to put in non-conservation related references to these. We do agree with the clarification that fire suppression systems need not have a PRV requirement.

Suggested Change (or Language): Consider deleting this language.

Comment: Section 3.3 – SNWA supports the exclusion of the requirement for all R4 insulation and can support the requirement that the piping hold no more than 0.6 gallons between the hot water source and any fixture since this seemingly includes both the piping and the manifold volumes. SNWA's program though currently has a limitation of 0.5 gallons.

Rationale: Requiring R4 may be unnecessarily burdensome with minimal gains. Additionally, the original insulation specification would have resulted in the need to do two separate site inspections (for different construction phases).

Suggested Change (or Language): Sustain the language.

Comment: Section 3.7.1 – Our understanding is that Energy Star is preparing to include a water use per cycle threshold that will have to be obtained in order for a machine to be considered Energy Star qualified in the near future. Since such a change should help to assure relatively water efficient machines are installed in WaterSense Homes, SNWA supports inclusion of such machines making a threshold.

Suggested Change (or Language): Sustain the language on the assumption that water efficiency will be within EnergyStar.

Comment: Section 3.8.2 – The specification needs to clarify that if an ion exchange technology is used it must be capable of being operated with potassium chloride in lieu of sodium chloride. Sodium chloride creates significant issues with trying to promote regional water conservation because it degrades the capability of communities to successfully reclaim wastewater for use in irrigation.

Rationale: Sodium chloride creates significant issues with trying to promote regional water conservation because it degrades the capability of communities to successfully reclaim wastewater for use in irrigation.

Suggested Change (or Language): Add “Any ion exchange type water softener installed must be capable of using potassium chloride.”

Comment: Section 3.8.3 – The term “efficiency rating” is not defined and may lead participants to believe an agency tests and rates such products. In general, the desired outcome from a water conservation perspective is unclear to most readers.

Rationale: Most readers are not technically specialized in this area.

Suggested Change (or Language): It may be useful to clarify that the system must yield, or produce 85 gallons of treated water for each 100 gallons input to the device.

Comment: Section 4.1 – The section is confusing as written and may pose significant risk to EPA’s efforts from potential loopholes.

Rationale: There is the requirement that at least the front yard be landscaped to meet the criteria below, but in the case of turf limitations it is unclear what this means. So, in the case of builder installed front yard landscaping only, is 40% of the front yard landscapeable area only allowed to be in turf at the time of installation? Or is this to mean the entire front yard can be in turf if the landscapeable area of the front yard is less than 40% of the site area?
EPA needs to add clarification to this section.
Some observers have suggested that the second paragraph of this section essentially compels the builder to landscape the *entire* yard when irrigation systems, pools, spas or water features exist in any portion of the yard (including the front yard). While it is unclear to SNWA if this is the intent of this section, at least in our region this would result in excludingbuilders from participation. This is because even with our requirements excluding front yard turfgrass, our xeric plantings still require irrigation in this climate. Since our builders do not generally install backyards they will decline to participate. The term “landscapeable area” is defined in a way that maximizes turf installation (also see comment below). For example, the concrete driveway is landscapeable area according to this specification, thus the fact that no grass is growing on the concrete “counts” in the turfgrass exclusion.

Suggested Change (or Language): The EPA should strive to author this section very carefully if it is to avoid 100% turf in the landscaped areas. This is critical because such a home is unlikely to save water vs. previously constructed homes and this would be disastrous for the program. SNWA's recommendation is that EPA simply have the specification state that turfgrass shall be limited to 40% of the builder installed landscaped area.

Comment: Section 4.1 – In the letter introducing the revised spec, EPA appears to explain that for landscapeable areas less than 1000 square feet, it would be difficult to assure sufficient functional turfgrass areas. With respect to the turf limitations SNWA agrees with this, but as written, such a site would seemingly be exempt from all the criteria.

Rationale: This is setting up EPA for some potentially wasteful, not to mention credibility damaging problems. For example, such a site could have a massive 800 square foot ornamental water feature and still be in this program. Such situations would demote the value of the program.

Suggested Change (or Language): The exemption should apply to stipulations covering the amount of turfgrass only. EPA should not exclude a builder from rest of the landscape provisions.

Comment: Section 4.1.1.1 – Option 1 in a quick read appears to limit the amount of turfgrass to 40% of the landscapable area. In practice this seems unlikely to occur.

Rationale: First, the language as written appears to allow up to 40% of the entire site landscapeable area to be developed to turf regardless of how much landscape is installed by the builder. In most circumstances, the builder will be able to put turf in the entire front yard. While in theory this then would limit the remaining portion of the site that could be developed to turfgrass, the residence will go to the owner after sale who may well then develop the entire backyard to turfgrass. The turf limitation will have been effectively defeated in most circumstances. Strangely, the only builders then that are effectively subject to the 40% limitation are builders who install the backyard before sale as well. This will create a duality in the program that EPA will be forced to explain. Worse, the EPA may well have to explain why only the custom-built homes are saving water ultimately. It is mathematically improbable that a new home with turf in large portions of the front and backyard can save water vs. historical homes because in most cases installation of such turf is associated with installation of in-ground automated systems that drive up consumption vs. older reference homes where typically a mix of handwatering and automated systems is found. It is vital the EPA resolve this dilemma before the launch of this specification.

Suggested Change (or Language): SNWA's recommendation is that EPA simply have the specification state that turfgrass shall be limited to 40% of the builder installed landscaped area.

Comment: Section 4.1.1.2 – The design standard effectively allows an entire site to be in turfgrass.

Rationale: In a manner similar to the issue identified above (for section 4.1.1.1), a builder can develop the entire front yard in turfgrass because they can claim that according to their water budget assumptions a significant portion of the non-landscaped portion of the site will be in low water use landscape. In this way LWRH will be lower than LWA on paper and the site passes the water requirement regardless of the fact that in practical actuality the developed site will not.

In short, the owner installing turfgrass in the backyard will defeat the specification in a manner already explained for Option 1. This is of course only the easiest way to defeat the specification; more subtle problems exist in terms of the lack of knowledge about the elements of KL.

Suggested Change (or Language): Unknown. SNWA has never favored Option 2 inclusion, but we recognize this is likely to occur in the spec. One possibility that would help resolve the specific issue above might be to allow Option 2 only when the entire property's landscapeable area is builder installed (though other technical issues would still exist).
EPA must strive to avoid developing Option 2 in a way that accidentally favors or permits more turfgrass than Option 1 or the goals of the program will be compromised.

Comment: Section 4.1.4 – While requiring mulch in the non-vegetated portions of the landscape should be a requirement, practically assuring 2-3 inches is difficult. Also, technically a builder putting down 3.5 inches would be out of compliance

Rationale: Assuring a certain depth throughout the mulch area is extremely difficult. Too deep mulch is almost never a problem.

Suggested Change (or Language): EPA should require mulch, but a depth requirement is probably too oppressive. If EPA is intent on this we suggest a minimum depth specification only.

Comment: Section 4.1.6 – It is unfortunate that the EPA has weakened its prohibition on ornamental water features.

Rationale: This will detract from the program.

Suggested Change (or Language): While the best option would be to reinstate the prohibition, since this seems unlikely we suggest the following additional requirements:
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).
"Beneficial use" is defined as either providing designed stormwater retention or those features that support defined aquatic or terrestrial fauna that live exclusively onsite.
Ornamental water features with a permanent connection to a water supply are prohibited.
EPA should set a maximum surface area on water features in addition to deducting such area from turf allowances. The idea of a home surrounded by large artificial water surfaces would be destructive to the brand not to mention inefficient.

Comment: Section 4.2.2 – In addition to no "visible leaks", when any given installed irrigation stations (and indoor uses) are off, no movement should be detectable on a meter.

Rationale: See Comments on Section 3.1

Suggested Change (or Language): See Comments on Section 3.1

Comment: Section 4.2.3 – The originally designed runtimes were already sufficiently comprehensive of the diversity of sites found nationally. The idea of having a WaterSense irrigation partner determine the unique site specific minimum operating requirements for the stations before runoff occurs is unprecedented and will no doubt lead to problems with the credibility of the specification being maintained.

Rationale: Without additional guidance, the natural tendency of the auditor will be to pass the site, damaging the credibility of the specification.

Suggested Change (or Language): The specification should define an operating duration. Overspray should be prohibited from leaving the property at all, not permissible for a certain amount of time (that again is undefined in the specification and audit guidelines). In many cases this may also be in conflict with local codes designed to prohibit water waste.

Comment: Section 4.2.4 – The distribution uniformity requirement is unclear. Generally the section and audit guidelines need improvement.

Rationale: As written in the specification it is unknown whether this refers to the average distribution uniformity of all irrigation stations or only those serving turf. According to the audit guidelines the only stations assessed are turf, but again this is unclear relative to the specification. Assuming the implication that the turfgrass areas must have DULQ = 70% is correct; this is a virtually unachievable requirement for customers with fixed spray sprinklers. It is unclear if turf stations with subsurface drip instead of sprays are subject to the requirement. The actual calculation of DULQ as alluded to in the spec is unclear (is it the average of all turf stations? Does each station need to achieve at least 70%? Etc.)

Suggested Change (or Language): Generally the section and audit guidelines need improvement. The DULQ selected needs to be revisited and possibly stratified for different types of irrigation systems. The exact calculation methodology needs defining.

Comment: Section 4.2.5 – SWAT just released its latest rainfall shutoff device specification for what may well be its final 30-day review. Is EPA willing to consider this for helping to define the device used in this section?

Rationale: This may provide vital additional information to EPA.

Suggested Change (or Language): Perhaps language similar to what is currently in italics pursuant to Section 4.2.6 should be used for now in this section.

Comment: Section 4.2.6 – SNWA supports the adaptation of the IA's SWAT climatological protocol to support this specification item.

Rationale: It is in EPA's interest to promote smart controllers to reduce the possibility that inefficient scheduling by residents will compromise outdoor water savings.

Comment: Sections 4.2.7 and 4.2.8 – The EPA seems to be going out of its way to make it clear that microsprays are acceptable even though these are relatively inefficient and prohibited by many utility incentive programs (including SNWA's). Bubblers also tend to water inefficiently but would appear to be permitted. EPA should put more effort into efficiency standards for microirrigation systems.

Rationale: These less efficient microirrigation components subtract from potential annual savings as found from the Xeriscape Conversion Study.

Suggested Change (or Language): Prohibit these components or better yet define drip systems more specifically as systems with a regulated pressure of 30 PSI or less with individual emitters of less than 20 GPH flow.

Comment: Section 4.2.9 – EPA should clarify that the watering schedule developed will comply with all local codes, provisions, or utility service rules designed to prevent water waste.

Rationale: It is counterproductive to author a schedule not in compliance with these.

Suggested Change (or Language): Add "the watering schedule developed will comply with all local codes, provisions, or utility service rules designed to prevent water waste."

Comment: Section 5.0 – If EPA continues on the path lay forth with regards to turf restrictions, a worksheet declaring the remaining square feet of area permissible for turfgrass installation should be included in homeowner education materials.

Rationale: The homeowner should know how much additional turfgrass (if any) they may install to effectively remain a WaterSense home.

Suggested Change (or Language): EPA would need to develop such a worksheet.

Comment: Section 7.0 – Comments on Definitions:
Evaporation Adjustment Factor – The new water budget approach using this factor is so weak the entire landscape can be turfgrass now.
Front yard – Defining the front yard as from the front of the house to the street or property line is unusual. In many if not most cases the front yard includes a portion of yard stretching to the sides of the house to a barrier, fence, or wall.
Landscapeable area – this should be the area capable of being landscaped (as implied by the word) and should not include concrete areas. Defining as the lot area excluding the area under roof practically permits a builder to count the driveway and other areas as "credit" to making the turf allowance.
Landscaped Area – this definition is missing and would allow the EPA the most flexibility in resolving the turf area deficiencies in the spec. The landscaped area is defined as the area of landscape installed by the builder.
Lower Quarter Distribution Uniformity (DULQ) –the existing definition does not seem to match up well with the audit.
Microirrigation system **–** EPA should consider a per emitter flow rate to define what this is.
Mulching material – While a proper mulch installation should be permeable and allow the free movement of oxygen into and out of the soil, the material itself should not have to be permeable and allow for movement of oxygen.
Softscape – These are not necessarily "natural" elements of a landscape, technically rocks may be a manufactured product.

Rationale: Described above.

Suggested Change (or Language): Revise definitions

Commenter: Steven Moore
Affiliation: Irrisoft, Inc.
Comment Date: June 17, 2009

As a surgical team works together to remove a tumor, some of the team focuses on the tumor while other members of the team focus on making sure the patient survives the procedure.

Urbanization is exchanging plants for roofs and paving. Take a minute and go to Google Earth and compare a native area to a new development to see how much vegetation was removed and replaced with roofs and pavement. Plants are essential to life. When solar energy reaches the earth and strikes pavement we get heat. But a plant absorbs the energy and uses it to exchange carbon dioxide into oxygen, the carbon becomes plant tissue. We eat and breathe because of plants. Plants are just as important to life as water.

The proposal by the EPA is focusing on reducing water use. There is no question that most landscapes are given more water than they need to remain healthy. To quote a common expression "plants don't waste water, people do." The approach to reduce the amount of plants in an attempt to reduce water use is like cutting off the head of a patient to remove a brain tumor. We need to assure efficient water use while protecting our landscapes. The EPA should actually be encouraging the use of more plants, because plants improve our environment.

The EPA has concluded landscapes receive twice the needed water. If this is true, then in theory we could double the amount of green space with efficient redistribution of water. Think of the positive impact this would have on our environment.

I have been in the Green Industry for over thirty years. Water is being wasted when property owners do not see the importance of efficient water management. The low bidder typically gets the job of installing and maintaining the irrigation system. There are property owners who have accepted the responsibility of seeing that an irrigation system is installed to the highest standards available and that systems are managed according to the best management methods to apply the right amount of water. The problem is these property owners are the exception not the norm.

A Water Sense Home should support as much plant life as possible. The irrigation system must be of the highest possible efficiency. The control process must react to the plant water needs. Raise the bar for the landscape industry, empower it to do its best to revegetate our urban spaces, eliminate water waste with high quality irrigation systems and effective management.

With this introduction I propose the following revisions to the proposed specification:

1) 4.1.1.1 - The EPA should not suggest turf grass be limited.
    a. Most overwatering is occurring on turf, but the turf is not the reason. With a good sprinkler system, the right soil preparation and good management water use can be reduced.
    b. Turf is one of the most drought tolerant plants. In severe drought, most turf will go dormant and recover when water is restored. Other plants will die in this scenario. Look to Mother Nature, the hills and plains can go months without water, then green up when it rains. http://www.hort.usu.edu/pdf/paul/DormancyWriteup.pdf
    c. Turf absorbs solar energy, absorbs carbon dioxide, delivers oxygen, cools the environment and reduces erosion.

d. There may be some areas in the country with very limited water supplies that need to restrict the amount of vegetation. These decisions should be administered locally not nationally.

2) 4.1.1.2 - Change 70% of evapotranspiration to 100%. - Allowing water use to only 70% of evapotranspiration is not reasonable and will result in a reduction of the amount of landscaped area.
   a. I have not seen any studies or demonstration projects that prove the 70% approach works.
   b. The EPA concurs with many reports that "more than 50 percent of commercial and residential irrigation water use goes to waste." This means that water use is 200% of ET. To go from 200% of ET to 70% of ET is extreme.
   c. The proposed formulas do not account for all potential system inefficiencies.
   d. 100% of ET is a more realistic target that does raise the bar for the industry.

3) 4.2.7 – Sprinklers should not be limited to turf only. - The soil is a reservoir that holds water for plant roots to draw from. When plants are massed together such as turf, ground cover or mass shrub plantings the root mass in the soil reservoir encompasses the entire area. Sprinkler irrigation is a very efficient way to water. We only need to look to agricultural watering practices to see examples of this. Too often water management does not follow the Managed Allowed Depletion method for water management, so sprinklers get blamed for over watering. Do not tie the hands of an irrigation designer and restrict the use of sprinklers to turf.

4) 4.2.4 - Distribution Uniformity – my comments here may surprise you. Requiring a 70% DU is too low. The irrigation industry has demonstrated a higher DU can be achieved. While many reports demonstrate that average system DU is about 50%, there are many that exceed 80%. Too many times property owners require a low cost system and have not been willing to pay for better systems. The irrigation industry has demonstrated it can do better and should be held to a higher standard. I would recommend the DU value be raised to 75% if not 80%.

5) Add to Specification - Pressure regulation in a sprinkler head ensures the sprinkler will operate at optimum pressures. Adding this as a requirement will reduce water waste.

6) Add to Specification - There is another topic that has not been addressed at all in the specification that should be part of the requirement. The soil is a reservoir from which plants draw water, air and nutrients. When plants are given the proper environment roots will grow deep. Deeper roots mean an increase in the capacity of the soil reservoir. A larger soil reservoir means watering frequency can be decreased and plants are more tolerant of stress. A Water Sense home specification should include specifications for soil enhancements to assure plant roots can reach their full potential.

When a team comes together and works together to solve a problem we can achieve the results we need as a nation. Please make sure you listen well to all sides, not just those most eloquent and persuasive. There must be a balance between efficient water use and making sure we protect life giving plants that improve our environment.

Commenter: Doug Soldat
Affiliation: Dept. of Soil Science, University of Wisconsin-Madison
Comment Date: June 19, 2009

Topic: No turfgrass on slopes of 4:1 or greater (section 4.1.3)

Comment: This is by far the most unfortunate aspect of the criteria. There is no better erosion control method than grass. By encouraging removal of grass from slopes, this initiative will greatly increase runoff and erosion. There is a substantial body of scientific work documenting this fact. There are only a few plants that could control soil erosion and runoff as well as turf. However, no alternatives to turfgrass are given for the slopes in the specification. In this case the specification allows (even encourages) mulch or brick pavers on slopes but prohibits turfgrass. Each of these alternatives (and several others not mentioned) would be a disaster with regard to storm water management and surface water quality, and conflict with state's efforts to comply with the Clean Water Act.

Rationale: Not allowing grass on slopes will increase runoff and soil erosion leading to decreased water quality.

Suggested Change (or Language): Remove the no turfgrass on slopes of 4:1 from the specification

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Topic: Limit turfgrass to 40% of landscapable area (section 4.1.1.1)

Comment: There is no scientific justification for limiting turfgrass to 40% of the landscapable area. Although this may make sense in arid portions of the country, it certainly does not make sense in many humid regions. Because the EPA has a history of using science to develop, the specification should stick with scientifically-sound practices. It is likely that this voluntary program will be mandated by smaller governmental units. I understand this process is already underway in one Massachusetts town.

Rationale: Science does not support the criteria to limit turfgrass to 40% of the landscapable area in all parts of the county.

Suggested Change (or Language): Remove the specification for 40% upper limit on turfgrass. Option 2 is science-based and more closely aligned with many university guidelines for landscape irrigation. Therefore, I suggest that EPA keep option #2 (ET-based irrigation, section 4.1.1.2), as the only option for complying with the WaterSense specifications.

Topic: One-size does not fit all for outdoor water conservation strategies (section 4.1)

Comment: The US is the most diverse country in the world with regard to ecological biomes. It is impossible to apply a one-size fits all approach to a water conservation effort. WaterSense specification should be regionalized for each of the 10 EPA regions. A committee of stakeholders should be assembled and charged with developing the most appropriate specifications for WaterSense homes in that particular region. This could be accomplished in a short amount of time, based on the large amount of interest the outdoor specification has attracted. It does not make sense to assume that the most effective outdoor water conservation techniques are the same in Hawaii as they are in Maine, or Alaska, or Florida. My current reading of the specifications detects a heavy bias towards a California-type climate.

Rationale: The US has a huge range of climates, and the best strategies for outdoor water conservation need to be regionalized to be effective. The EPA already has 10 autonomous regions, grouped by climate type. These regions should be utilized in the WaterSense specification

Suggested Change (or Language): "To be most effective, outdoor water use criteria are specific by region. Go to www.watersense.epa.gov to identify your region and download the outdoor water use specifications specific to your climate."

Commenter: Rachel Della Valle
Affiliation: Southern Energy Management
Comment Date: June 22, 2009

Topic: Homeowner Manual

Comment: Add some other low hanging fruit to the manual such as checking for leaks periodically.

Rationale: Leaks are one easy way to conserve water and energy. Homeowners can check for many potential leaks on their own with minimal equipment and knowledge.

Other low hanging fruit:
-Check your water heater temperature setting to make sure it is working most efficiently (change when on vacation or seasonally).
-Check insulation on pipes in unconditioned areas to make sure they're well insulated.

Suggested Change (or Language): Operating Manual will include operation/maintenance information on: Checking for leaks on a regular basis (insert time) in plumbing, fixtures, appliances throughout home and outside of home.

Topic: Hot Water Delivery System

Comment: All hot water distribution systems in a home shall comply with WaterSense and be tested.

Rationale: Some homes will have more than one hot water distribution system installed.

Suggested Change (or Language): All hot water distribution systems in a home shall store no more than 0.6 gallons (2.3 liters) of water in any piping/manifold between the hot water source and any hot water fixture.

Topic: Kitchen Faucets

Comment: All kitchen faucets in a home shall comply with WaterSense and be tested.

Rationale: Some homes will have more than one kitchen sink (IE: one kitchen with multiple sinks, or multiple kitchens with one sink each).

Suggested Change (or Language): All kitchen faucets shall comply with federal standards for maximum flow rate of 2.2 gallons per minute (gpm) @ 60 psi (8.3 liter per minute [lpm] @ 414 kPa).

Topic: WaterSense requirements to align with Energy Star Version 2011 (and vice versa)

Comment:
Energy Star v 2011 is proposing to require:
-Water piping in exterior walls to be insulated.
-Average flow-rate for all shower-heads shall be less than or equal to 2.0gpm.
-Hot water distribution system shall use demand pumping, manifold, or core layout.

WaterSense is proposing to require:

-Maximum flow rate for showerheads is 2.5gpm (per shower compartment).
-Water piping in exterior walls or any walls is not to be insulated.
-Hot water distribution system shall store no more than 0.6 gallons of water in any piping/manifold between the hot water source and any hot water fixture. Timer and temperature based recirculating systems shall not be used to meet the criteria.

Rationale: I believe that both EPA programs shall coexist and use the same criteria so that when builders are doing both programs it is a seamless process.

Suggested Change (or Language): I'm not sure which one is better/best/applicable, but I do believe where the programs overlap, that the requirements and wording be the same.

Commenter: Tim Dickson
Affiliation: Chemilizer Products, Inc
Comment Date: June 23, 2009

Allison Hogge

This letter is follow on from the Webinar of 6/22/09.

The Water Budget approach, option 2, allows for specification of low, medium or high water requirement turfgrass. However, the associated landscape coefficient (K_L) associated with those are still very high compared to other landscape choices.

There are technologies available today for treating landscape, including turf, which actually reduce the need of the plants for supplemental water. These treatments can be applied via an irrigation system or manual watering. Use of these technologies should be a viable option for builders who want to provide more choice in landscaping options that comply with the WaterSense requirements to their customers. Many homeowners choose turf grass not as the “easiest” or “cheapest” choice available but because the want the look and utility of turf. With treatments available that allow the K_L of turfgrass and all plants to be much lower than would be the case if untreated, this option should not be omitted from the Water Budget Tool. The tool should be able to recognize and accommodate this viable alternative for water conservation.

Proper use of this technology, can even allow reductions in the level of fertilizer and pesticides applied. While eliminating runoff and harmful chemicals is not under the scope of the WaterSense effort, it is of great interest to the EPA.

It is obvious that products that enable plants to make more efficient use of water will provide significant water conservation even when no permanent irrigation system is in place, or an irrigation system that does not meet the WaterSense criteria. Moreover, such a technology can be easily implemented in many existing homes dramatically increasing the conservation potential.

The landscape treatment technologies have the demonstrated potential to reduce water usage a further 25-50% after the gains achieved by the most sophisticated irrigation system. This is true for turfgrass, ground cover and trees/shrubs.

This concept could be called eco-irrigation or some other descriptive term for reference.

We urge that the technology and the products offering these types of benefits should be recognized and allowed for in the Water Budget Tool. This could be done with an entry for eco-irrigation that allows 25% reduction in the “normal” K_L of the landscape choices.

While there are a number of these products available, two that I would suggest you evaluate are Inoculaid and Hydretain. An internet search will turn up a lot of information on both. Neither are manufactured or sold by Chemilizer.

Commenter: Carl J. Smith, Jr.
Affiliation: Hwy 1 Sod
Comment Date: June 29, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's limitation on turf grass is unreasonable, and not supported by any scientific findings. My concern is specific to the 40 percent turf grass limitation, the ban on turf grass for steep slopes, and the single nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale: The idea of grouping the entire United States under this limitation on turf grass is absurd. Did anyone consider that in the Midwest, Minnesota especially, there is ample water supply. The benefit of turf grass on our environment is scientifically proven, unlike this concept of limiting turf grass to 40 percent regardless of the location of the building site.
With the given status of our economy, I am curious if anyone thought how this would affect turf farms who are already feeling the effects of a struggling economy as building continues to be slow.

Suggested Change (or Language): I feel there needs to be more consideration and scientific study needs to be completed before this rash of a decision is made. We live in a very diverse country- you need to consider how different Minnesota and Arizona are before you make a law that affects the entire country.

Commenter: DeVille Hilton Hubbard & Texas Irrigator Advisory Council
Affiliation: Texas Irrigator Advisory Council
Comment Date: June 29, 2009

Attached are comments from the Texas Irrigator Advisory Council (Council). The Council is a nine member group that provides advice to the Texas Commission on Environmental Quality on irrigation issues. The Council appreciates the efforts of the Environmental Protection Agency in developing the draft specifications and the opportunity to comment. Any questions may be directed to Mr. Doug Goodwin, Chairman, at (281) 252-0375.

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment: The requirement of 40 percent is not considerate of the turfgrass type.

Rationale: Option 2 is flexible to turf type. Low water demand trufgrass requires less water than shrubs or groundcover and in most areas can be turned off in the summer months. Proper water scheduling saves more water than properly designed landscapes that are overwatered.

Suggested Change (or Language): Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area for high water demand grass, 70 percent of the landscapable area for medium water demand grass or 90 present for low water demand grass.

Topic: 4.1.2 Turfgrass- Turfgrass shall not be installed in strips less than 4 feet wide.

Comment: Drip irrigation works fine in areas less than 4 feet wide. I believe developers will increase these areas to more than 4 feet and plant turf . The 4 foot wording allows shrubs and groundcover to be planted in these areas. 4.1.2 will not reduce water consumption or prevent runoff.

Rationale: Trying to regulate a design component is not as easy as regulating the desired results. Stating that there can be no runoff in areas under 4 feet wide achieves your goal.

Suggested Change (or Language): All landscaped areas in strips less than 4 feet wide must be irrigated with drip irrigation.

Topic: 4.2 Irrigation System – Irrigation systems, if installed, shall meet the following criteria:

Comment: The wording is poorly composed.

Rationale: The current wording inserts an opposing comment into the sentence. If the irrigation system is not installed of course it will not need to meet the following criteria.

Suggested Change (or Language): All installed irrigation systems shall meet the following criteria;

Topic: 4.2.4 Distribution Uniformity – irrigation systems shall achieve a low quarter distribution (DUlq) of 70 percent or greater. Distribution uniformity will be measured during the post – installation audit

Comment: This criteria as stated will eliminate the use of the spray nozzle in the platform of riser or spray head.

Rationale: The (DUlq) computes the lowest (DU) percentage. The spray nozzles used in these pop-up heads and risers are reliable and effective but generally will not score a 70% under a (DUlq) audit. An irrigation system with a very high (DU) that is improperly scheduled looks great on paper but will not conserve water.

Suggested Change (or Language): Distribution Uniformity – irrigation system shall achieve a low quarter distribution (DUlq) of 55 percent or grater. Distribution uniformity will be measured during the post – installation audit.

Topic: 2.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigaion system , shall not be used to water plantings other than the maintained trufgrass. Sprinkler heads shall have a 4- inch or greater pop-up height and matched precipitation nozzles.

Comment: The wording is poorly composed.

Rationale: The wording is poorly composed.

Suggested Change (or Language): Sprinkler irrigation heads must have a pop- up height of 4 inches or greater using matched precipitation nozzles and can only be used in turfgrass applications. Microirrigation or drip applications must be used in all other applications. Fire barrier and dust control system are exempt from all restrictions.

Topic: 4.2.9 Schedule – Two water schedules, developed by the WaterSense irrigation partner as part of the post –installation audit shall be posted at the controller. One schedule shall be designed to address the initial grow in phase of the landscape and the second schedule shall be designed to address on established landscape. Both schedules shall be seasonal in nature.

Comment: All irrigation schedules need to be based on evapotranspriation factors.

Rationale: If you do not base the irrigation schedule on evapotrranspriation factors there is no foundation for the math.

Suggested Change (or Language): 4.2.9 Schedule – Two water schedules, developed by the WaterSense irrigation partner as part of the post –installation audit shall be posted at the controller. One schedule shall be designed to address the initial grow in phase of the landscape and the second schedule shall be designed to address on established landscape. Both schedules shall be seasonal in nature and be based on local evapotransporiation factors for plants and historical or real-time rainfall.

Topic: Revised Draft water – Efficient Single Family New Home Specification : Water Budget Tool

Comment: Overall this tool is dramatically better.
Consider lowering the landscape coefficient (Kl) for Turfgrass – Low water Requirement at .6 and Turfgrass – Medium water requirement at .7.

Rationale: In the southern states we use (Kl) .6 for Bermuda grass which is a medium water requirement grass.

Suggested Change (or Language): Change the (Kl) for Turfgrass- Low water requirement to .5 and Turfgrass – Medium water requirement to .6

Commenter: Dr. William R. Hoover
Affiliation: William R. Hoover LLC
Comment Date: June 29, 2009

Dear Ms. Frace:

The most recent version of the Water Sense for New Homes specification represents a substantial improvement over the earlier version. However, there are still two issues which need to be addressed: (1) The 0.60 gallons of allowable waste when waiting for hot water and (2) The removal of the requirement for hot water piping insulation.

Structured plumbing design approaches along with an on-demand recirculation system can readily limit the water waste to 0.125 gallons per hot water draw. The proposed limit of 0.60 gallons is excessive for several reasons. First, compared to the structured plumbing approach, the new guidelines would allow 0.475 gallons of additional waste per hot water draw. Since the average family makes between 50 and 70 hot water draws per day, this represents allowing an excessive waste of 23 to 33 gallons per day.

Secondly, an allowable waste of 0.60 gallons per hot water draw will mean a time delay of more than 60 seconds for fixtures with 0.5 gpm flow rates. This long delay will encourage users to turn on the hot water fixture and go do something else while waiting on the hot water arrival. Once the user turns their attention to another activity, the likelihood of increased behavioral waste is significantly increased.

One justification for setting the allowable waste at such an unreasonably high level was the fear that builders would use unacceptably small pipes to achieve the desired performance. This is a bogus argument; minimum pipe diameters are set by code and should be enforced by plumbing code officials. This should not be deemed as an acceptable reason to set the WaterSense performance requirements at unjustifiably wasteful levels.

Knowing that a maximum waste of 0.125 gallons is readily achievable, WaterSense should set the maximum waste per hot water draw at a level no higher than 0.25 gallons per draw rather than the proposed level of 0.60 gallons per draw.

I understand that it may be difficult to justify the cost of hot water piping insulation on the basis of energy savings based on today's costs and conditions. However, pipe insulation increases the performance of the plumbing system by assisting in the delivery of hotter water and by slowing the cool down of the hot water in the piping after a draw. Thus, the likelihood of the water in the piping being at a useful temperature for a subsequent draw in enhanced.

Hot water piping insulation is as much a performance issues as it is an investment issue. It is my opinion that every homeowner buying a WaterSense house has the right to expect a hot water system which performs well. Without hot water piping insulation, there hot water system will underperform. Since the piping in a new house will not likely be changed for 50 or more years, we should do everything in our power to insure that today's good practices are being followed so that when energy and water costs increase in the future, the homeowner will not suffer the consequences of short-cuts taken at the time of construction.

Knowing that the only argument against requiring hot water piping insulation is a marginal economic argument which ignores the performance issues, the requirement to insulate all hot water piping should be re-instated.

Thank you for your careful consideration of these inputs.

Commenter: Kevin Rogers
Affiliation: Home owner and employee of the largest U.S. farmer-owned agricultural cooperative (CHS Inc.)
Comment Date: June 30, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft limits on turf grass to 40% does not fit all climates. The ban on planting turf on steep slopes will lead to more erosion to storm drains, streams, and rivers. Many contractors will use the least effort possible to comply and will cause many more environmental problems.

Rationale: The 40% limitation does not work in the areas I live and do business in. I live in Spokane, WA and work in a rural community just outside of Spokane. I live on a hill side where the yards are on a fairly steep slope. I am able to keep my soil in place through a combination of landscape blocks, terraced gardens and approximately 70% turf grass. Nature provides sufficient amounts of rain to green up the lawn in the spring, the lawn can go dormant during the summer, and fall rain breaks summer dormancy and it greens up again. Even during the summer, the soil stays intact. My uphill neighbor made many fruitless attempts to keep the soil in place without turf grass and the soil always ended up eroding down to me or past me on the sidewalk. I know it is possible through proper planning, increased initial costs, and proper maintenance to properly comply with this draft but I also know the human/business tendency to employ least-cost or least-effort methods to comply with these specifications. These methods will lead to more erosion, higher cooling costs for homes, and reduced air quality through higher particulates and CO_2 and reduced O_2 unless the wording is drastically changed.

Suggested Change (or Language): Forget the 40% limit. If you must limit the percentage, provide an easy-to-use chart based on complete and readily-available rainfall/humidity data. Eliminate the ban on planting turf to slopes since this is the best practice for erosion control. Limit watering practices through the summer as our city encourages. Summer dormancy of turf works and is immediate feedback in the form of financial savings.

Commenter: Michael P. Kenna, Ph.D.
Affiliation: United States Golf Association, Green Section Research
Comment Date: June 30, 2009

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment: The draft specification's limitation on turfgrass is arbitrary and not supported by science.

Rationale: The one-size-fits-all home specification imposes a 40 percent turfgrass limitation on landscapable areas of new home sites whether that home site is located in the arid, desert southwest or in cooler, wet climates. There are many possible scenarios were the Water Sense criteria would result in environmentally unsound as well as undesirable consequences to the public. Dr. James B. Beard and Dr. Michael P. Kenna edited a book for the Council for Agricultural Science and Technology (CAST) titled "Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes." Figure 5.2 from this book demonstrates the vast difference in climates and adapted turfgrass species. The Water Sense program should point home builders to the state cooperative extension service to determine the appropriate turfgrass species and water requirements.

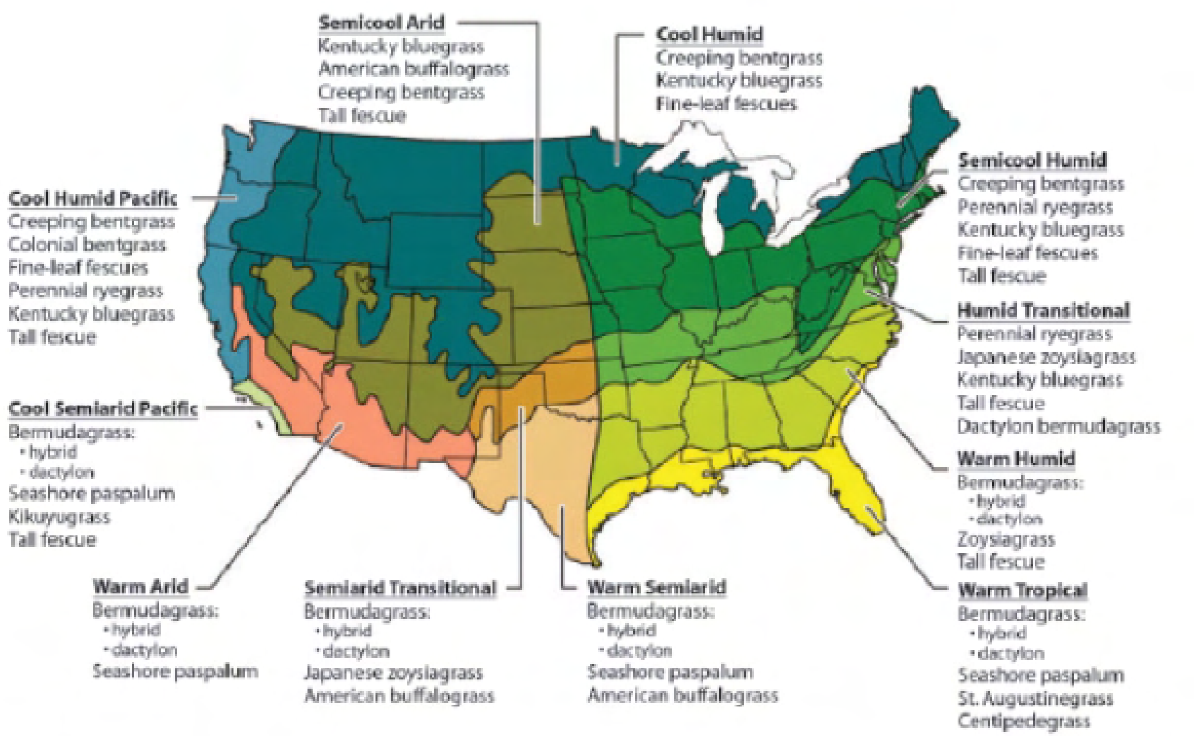

Figure 5.2. Major turfgrass climatic zones and geographic distribution of species in the United States (adapted from Beard 2002).

Suggested Change (or Language): Remove.

Topic: 4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment: The ban on using turfgrass on 4:1 slopes (15 degree angle) does not take into consideration the erosion prevention and water infiltration this turfgrass species provide in urban landscapes.

Rationale: Turfgrass provides erosion and stormwater control benefits in urban environments. It is often specified by civil engineers to control erosion along roadsides or steep embankments. Under the draft specification, plants other than turfgrass can be planted on steep slopes. The dense canopy and fibrous root system of turfgrass is better than hundreds of species of plants in controlling erosion, a key factor in choosing a ground cover for slopes. Turfgrasses are used on most roadside slopes because they are the best and most economical species at controlling erosion. And in the case of roadsides, turfgrass is effective on slopes, when using an adapted species and cultivar, without requiring supplemental irrigation. The same came be said for turfgrass on slopes within an urban landscape.

Suggested Change (or Language): Remove.

Topic: 4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.

Comment: The single, nationwide 0.7 evapotranspiration factor for calculating the water budget is inappropriate for the entire United States.

Rationale: The single, nationwide ET factor for calculating a water budget is not supported by scientific research. Builders seeking the Water Sense label will avoid the complexities of a water budget and related calculations and simply use the option to limit turfgrass. Furthermore, designating a single ET rate ignores the regional climatic variations and average rainfall levels in different regions of the country that is depicted in Figure 5.2.

The new draft specifications require that the user of the water budget tool access the International Water Management Institute World Water and Climate Atlas to determine monthly ETo. To utilize the tool, the user is required to input exact latitude and longitude, after which an estimate of monthly ETo is provided. This is interesting as the scientists that met with EPA on Feb. 10th discussed the lack of ETo data available nationwide. Therefore, it is highly questionable how useful this tool really is in providing accurate ETo, as well as if most people will go through the trouble of identifying their longitude and latitude. The ETo information should be requested from the state land-grant university cooperative extension service. The state turfgrass specialist working in concert with county extension agents and master gardeners could provide better information.

Suggested Change (or Language): 4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on percent evapotranspiration adjustment factor determined by the state land grant university cooperative extension program on turfgrass management.

Commenter: Charles H. Hart
Affiliation: The Chas. C. Hart Seed Co.
Comment Date: June 30, 2009

See Appendix C for a copy of the comments submitted.

Commenter: René Fleming
Affiliation: City of St. George, Utah Water Services Department
Comment Date: June 30, 2009

Topic: Showerheads (3.6)

Comment: I support the restriction on total flow in a shower compartment to 2.5 GPM.

Rationale: I see too many homes with expansive master baths, numerous showerheads and significant amounts of water some in excess of 8 gpm being used.

Topic: Appliances (3.7.1)

Comment: Dishwashers – can a water factor be included or language inserted to say it will be included when available. Perhaps require models using less than 5 gallons per cycle.

Rationale: EnergyStar rated dishwashers may not be water efficient. There is more information on water factors available now than in the past.

Suggested Change (or Language): Note: Dishwasher criteria will be revised to reflect water factor ratings as they become available. Currently dishwashers rated at 5 gallons per cycle or less qualifies.

Topic: Irrigation Audits (4.2.1)

Comment: Post audit requirement by a WaterSense Partner – this may be a hard requirement to meet if there are none or limited partners in the area.

Rationale: Will this requirement be so difficult to meet due to a lack of WaterSense partners that builders will not even attempt to qualify.

Suggested Change (or Language): All irrigation systems shall be audited by a WaterSense Partner or an irrigation auditor certified by a WaterSense program or the Irrigation Association.

Commenter: Craig Selover
Affiliation: Masco Corporation
Comment Date: June 5, 2009 (revised July 1, 2009)

Comment: Section 3.3 Hot Water Delivery System specification has been changed to increase the allowable pipe volume of water between the water heater and any fixture outlet to 0.6 gallons. This is considerably more than was allowed under the previous draft. In so doing, this revision of the specification also eliminates the definitions and discussion around the various piping schemes that can be employed to reduce the water wasted waiting for hot water. While there is some benefit in simplification in this approach, we believe that more needs to be done to educate both builders and plumbing contractors in regard to the various piping arrangements and their importance in creating a proper design and it's execution in eliminating this wasted water and associated energy.

Suggested Change (or Language): Change the allowable volume to 0.4 gallons.

Comment: The requirement that hot water piping be insulated to a minimum R-4 value has been eliminated. While perhaps practical from a cost standpoint, cumulatively, this allows the continued waste of energy.

Rationale: From data we have received on home faucet usage, faucets are used an average of 58 times per day, with an average peak flow rate of 0.96 gpm, average use duration of 3.5 seconds and average use volume of 0.5 gallons. Given that current home designs often require full flow rate draws for 30 seconds or longer to get hot water to the tap, this means that the vast majority of faucet draws are for cold water and of extremely short duration. Further, logical assumptions about when hot water draws from a cold start are made and the 10.9 gallons/capita/day of faucet usage (Residential End Uses of Water – AWWARF, 1999), lead us to believe that approximately 25% of faucet usage are hot water draws from a cold start (about 16, including showers). Experimentation by Carl Hiller, and reported on by Gary Klein, has shown that an extra 25 – 50 percent of water volume is required in addition to the pipe volume to warm up the piping materials in getting hot water to the tap. In addition, the percentage of extra water waste is larger at lower flow rates, which means it is more critical to get the volume and insulation details right to support the benefits intended from the use of Water Sense faucets, showerheads and other hot water using appliances. All water drawn to the tap draws an equal amount of ambient temperature water into the water heater, which creates an energy demand to heat it up to water heater temperature. In addition, lack of insulation allows much faster cool down, such that after only some 15 minutes, another cold start draw must be made for a subsequent use.

We estimate that additional cold start hot water draws due to uninsulated pipe will increase by 6 uses. Six uses, multiplied by 0.6 gallons per outlet, times 1.25 for heating, equals an additional 4.5 gallons per day. Heating this water 40 °F will consume 1500 BTU/day, or 0.525 therms/year.

Suggested Change (or Language): Reinstate the R-4 insulation requirement.

Comment: Hot Water Delivery System, Section 3.3 – We know from experimental data that getting hot water to the outlet takes approximately 25% more than the volume of water in the pipe, due to the necessity for the water to also heat up the piping material. The measurement therefore should be more like a 0.75 gallon draw before hot water gets to the outlet. The Hot

Water Service Delivery test should be modified to measure when the water temperature reaches 105°F, rather than a 10°F rise.

Rationale: Each of these changes reflects a more realistic test validation method of system performance.

Suggested Change (or Language): The temperature must increase to 105 degrees Fahrenheit.

Comment: Bathroom Faucets (Section 3.5.1), Kitchen Faucets (Section 3.5.2) and Showerheads (Section 3.6) If all these products are already certified under the WaterSense program, what is the purpose of running these tests? For showerheads which have flow controls that are removable, a test may make sense to see that they are still in place. However, this does not make sense for faucets.

If the purpose is to make a real check of the flow rates, then the test as specified will result in false positives in a number of cases.

Rationale: The issue is that in the field, the actual pressures when flowing are most often significantly lower than the 60 psi or 80 psi pressures against which the product standards are established. In some cases, devices utilize pressure compensating flow control elements which produce a fairly constant flow rate across a wide range of pressures, and these are less likely to produce a false positive, although they can. It is the plain orifice type of flow control that most likely will produce a false positive.
For example, if a showerhead or faucet outlet utilizes an orifice plate technology, it will produce it's highest flow rate at the maximum pressure covered under the testing methodology. This is because the manufacturer will desire for there to be as much flow as possible at lower pressures. For a 2.5 gpm maximum flow (showerhead) at 80 psi, an orifice plate restrictor has a C_v flow coefficient of 0.2795 (flow rate divided by square root of the pressure drop). This flow coefficient will result in a flow rate of 1.76 gpm at a flowing pressure of 40 psi, not uncommon in the field. This is, of course below the 2.5 maximum WaterSense specification. However, where the field flowing pressure is 40 psi, under the draft test procedure, a flow rate of 2.2 gpm would also pass. However, the C_v for this device is higher, or 0.3478; therefore this device would pass 3.1 gpm.

Suggested Change (or Language): Our recommendation is that to adequately avoid false positives (approve a non-compliance device), one must have the flow curve for the faucet or showerhead in question, and know the pressure supplied to the showerhead or faucet when it is on to full volume. This would allow the tester to see what the flow rate should be from the flow curve and compare it with the measured flow rate. We also understand that flow curves may not be readily available, but are not sure that there is an alternative way to make a proper determination, given that you cannot boost the building pressure to 60 or 80 psi, either. Some creativity may be necessary to develop an accurate method. Perhaps flow curves could be required at a plan review stage.

Comment: Addendum to prior comment (6/5/2009) – Sequential use of hot water drawn to the same fixture of fixture grouping is facilitated by insulation of hot water piping. The provision requiring hot water pipe insulation should be restored to the specification.

Rationale: Without insulation, the water in the pipes will cool down below a hot water use temperature in 5-10 minutes, requiring a fresh purging of the water as waste to obtain new hot. Insulation will extend this time to 20 minutes or more. EPA staff has indicated that sequential use behaviors do not occur frequently, limiting the payback value. We would like to point out that behavior change will be a critical factor in generating both water and energy savings going forward. Both public education and water pricing will help drive behavioral changes over the long term. Given the cost to build a home, which is amortized over 15-30 years on a mortgage, the incremental monthly mortgage payment cost to insulate hot water pipes is very marginal. Requiring this in new homes built going forward means that behavioral changes will reward us with lower water wasted waiting for hot water. Given a very low marginal cost, why would we allow homes to be built that will not allow us to reap the benefits of not wasting this water in decades to come? The same argument can be advanced in reducing the 0.6 gallons between the water heater and each outlet to 0.4 gallons. While in an individual home, this does not amount to a very significant amount of water, this will be of great significance when added up over all the new homes built: for the community, its water resource supply, the water utility and wastewater utility.

Suggested Change (or Language): Hot Water Delivery System – All hot water pipes, both above and below ground, shall be insulated to a minimum of R4.

Comment: Section 3.6 Showerheads – eliminate the restriction of 2.5 gpm per shower compartment.

Rationale: We believe that the logic behind this restriction is severely flawed, and inconsistent with how other recreational and therapeutic use of water is dealt with in WaterSense for Homes. The vast majority of showers and tub/shower installations involve only one showerhead. The portion of the market which involves additional showerheads, body sprays, handshowers and the like is very small. Further, the use of multiple outlets simultaneously on a daily basis is also very small. For instance, I do have a shower with a showerhead, body sprays and a handshower. I also have a steam generator. For daily use, only the showerhead is used. Like most people, my shower is used for daily bathing, wherein the point is to minimize the time spent to get the job done. On rare occasions, I use the handshower for therapeutic purposes, perhaps 4 times per year, and about the same for the steam attachment, to treat sinusitis and relax muscles. WaterSense for Homes has not prohibited whirlpools or spas, which are also used primarily for therapeutic/recreational use, and in the case of spas, are continuously heated, creating a large waste of energy. The same can be said of swimming pools, which have continuous pumping for disinfection and sometimes heating, and have tremendous evaporation, which requires make-up water. From that standpoint, the restriction on shower total flow is quite illogical and appears to be window dressing so that you can say that something is being done. However this has no effect on consumer choice with respect to aftermarket products and retrofit installations.

This restriction also ignores the reality that we will need to construct bathroom bathing/showering facilities for our aging population. A growing number of families will be faced with accommodating both young adults and their grandparents. Given the increasing average height with each generation, having a showerhead installed high enough for young adult showering is a requirement. More and more often, the same shower will be used by the elderly, who will not be able to stand up to bath, nor to sit at floor level in a bathtub. To accommodate the elderly, a handshower will be necessary in addition to the showerhead, and located low enough that it can be reached. In these cases, it will not always be practical for the handshower to be on a slide bar, as when it is at the top, it will not be reachable by the elderly.

Lastly, neither WaterSense for Homes nor Energy Star has been consistent in addressing water heating in this sense: We frequently hear stories of teenagers taking long showers, and they might be more likely to use multiple shower outlets simultaneously. However, this is a self limiting proposition, as water heaters have a limit to the amount of hot water that they can supply. Tankless water heaters are gaining in popularity, in part due to lower standby losses compared with storage tank heaters, however the “forever hot water” promotional approach seems very inconsistent with water and energy conservation. We have also noted that in standard Tankless Water Heaters, there is a significant delay in delivering hot water, as much as 20 seconds, which can double the time and water wasted waiting for hot water compared with storage type heaters. The new hybrid tankless units appear to resolve this problem, and are not covered in either WaterSense or Energy Star. The choice to single out shower compartment total flow restriction seems to be an artificial construct that ignores these realities.

Comment: Hot Water Delivery System (Section 3.3) – The water heater setting should not just be verified as “on” prior to the test, but should be set at the 120°F delivery temperature.

Rationale: As a system test, the heater could be at a “vacation” or at the maximum temperature setting, neither of which would provide a proper reflection of system performance under normal conditions.

Suggested Change (or Language): Verify that the water heater is on. Verify that the water heater is set at 120°F.

Commenter: Dale Stroud
Affiliation: Director of Business Development, Uponor, Inc. (Manufacturer of PEX-based plumbing systems), Apple Valley, MN
Comment Date: June 29, 2009   Amended July 1, 2009

Topic: Section 3.3 Hot Water Delivery System

Comment: Specify that on-demand recirculation systems with a dedicated return line be allowed, and the hot water source be defined as the supplying 'trunk' line.

Rationale: Since timed and continuous circulation systems are specifically <u>not</u> allowed, some individuals may incorrectly assume that on-demand recirculation is also not allowed. When on-demand recirculation is used, the trunk line becomes the hot water source (not the water heater) and this should also be clarified.

Suggested Change (or Language): On-demand recirculation systems in which a dedicated return line is employed may be utilized and, in such cases, the main hot trunk line shall be classified as the hot water source. When on-demand recirculation is employed, the 'contained volume' requirement shall be 0.2 gallons (instead of 0.6 gallons) and to be confirmed by a flow test in which no more than 0.25 gallons of water may be discharged prior to the time that 105 F water flows from the tap. Prior to conducting the flow test, the pump shall be activated and, after activation, at least thirty seconds will lapse prior to initiation of the flow test. The consecutive use requirement applies.

Topic: Section 3.3 Hot Water Delivery System

Comment: The hot water side of a plumbing system should be designed ((i.e., the physical layout of the system) such that consecutive use of fixtures (faucets) located in the same and/or adjacent fixture groups should allow for very rapid delivery of hot water during a consecutive use. In other words, if a fixture is used shortly after hot water has been delivered to another nearby fixture (i.e., one in the same and/or nearby fixture group), the hot water delivery to the consecutively-used fixture should be very rapid and require purging of only a small amount of cool, previously-heated water. This results in significant water and energy savings in consecutive use situations.

Rationale: Consecutive use of different hot water fixtures is common, and plumbing systems should be designed so that the amount of water wasted (while waiting for hot water to arrive at the consecutively-used fixture) should be minimized through the use of plumbing layouts that minimize water waste in consecutive-use situations.

Suggested Change (or Language): Within ten minutes after completing the test to confirm the 0.6 gallon requirement (as specified in Section 3.3), fully open a different hot water faucet that is located n the same fixture group as the faucet at which the 0.6 gallon test was conducted. Assure that water that is usably hot, as judged by touch (about 105 F), is flowing from that second faucet within eight seconds after it is opened. <u>Note</u>: Neither a thermometer nor a catch-bucket/bag need be used. Judge the arrival of hot water by carefully holding your hand in the water stream. REMOVE YOUR HAND FROM THE WATER STREAM AS SOON AS HOT WATER IS DETECTED.

Topic: Section 3.3 Hot Water Delivery Systems

Comment: Restrict the requirement of the 0.6 gallon limit to faucets and showerheads located in bathrooms and faucets in kitchens only. Tub spouts need not be regulated and low-hot-water-use faucets such as those at bar sinks, stationary (laundry) tubs, etc. need not meet the criteria.

Rationale: Focus the water conservation requirements on high-use fixtures only. This addresses virtually of the water waste issue and simplifies the cost and complexity of plumbing systems.

Suggested Change (or Language): …between the hot water source and hot water fixtures located in kitchens, bathrooms (tub spouts are exempted), and lavatories.

Topic: Section 3.3 Hot Water Delivery Systems 3.3

Comment: Reinstate a requirement for insulated hot water lines.

Rationale: Use of insulation dramatically increases the time that hot water of a usable temperature (>105 F) remains in the plumbing system. Hence, the amount of water wasted in both consecutive and spaced uses can be decreased dramatically because less purging of cool, previously-heated water is required.

Suggested Change (or Language): Insulate trunk and branch lines (including those connected to a central manifold in a parallel or 'homerun' configuration) to a minimum of R2.5, including any contribution to the R value by the pipe itself. Drops or 'twigs' that connect the trunk and/or branches to stops or directly to fixtures need not be insulated.

Topic: Section 3.3 Hot Water Delivery Systems

Comment: Confirm the 0.6 gallon contained-volume requirement through the use o fa flow test that allows 0.8 gallons of water to flow from a faucet before usable hot water (approximately 105 F) arrives. Another factor to consider is that the test will likely be conducted after all of the walls are 'closed' (i.e., drywall has been installed) and the pipng is not visible. Hence, it is difficult for the tester to know which fixture is farthest from the hot water source (in terms of piping distance).

Rationale: Testing done by Davis Energy Group has indicated that plug flow does not occur in typical plumbing systems. Their research has indicated that there is an 'excess flow factor' of approximately 1.3. Therefore, a plumbing system that has 0.6 gallons of 'contained-volume' between the hot water source and a fixture requires approximately 0.8 gallons to be purged before usable hot water actually arrives at the tap (i.e., 0.6 X 1.3 = ~0.8). Usable hot water is typically defined as approximately 105 F. Therefore, it seems appropriate to terminate the test when the water is at that temperature, rather than a 10 F rise (as indicated during the web conference). Further, it seems that it would be easier for the tester to observe a 105 F temperature rather than detect a 10 F rise, especially since it seems that the thermometer would first have to be 'conditioned' at the starting point temperature (of the standing water in the pipe prior to opening the tap).

Suggested Change (or Language):
…shall store no more than 0.6 gallons (2.3 liters) of water in any piping/manifold between the hot water source and any hot water fixture AND this storage limit shall be confirmed by a flow test in which no more than 0.8 gallons (3.1 liters) of water is discharged from the fixture prior to the water temperature reaching 105 F.

QUESTION:
Will there be a published procedure on how to conduct the water volume test? There are a lot of nuances that could affect the results. A well written test procedure will be important.

Topic: Section 3.3 Hot Water Delivery Systems

Comment: Designing a plumbing system in such a way that the contained-volume is limited to a certain quantity (e.g., 0.6 liters) requires knowledge of the volume of water contained within different types/sizes of pipe.

Rationale: To facilitate the design of plumbing systems of known contained-volume, include a volume per length table in the Specification.

Suggested Change (or Language): To assist in the design of a hot water distribution system that contains no more than 0.6 gallons of water (between the hot water source and any hot water fixture), use the following reference table:

Volume of Water Distribution Tubing Materials

Ounces of water per foot length of tubing							
Nominal Size (inch)	**Copper M**	**Copper L**	**Copper K**	**CPVC CTS SDR 11**	**CPVC SCH 40**	**PEX-AL-PEX ASTM F 1281**	**PEX CTS SDR 9**
3/8”	**1.06**	**0.97**	**0.84**	**NA**	**1.17**	**0.63**	**0.64**
1/2”	**1.69**	**1.55**	**1.45**	**1.25**	**1.89**	**1.31**	**1.18**
3/4”	**3.43**	**3.22**	**2.90**	**2.67**	**3.38**	**3.39**	**2.35**
1”	**5.81**	**5.49**	**5.17**	**4.43**	**5.53**	**5.56**	**3.91**
1-¼”	**8.70**	**8.36**	**8.09**	**6.61**	**9.66**	**8.49**	**5.81**
1-½”	**12.18**	**11.83**	**11.45**	**9.22**	**13.20**	**13.88**	**8.09**
2”	**21.08**	**20.58**	**20.04**	**15.79**	**21.88**	**21.48**	**13.86**

0.6 gallons = 76.8 ounces

Commenter: Feinglas, Stuart
Affiliation: City of Westminster
Comment Date: July 1, 2009

I have the following comments on the proposed revised draft single family new home landscape requirements.

The city of Westminster, Colorado implemented water conservation based landscape regulations in 2004. Since that time hundreds of homes have participated and the City has learned many lessons.

Soil amendments

Soil amendments are required in the landscape regulations as well as a requirement to till in the amendments to a 6" depth. Tilling is critical as is the timing of the amendment application. If amendments are installed longer than 6 months prior to the installation of the landscape, significant loss of benefit is experienced through wind, and possibly leaching. Tilling must occur close to planting to avoid compaction of the site from construction activities. An inspection of the amendment and tilling is required since there have been significant issues about what was actually installed when only load tickets are provided. The City has seen some sites get tilled and then all the loose soil and amendments removed from areas during the final site grading, leaving some areas untilled and unamended, highlighting the need for an inspection prior to planting. The City has a requirement for the entire front and back yard to be amended even though only the front yard is often planted by the developer. The thought here is that once the fence is installed between the front and back yard, vehicles will not be able to bring amendment to the back yard.

Rain shutoff

Rain shutoffs are required to be installed. Once again an inspection is required. We have found numerous instances where the shutoff has been improperly installed, adjusted, or even left unwired.

Customer education

Westminster requires a 3 season watering schedule, developed with the results of the required irrigation audit, be posted at the controller. We have found that any savings possible due to a good installation can easily be lost due to improper homeowner operation. This requirement can be waived if an advanced controller is installed which internally develops a schedule based on need. We have seen many instances where advanced controllers have been permanently set on manual thus negating potential savings. The City has not found a satisfactory way to deal with this problem.

Use of lower quarter DU

While the City uses the lower quarter DU for minimum efficiency requirements, there may be issues using it to develop a watering schedule. We recommend using the lower half for developing watering schedules to avoid over watering.

Establishment watering schedule

The City requires irrigation installers return to the home after 6 weeks to change the watering schedule from an establishment one to normal operation. We have found many instances where the establishment schedule remains in place for several years when left up to the homeowner. The city has no inspection set for this requirement so enforcement is spotty.

Water use

The City has not performed a comprehensive study to determine the benefits of adherence to the landscape regulations. We have noticed that the while the total outdoor water use per home may be low, smaller landscapes installed on new homes often have very high levels over watering. Quality of landscapes seem to be better at the homes installed under the landscape regulations.

General comments

We have noticed that any requirement that is not inspected is often not installed. Training of installation staff is spotty and even companies that work often in Westminster, rotate their crews and have installers working who are unfamiliar with the regulations. By not requiring Water Sense partners perform the installation, the chances of an acceptable Water Sense installation will be low. In our experience, the majority of the local landscape and irrigation industry is at the beginning of the curve when it comes to training in installation and new technology. Water Sense standards and requirements would be a great incentive for the industry to implement the training necessary.

Commenter: Jim Petersen
Affiliation: Pulte Homes
Comment Date: July 1, 2009

Topic: Hot Water Delivery System

Comment: The capacity should be increased to .8 gallons.

Rationale: Allows use of mini manifold trunk and branch systems which are more cost effective and in actual customer use provide better hot water delivery in repeat use and numerous room fixture applications.

Topic: Service Pressure

Comment: This requirement should be pushed to the utility not to the residence.

Rationale: It is much more cost effective for the utility to integrate pressure control in the supply than pushing it to the homebuilder.

Commenter: Stephen Brown
Affiliation: Quality Turf
Comment Date: July 1, 2009

Before you attempt to issue Outdoor Water-Efficiency Criteria. Why don't you find out whether it will help or hurt the local environment. This is not something that should be done "off the cuff". Most of the more recent studies point the opposite way.

Commenter: David R. Chalmers
Affiliation: Professor and State Extension Turfgrass Specialist; Texas AgriLife Extension Service; Dept. of Soil and Crop Sciences; Texas A&M University
Comment Date: July 1, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: A federal agency flinging out a one-size fits-all program isn't a pretty picture. There is this thing called science to consider. The EPA's Proposed "WaterSense" Program is much more of a "doctrine" in regards to reducing turfgrass areas than it is a learned science based program. A doctrine is defined as " a belief or set of beliefs held and taught by a church, political party, or other group."

Rationale: As written, and if approved, this Water Sense Program will become a stated principle of government policy through the EPA, even though participation is on a volunteer basis. As such those who choose to participate in implementing this new unsupported turfgrass "doctrine" may be individual home consumers, builders, landscape professionals or licensed irrigators.

At the core of this debate is what has gone into the belief system of the EPA that underpins this WaterSense "Doctrine" for turfgrass? Is it science based or a specious proposal?

Whether a volunteer program or not, the very worthwhile goal is an environmentally sensitive approach to landscape water conservation. In the broadest sense the Water Sense Program targets turfgrass areas as a way to reduce landscape water use by limiting it to 40% of the landscape regardless of climate, soil, species, and annual rainfall. Many commodity groups and organizations have come forth to document that grass has a role as a beneficial component of "Urban Agriculture". Only recently have there been attempts at defining "Urban Agriculture" so that its contribution to our society is not overlooked. A recent effort to elevate the contributions of Urban Agriculture was addressed most recently by the Georgia Urban Landscape Council. I believe the most appropriate description from the landscape perspective is that... "Urban Agriculture mitigates man's land altering activity to enhance quality of life by improving environmental, economic, and social sustainability of constructed natural landscape ecosystems." Turfgrass makes important contributions in urban landscapes.

Suggested Change (or Language): There are flaws and assumptions in the WaterSense program that EPA should willingly modify it before it is released/promoted, because most developers will focus simply on the 40% number, even where turf rarely requires irrigation. EPA has ten regional offices (http://www.epa.gov/epahome/regions.htm), each of which is responsible for several states and territories. This suggests that internally EPA recognizes unique differences in how unique regions in the US can be. Any WaterSense Program impact on turfgrass makes more sense if it is regionally based and respectful of climate, soils and species. If EPA is unwilling to modify the 40% and ET threshold so that those numbers are locally sensible, perhaps EPA will at least apply those portions of the WaterSense program only to the more arid portions of the country, i.e. (with huge exceptions where warranted), EPA Regions 9, 8, 10 and 6.

EPA should consider setting aside the Outdoor Water Efficiency Criteria at this time. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water efficiency solutions that actually reduce water consumption and do not result in unintended consequences.

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The Water Sense Program falls short in arriving at promoting how best to modify urban sites toward most effective water use and water conservation. There is an absence of any consideration of soil quality, soil depth, and soil uniformity in any constructed landscape, regardless of plant selection. As written, turf or any other plant material could be placed upon bedrock, and be in compliance, as far as the current Water Sense Program/Doctrine is concerned. If the goal is to have efficient water use why then does the Water Sense Program/Doctrine set no minimum standards for soil quality, depth, or uniformity?

Rationale: Landscape ornamentals are typically planted in soil beds that have been modified to favor their quality and persistence. However, for too long developers and builders have not mitigated their own land altering activity during the course of new home construction, to restore disturbed soils to best sustain plant material. Topsoil can be stripped and sold prior to development without consequence and compacted sites are almost never deep ripped to restore the soil profile to near what it was prior to disturbance. Sand is brought in to level out a rough grade since tilling, soil settling, and grading takes too long and costs more to make it right. Short cuts are taken to get the areas planted with grass for the immediate gain of getting paid and not for installing a landscape that has a better chance to more efficiently hold/store usable water and favor root development. I would contend there should first be a movement within EPA called the Soil Sense Program where developers and builders must return disturbed soils to its near original state, or in areas where the soil can be improved they work to do so prior to planting the landscape. This includes turf areas.

Soil infrastructure depth has tremendous bearing on drought survival of grasses maintained as turf. In a two-year drought research study in San Antonio Texas 25 turfgrass varieties were planted on 4-inches of native soil and native soil of 18-inch soil depth. Using a rainout shelter to simulate 60-day summer drought no grass planted on the 4-inch constructed soil survived while all grasses planted on the 18-inch soil depth survived 60-days drought. The results can be viewed at http://itc.tamu.edu/documents/2008FinalReportSAWS&TPT_s.pdf

Suggested Change (or Language): Research, consider and include statements favoring the protection or improvement of the characteristics of existing natural soil profiles while mitigating negative impacts from soil disturbance in construction. Without such language the WaterSense Program should not go forward.

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: Economic Impact on Urban Agriculture industries and Services. There is little consideration for the private sector who’s livelihood serves to mitigate man's land altering activity to enhance quality of life by improving environmental, economic, and social sustainability of constructed natural landscape ecosystems

Rationale: Goals and considerations of the WaterSense Program should be environmentally sensitive, agronomic, business oriented, and an opportunity for the private sector to rise to the challenge of water conservation as a way of life. It is particularly clear that the WaterSense Program has not been influence by science but by specious perceptions as to how a broad stroke of reducing turfgrass area to 40% reduces irrigation and favors water conservation. The program remains appealing to irrigators (already a WaterSense Partner) and suppliers of horticultural plant material that will be planted in mulched or turfed areas. There can be little that does not appeal to those segments of Urban Agriculture in partnering with Water Sense at this point in time. Yet turfgrass affiliated businesses will be impacted.

The EPA identifies mulching material as being “organic and/or inorganic permeable materials that will retain soil moisture, suppress weeds, and allow free movement of oxygen into and out of the soil.” When I see that description of what the Water Sense Program would like to see in mulched areas… take out the word inorganic and the functions of the mulching materials are also the benefits associated with well construted of turfgrass/soil systems. The turfgrass/soil system is perennial and a renewable resource in locations where rainfall amounts sustain turf.

Suggested Change (or Language): Economic impact analysis should provide perspective as to potential disadvantage toward components of the turfgrass industry and the costs, and/or incentives of alternative areas composing up to 60% of the landscape area.

Commenter: Dale Bremer
Affiliation: Dept. of Horticulture, Forestry & Recreation Resources;Kansas State University
Comment Date: July 1, 2009

I am writing to address the EPA's proposed guidelines for water-efficient single-family new home specifications. I am all for water conservation in home lawns but there are two aspects that I object to and indeed are counter to results from scientific studies (I am a turfgrass scientist by profession). The first is the restriction of turfgrass on slopes greater than 4:1. Turfgrass is an excellent form of erosion control and certainly is better than soil covered with mulch, bare soil, or even landscaping plants. This recommendation seem counter to common sense and may even have negative implications for water quality in urban areas from increased runoff of sediments and pesticide/nutrients from non-grassed surfaces.

The blanket 40% limit on turfgrass regardless of geographical region is also troubling. In non-arid regions, the benefits of turfgrass include local cooling of the air, reduced dust, and an area where recreation can be enjoyed by homeowners. Water conservation may be better achieved by carefully selecting low-water-use turfgrass species/cultivars that are suitable for a particular region. Even in arid regions, it may make more sense to recommend lower-water-using turfgrass species rather than limiting to 40% of the area. For example, a lawn that was 40% cool-seasoned turfgrass may use as much or more water, and certainly could be watered as much or more than the same lawn covered with a warm-seasoned turfgrass that uses less water.

It seems that the EPA would better achieve its goals of conserving water in lawns by adapting a regional approach to its recommendations rather than an across-the-board policy that is the same for a lawn in sunny, arid southern California as for the cooler, wet northeastern US. I urge the EPA to go back to the drawing board and rethink their policy to adjust for regional differences in climate.

Commenter: Bob Fitch, Executive Director
Affiliation: Minnesota Nursery & Landscape Association
Comment Date: July 1, 2009

The 1,500 members of the Minnesota Nursery & Landscape Association support the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: Tom Bosse
Affiliation: Unknown
Comment Date: July 1, 2009

Landscaping with natural grass is the most enviornmentally way to go. First it cleans the air and produces oxygen for us to breath.

It also helps cool the earth by absorbing heat.

After 35 years in the irrigation business, natural grass uses less water than other alternatives. Case in point, the San Antonio water problem. After banning some natural grass the use of water has gone up.

The good lord put grass on earth for a purpose and the EPA thinks they know better? What foolisnish!!!!

Commenter: Tobin R.Bowers
Affiliation: Unknown
Comment Date: July 1, 2009

To whom it may concern, i hope that before we start telling people how much grass they can plant on there property, that you thank about how many people you will affect. For one thing were in a recession and people are already out of work, if you decide to do this more people will be out of work. The farmer that produces the seed, the landscaper who puts the lawn in, the sod farmer who produces the sod, the manufacture that makes the equipment, the people put in the sprinklers,it can go on for ever. Lawn produces oxygen, cools the air, cleans the air, filters the water, and it's just nice to look at. I really hope you people in charge really thank about what your doing before you do it,your trying to push this big green movement and know your trying to limit the green that's out there.

Sincerely Yours

Tobin R.Bowers concerned American that doesn't want to live in Russia

Commenter: Russel P Prophit
Affiliation: EPA WaterSense Partner; Irrigation Association Member; Florida Irrigation Society; Precise Irrigation Design and Consulting, Inc.
Comment Date: July 2, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Kristen Fefes, CAE
Affiliation: Associated Landscape Contractors of Colorado
Comment Date: July 2, 2009

On behalf of the Associated Landscape Contractors of Colorado, a 700-member organization representing landscape contractors, designers, irrigation companies, and industry suppliers, I submit thse comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an “endorsement” of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

See Appendix A for a copy of the comments submitted.

Commenter: Brenda O'Brien
Affiliation: Green Industries of Colorado (GreenCO)
Comment Date: July 2, 2009

The Green Industries of Colorado submit these comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

See Appendix A for a copy of the comments submitted.

Commenter: Bill Rogers
Affiliation: Consultant
Comment Date: July 2, 2009

Topic: 60 PSI regulator

Comment: What is the purpose of the 60 PSI regulator with regard to irrigation?

Commenter: Betsie A. Taylor, Executive Director
Affiliation: Kentucky Nursery and Landscape Association
Comment Date: July 2, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Paul W. Chappell
Affiliation: Diversified Trees, Inc.; Chairman of the Georgia Green Industry Association
Comment Date: July 2, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Rena Sumner, Executive Director
Affiliation: Massachusetts Nursery & Landscape Association
Comment Date: July 2, 2009

On behalf of the more than 450 business members of the Massachusetts Nursery & Landscape Association, I would like to present to you our support of the official comments and position submitted to you by the Irrigation Association related to the WaterSense® outdoor watering specification.

See Appendix A for a copy of the comments submitted.

Commenter: Peter J Censky
Affiliation: Executive Director, Water Quality Association
Comment Date: July 2, 2009

Dear: WaterSense:

Thank you for the opportunity to continue to comment on the "Draft Water-Efficient SingleFamily New Home Specification." As you know, during the past year, we provided comments on the program's water softening elements. We were grateful that EPA took our comments seriously.

By way of reminder, the Water Quality Association (WQA) is the not-for-profit international trade association representing approximately 2500 companies from the United States and around the world who manufacture, sell, and service water treatment equipment and who solve water quality problems for homes, businesses, and small communities. Quality water along with water efficiency is our foundation and highest priority. WQA is dedicated to education, fairness, and consumer confidence in water treatment services. Last year we provided suggested edits to portions of the draft. Below please find a reiteration of those comments related to systems other than water softeners. Our suggested revisions are shown in track changes format additions underlined and strikethrough of deletions. The rationale for our suggestions is highlighted in yellow.

3.7.3 Drinking water treatment systems - Other drinking water treatment systems must be certified by an ANSI-accredited certifier to meet the applicable NSF/ANSI Drinking Treatment Unit (DWTU) Standard. All drinking water treatment systems covered by the other NSF/ANSI DWTU standards listed blow have water efficiencies of 100% except for reverse osmosis systems tested and becomes product water for use. No water is wasted or discharged to waste. Reverse osmosis systems however do have a reject water stream that is necessary to maintain the membrane from fouling and prematurely plugging. Standard NSF/ANSI 58 contains specifications and a specified test procedure for recovery rating and efficiency rating claims and testing for certified reverse osmosis systems. For efficiency ratings, NSF/ANSI 58 requires that reverse osmosis systems be equipped with an automatic shut off device to prevent water wasting.

And the supporting statements:

• *Drinking Water Treatment Systems* - This specification establishes that drinking water treatment systems installed by the homebuilder shall be certified by an ANSI-accredited certifier to meet applicable NSF/ANSI Drinking Water Treatment Unit (DWTU) Standards and in particular to meet the efficiency rating parts of these standards where applicable. The applicable and accredited NSF/ANSI standards for Drinking Water Treatment Unit Products are as follows:

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 (Reverse osmosis systems must be certified to meet the recovery rating and efficiency rating testing and claims specified in NSF/ANSI 58 (i.e., contained in Section 6.9 of the 2004 edition of NSF/ANSI 58), including the standard's requirement that units be equipped with an automatic shut off device to prevent water wasting.)

NSF/ANSI 62 Drinking Water Distillation Systems
NSF/ANSI 177 Shower Filtration Systems - Aesthetic Effects

Commenter: Wayne Thorson
Affiliation: Unknown
Comment Date: July 2, 2009

I disagree with limiting turf to 40% of the landscape. I understand limiting the water use, but a turfgrass like Buffalograss will use up to 80% less water than other grasses. Buffalograss will use less water than any other grass and many of the plants that would replace the turf area while providing environmental advantages like trapping rain water, purifying it and allowing the rain to be absorb by the ground instead of running off into the storm drains. It provides a safe place for children to play and other social activities. Like any turfgrass, buffalograss will also reduce the heat island effect caused by asphalt, synthetic turf, stones and many mulches. Grass acts like an air purifier and conditioner. Without turfgrass to cool the area around the house, other plants will use more water due to the reflected heat radiating up to the bottom side of their leaves. Just like cars vary greatly in gas mileage, grasses vary greatly in water use rates. This needs to be taken into consideration. Placing the right grass species in each local climate is essential to water savings. People should not grow high water use grasses like bluegrass, fescue or St Augustine in the desert. I ask you to consider an exemption for the new turf-type buffalograss cultivars.

Commenter: Brian Swingle, Executive Director
Affiliation: Wisconsin Green Industry Federation
Comment Date: July 2, 2009

The 850 members of the Wisconsin Green Industry Federation support the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: Kevin Morris
Affiliation: President, National Turfgrass Federation
Comment Date: July 2, 2009

See Appendix C for a copy of the comments submitted.

Commenter: Kevin Marks CID
Affiliation: HYDROlogic Water Management, member Irrigation Association
Comment Date: July 2, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Jeanne McNeil, Esq., Executive Director
Affiliation: Washington State Nursery & Landscape Association
Comment Date: July 2, 2009

The 500 members of the Washington State Nursery & Landscape Association support the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: Peter Estournes
Affiliation: Licensed Landscape Contractor, California Landscape Contractors Association, Co-Director CLCA Water Manager Certification Program
Comment Date: July 2, 2009

Topic: General Overview

Comment: I applaud the EPA WaterSense's approach to Water Efficient Single Family New Home Specification - great job on the draft. This will be easily adaptable in California

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Topic: 1.0 Scope and Objective

Comment: …"new homes will use approx. 20% less water than a standard new home…" Is this standard a national standard? Based upon what?

Rationale: This is unclear and should be more specific. In California new home standards include water conservation efforts inside and out.

Suggested Change (or Language): "20% less water than a standard new home (national standard) by using…."

Topic: 4.1.1.1 landscape design – Option 1

Comment: In many parts of the country there is enough rainfall to offset the need for irrigation for most of the season. If supplemental irrigation is not required why limit the size of turf areas?

Rationale: if some areas of the country do not readily require supplemental water to be used on landscaped sites incl those with turfgrass why set a limit of 40%. Limiting irrigated turfgrass to 40% makes more sense and accounts for these "wetter" areas of the country.

Suggested Change (or Language): Irrigated turfgrass shall not exceed 40 percent of the landscaped area

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Topic: Microirrigation Ssytems

Comment: definition does not account for low volume spray systems such a 'Maxijet" or similar "mini spray" type of nozzles/sprinkler. This would include Rain Bird's "Xeripop" or possibly Hunter's MP Rotator

Suggested Change (or Language): change to include low volume "spray" type

Commenter: Douglas Lechlider
Affiliation: President, Maryland Turfgrass Association (MTA)
Comment Date: July 2, 2009

Topic: Outdoor Water Efficiency Criteria 4.0 thru and including 4.1.6

Comment: As an association of Professional Turfgrass Growers we find these draft specifications to be arbitrary, not based on sound science, and detrimental to most of the environmental protective issues we have fought for and implemented over the last 30+ years working with the University of Maryland, The Maryland Department of Agriculture, the Chesapeake Bay Foundation, and the U.S. Department of Agriculture to improve our environment, educate our clients, and protect the many sensitive ecosystems found here in Maryland including, but not limited to, the Chesapeake Bay and its tributaries.

Rationale: The one-size-fits-all specifications for home lawns, greater than 1000 sq. ft., limits turfgrass to 40% or less and forbids the use of turf on slopes greater than 1 foot of rise in 4 feet of length (approximately 14 degree slopes). With Maryland's diverse topography, soils, climate, and rainfall, this proposal doesn't save water. Instead, it sets up builders who are trying to meet the Water Saver standards to dump excessive soil, sediment and storm water into already over-burdened storm drains and ultimately increase contamination and sediment into our streams, rivers, and the Chesapeake Bay all while compiling with specifications of the EPA.

To comply with these standards, a builder could have Kentucky bluegrass installed on the pure sand soils of Ocean City, requiring watering constantly to keep the grass alive and as long as it only covers 40% or less of the landscape it would qualify as a Water Saver house. Conversely, a builder could also decide to cover the entire "lawn area" with brick, asphalt, concrete or other impervious materials and this also would qualify as a Water Saver home under your specifications. Neither of these choices would be acceptable to most home buyers and certainly does not comply with water and soil sediment regulations of the Maryland Department of the Environment and other U.S. EPA regulations. Not to mention it does not make common sense.

It appears by these regulations that turfgrass has now become the EPA's number one environmental enemy which is down right <u>ludicrous.</u> In Maryland, if not almost every section of this country, turfgrass is the most eco-friendly, as well as the most sought after, material that can be applied to lawns and landscapes.

Countless studies have been completed by numerous Universities across the United States as well as USDA-ARS that show the environmental benefits of turfgrass. These studies show:

- **The cooling benefits of turfgrass.** In some cases turf reduces ground surface temperatures as much as 30 – 40 degrees over bare soil and as much as 50 – 70 degrees over impermeable surfaces like asphalt or concrete or artificial turf.[1] These regulations would add significantly to global warming. Take a look at any infrared picture of any city or town you want and it is always the artificial impervious materials which are showing the extreme heat, while the coolest areas consistently are areas of turfgrass.
- **The use of turfgrass minimizes the carbon footprint.** Turfgrass plays a positive role in confronting climate change. A well maintained lawn, fed by nutrients from grass clippings, sequesters carbon from the atmosphere. Replacing turfgrass with mulch will actually increase the carbon released back into the atmosphere by exposing soils and/or using

decaying materials as mulch.[2] While mulch may provide some soil runoff protection it is not nearly as effective as turfgrass in reducing greenhouse gas emissions.

- **Healthy, well maintained turf has near zero storm water runoff.** There have been many University studies, some right here at the University or Maryland, showing time after time that the best control of storm water runoff is a good maintained turfgrass cover. According to research by the University of Minnesota[3], storm water runoff due to increase impervious surfaces has reduced the quality of water and ends up burdening our storm water systems causing detrimental pollution to our streams and rivers. In the State of Maryland this pollution ultimately ends up in the Chesapeake Bay.

The ban on utilizing turfgrass on any slopes with a 1 foot rise in 4 feet of length is also extremely perplexing. According to the specification, other plants are to be utilized on slopes over the 1 foot to 4 foot limit. There are many highway slopes and home lawns greater than 14 degrees in the several Western Maryland counties located in the Appalachian Mountains. With the utilization of adapted turf species and cultivars, effective turf on slopes greater than 14 degrees have been established without the use of supplemental irrigation water. The same technology could be utilized on home landscapes as well. No other plants or man made surface materials have the fibrous root system of turfgrasses and nothing has been found to be better in holding soil on steep slopes. Thus prohibiting the use of turf is asking for soil to remain un-stabilized leading at a minimum to sediment runoff and potentially to danger to human life due to land slides.

Another concern is the option of utilizing a single, nationwide ET factor for calculating a water budget. Being realistic, builders desiring to have a Water Sense label will avoid the complexities of calculating a water budget and will instead opt for the 40% limitation. Even if they do decide to have a water budget, having a single rate for the entire country ignores the regional climatic variations and average rainfall levels. How can a single ET factor be the same for Arizona and Maryland? Are sufficient weather stations and data even available to consider such an option?

We are aware that this program is voluntary, however, we have seen time and time again that local, county and state regulators seek some source from a higher “authority” to base their regulations and laws upon, thus voluntary criteria becomes hard and fast regulations and law. This adoption has already occurred in Lexington, Massachusetts and these criteria guidelines have not even been finalized.

In closing, please rest assured we are very much aware of the importance of conserving both the quantity and quality of water now and for generations to come. In that respect, we as Turfgrass Professionals are supportive of policies and programs like the Water Sense program. However, the regulations must be based upon sound research and the Outdoor Water Efficiency Criteria (Sections 4.0 to 4.1.6) are not. If the latest irrigation technology, with smart controllers and efficiency systems, are utilized the water savings of 20% or more could easily be achieved without having to restrict the desire or need of efficient turfgrass landscapes.

[1]The Lawn Institute; How the Environment Benefits from a Well Maintained Lawn; http://www.turfgrasssod.org/lawninstitute/environmental_benefits.htm

[2]Dr. Ranajit (Ron) Sahu; Technical Assessment of the Carbon Sequestration Potential of managed Turfgrass in the United States; www.opei.org/carbonreport

[3]University of Minnesota; Sustainable Urban Landscape information Series; Environmental Benefits of a Healthy, Sustainable Lawn; http://www.sustland.umn.edu/maint/benefits.htm

Suggested Change (or Language): We as professionals request the EPA set aside the sections 4.0 through 4.1.6 of the Outside Water Efficiency Criteria until such time as qualified research can be conducted by non-partisan Universities to answer the concerns these regulations would have on the environment and the many companies involved in supplying the housing industry both here in Maryland and across the United States. The intentions are admirable but the unintended consequences would be catastrophic as the criteria are currently written.

Commenter: Richard Shank, Ph.D., Senior Vice President, Government and Regulatory Affairs and Chief Environmental Officer
Affiliation: The Scotts Miracle-Gro Company
Comment Date: July 2, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The Scotts Miracle-Gro Company, a partner with the Alliance for the Great Lakes, the Chesapeake Bay Program, Clean Water NJ and other entities focused on water quality, is concerned that the draft specification's limit on turfgrass is arbitrary, not supported by science and may undermine the goals of the Water Sense program. ScottsMiracle-Gro's concerns are specific to the 40 percent turfgrass limitation, the ban on turfgrass for steep slopes and the single, nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale:

<u>The 40% Turf Limit in Option 1 Ignores the Environmental Benefits of Turf</u>

The proposed restrictions suggest that a yard covered in turf is less beneficial for the environment than other landscape choices. On the contrary, studies show there are many environmental benefits from turfgrass.

- Healthy turf is one of the best natural surfaces to reduce soil erosion[1]
- Dense turf acts as a natural sponge, filtering water before it passes into groundwater supplies
- Grass in the US traps about 12 million tons of dust and dirt from the air annually[2]
- Healthy lawns reduce surface temperatures by 30-40 degrees as compared to bare soil and 50-70 degrees when compared to paved areas[3]
- The lawns of 8 average sized suburban homes provide the cooling effects of 70 tons of air conditioning[4]

A well maintained, growing lawn that is fed by nutrients from grass clippings sequesters carbon from the atmosphere and helps to minimize the property's carbon footprint[5]. Reducing the turf area and replacing it with mulch or hardscape makes an active carbon "sink" inactive, and it may actually increase the carbon released back into the atmosphere by exposing soils or using non-growing, decaying materials such as mulch. These
alternative methods have great aesthetic value and help control water run-off and use, but they do not contribute to the reduction of greenhouse gas emissions, a major environmental concern today.

[1] The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans, James B. Beard and Robert L. Green, Journal of Environmental Quality, 23: 452-460, 1994
[2] Healthy Turf, Healthy Earth, Georgia Turfgrass Foundation Trust, www.turfgrass.org, July 2000.
[3] How the Environment Benefits from a Well-Maintained Lawn, The Lawn Institute, www.lawninstitute.com, August 2000.
[4] Care for the Environment While Caring for Your Lawn, Mid-American Green Industry Council, www.magicouncil.org, August 2000.
[5] Dr. Ranajit (Ron) Sahu; Technical Assessment of the Carbon Sequestration Potential of Managed Turfgrass in the United States; www.opei.org/carbonreport/

In contrast, there are no published scientific data available to support a view that turfgrasses are higher water users than trees and shrubs. Very few of the tree and shrub species-cultivars have been quantitatively assessed for their evapotranspiration rates, while a major potion of the turfgrass species-cultivars have been assessed. When available studies are reviewed, typically trees and shrubs are found to be higher water users than turfgrasses on a per unit land area basis.[6]

The Steep Slope Ban in Options 1 and 2 Does Not Make Sense When the Environmental Benefits of Turf are Considered

The erosion control benefits that turfgrass delivers makes the steep slope ban on turfgrass in the specification perplexing. Under the draft specification, plants other than turfgrass can be planted on steep slopes. Turfgrass, because of its fibrous root system, is better than other plants in controlling erosion, a key factor in choosing a ground cover for slopes. Turfgrasses are used on most roadside slopes because turfgrasses are the best species at controlling erosion. And in the case of roadsides, turfgrass is effective on slopes, when using an adapted species and cultivar, without requiring supplemental irrigation. The same can be said for turfgrass on slopes within a home landscape.

Regional Variables and Actual Homeowner Behaviors Should be Considered

The one-size-fits-all home specification imposes a 40 percent turfgrass limitation on landscapable areas of new home sites whether that home site is located in the arid, desert southwest or in cooler, damp climates such as Seattle, Washington or Portland, Maine. Under the proposed criteria, a homebuilder constructing a house in Phoenix could plant cool season Kentucky Bluegrass on 40 percent of the property-a scenario that would require non-stop irrigation--and qualify that house for the Water Sense label. Conversely, a homebuilder in Northeast Michigan could mulch and hardscape the entire landscapable area and also qualify for the label. These practices would be environmentally unsound as well as undesirable to homeowners.

Additionally, industry research indicates that 50% of all homeowners in the United States do nothing to maintain their lawns. Actual irrigation practices should be ascertained before arbitrary standards are imposed.

The National Evapotranspiration Factor in Option 2 is not Supported by Science

Designating a single evapotranspiration rate for our entire nation ignores the many factors that affect water use by plants and that occur in actual growing conditions: regional climatic variations, average rainfall levels in different regions of the country, grass species, quality and texture of soils and rooting depth.

If real water conservation is the key, the Water Sense guidelines could instead require builders/landscapers to install high quality soils in new landscapes and to plant drought-tolerant turf grasses. Many turfgrasses survive with no supplemental irrigation, entering dormancy when natural rainfall is limited but resuming natural growth when rainfall returns.

[6] Beard and Green, *supra,* at 457.

In summary, there is no research supporting any of the tenets of the Section 4.0. Turfgrass can be maintained with limited or no supplemental irrigation in many regions of the U.S., and to impose a national standard without factoring in regional variations is not sound science.

Suggested Change (or Language): We respectfully request that EPA set aside the Outdoor Water Efficiency Criteria at this time. Based on reaction at the public hearings and the webinar the Agency hosted, the outdoor criteria has raised many concerns about the negative impacts these criteria will have on the environment and suppliers that serve the homebuilding industry. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water efficiency solutions that actually reduce water consumption and do not result in unintended consequences.

Commenter: Doug Soldat Brian Horgan
Affiliation: Assistant/Associate Professor; Department of Soil Science Department of Horticultural Sciences; University of Wisconsin-Madison & University of Minnesota
Comment Date: July 2, 2009

Dear Mr. Flowers,

On behalf of the North Central Extension and Research Association concerned with improving the environmental impact of turfgrass management (NCERA-192), we would like to express our appreciation for the opportunity that the EPA has afforded stakeholders to comment on the WaterSense draft single-family home specification.

The objectives of NCERA-192 are to (1) investigate the environmental impacts of turfgrass management, (2) identify management techniques to decrease inputs of water and chemicals on turfgrass and (3) communicate these environmentally responsible methods to the industry and public. Our membership is comprised of researchers and educators from prominent educational institutions in twelve states, and we actively work to cooperate with other scientific and educational organizations. This is critical work given the land area in the US planted with turfgrass today.

Regarding the draft specifications, our membership has specific concerns related to Section 4.0-Outdoor Water Efficiency Criteria, Section 4.1.1.1. In this section, Option 1 states, “Turf shall not exceed 40% of the landscapable area. Turf shall not be installed on slopes greater than 4:1.” The first part of this option is concerning because by default and without definition, homeowners are free to pave, mulch, brick or plant gardens on the remaining 60% of the landscapable area. Lacking dense vegetation, exposing soil and increasing impervious surfaces, scientific literature proves large runoff volumes will exit the landscape and lead to poor water quality, increased demand on municipall storm sewers, and increased flooding.

Furthermore, the second part of this option is also concerning because of the negative impact it will have on environmental quality in the North Central Region and elsewhere. Dense stands of grass have long been known to be the best method for soil erosion control. In 1935, Hugh H. Bennett, the father of soil conservation, wrote in a scientific paper that “The importance of grass as a means of controlling erosion is so great that this paper may be appropriately prefaced with the assertion that where there is a good cover of grass, there is no serious problem of erosion”. By specifically excluding grass from sloped surfaces, the soil erosion from non-grassed areas will increase substantially as there are very few other plant materials that will perform this function effectively. There is no scientific justification to exclude grasses on slopes for water conservation or for water quality.

For these reasons, we request that Option 1 in section 4.1.1.1 be dropped from the specification. The option of using ET-based irrigation has considerable scientific merit and should be the only permissible option for WaterSense certification. It is clear to us that reducing outdoor water use is a high priority, and in many cases research is not available to determine the most appropriate water conservation strategies. Our membership is interested to work with EPA to provide the scientific data needed to develop future guidelines related to outdoor water conservation.

We respect the mission of the USEPA to protect both the human and environmental health of this country as it is strongly aligned with the mission of our membership. We also support

USEPA's goal of formatting policy based on sound science. Federal policies are capable of being adopted in part or full as policies or regulations by local/state agencies who may not understand the vetting process which occurs when national policies are developed. Consequently it is vital that scientific information be used to develop policies when human health and/or the environment are at stake.

It is our hope that these comments will be viewed with that goal in mind. Thank you for your consideration.

Commenter: Norman Bartlett, Executive Director
Affiliation: American Society of Irrigation Consultants
Comment Date: July 2, 2009

We applaud your efforts but feel that there are many things in the specification that should be changed. We would suggest that you promote your WaterSense irrigation partners program which we have been encouraging our membership to participate in, and leave the design details of the landscape and its irrigation system to professionals. We feel that your specification should be focused on performance and conservation goals rather than details. No one set of specifications can cover the vast differences in climate, geography or personal preferences.

See Appendix B for a copy of the comments submitted.

Commenter: Joe Dixon, CID, CLIA
Affiliation: Dixon Irrigation Services
Comment Date: July 2, 1009

I support the input being drafted by the Irrigation Association commenting on your guidelines for new homes.

Your one-size-fits-all fails to consider differences in climate and geography across the country. I completely support any conservation efforts that make sense, but I am totally opposed to EPA directed guidelines.

Commenter: Michael Robinson
Affiliation: Seed Network International
Comment Date: June 30, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's limitation on turfgrass is arbitrary, not supported by science and may undermine the goals of the Water Sense program. Our concerns are specific to the 40 percent turfgrass limitation, the ban on turfgrass for steep slopes and the single, nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale: The one-size-fits-all home specification imposes a 40 percent turfgrass limitation on landscapable areas of new home sites whether that home site is located in the arid, desert southwest or in cooler, damp climates such as Seattle, Washington or Portland, Maine. Under the proposed criteria, a homebuilder constructing a house in Phoenix could plant cool season Kentucky Bluegrass on 40 percent of the property-a scenario that would require non-stop irrigation--and qualify that house for the Water Sense label. Conversely, a homebuilder in Northeast Michigan could mulch and hardscape the entire landscapable area and also qualify for the label. We believe that these are outcomes that should be avoided. There are many other scenarios that we could provide that would fit the Water Sense criteria, yet be environmentally unsound as well as undesirable to the consumer.

The proposed restrictions assign a negative environmental value to turfgrass and suggest that a yard covered in turf is somehow less preferable or less eco-friendly than other landscape choices. On the contrary, studies show, in compelling fashion, the myriad environmental benefits of turfgrass. Consider, for example, the cooling benefits of turfgrass. In some instances, ground level temperatures of grass-covered land areas are 30 to 40 degrees cooler than bare soil. They are also 50 to 70 degrees cooler than hardscaped (asphalt or concrete) areas1. Reducing turfgrass only contributes to the "heat island" effect that plagues urban areas across our nation. In addition to its cooling properties, managed turfgrass plays a positive role in our efforts to confront climate change. A well maintained, growing lawn that is fed by nutrients from grass clippings sequesters carbon from the atmosphere and helps to minimize the property's carbon footprint. Reducing the turf area and replacing it with mulch or hardscape makes an active carbon "sink" inactive, and it may actually increase the carbon released back into the atmosphere by exposing soils or using non-growing, decaying materials such as mulch. These alternative methods have great aesthetic value and help control water run-off and use, but they do not contribute to the reduction of greenhouse gas emissions, a major environmental concern today. Finally, the benefits of turfgrass in regard to soil erosion are also well documented. According to the University of Minnesota3, storm water runoff due to increased impervious surfaces has reduced the quality of runoff water that ends up over-burdening our storm sewer systems and ultimately pollutes our lakes, streams, and rivers. However, research shows that a healthy, well-managed lawn, with dense turfgrass, has near zero storm water runoff.

These erosion and stormwater control benefits that turfgrass delivers makes the steep slope ban on turfgrass in the specification perplexing. Under the draft specification, plants other than turfgrass can be planted on steep slopes. Turfgrass, because of its fibrous root system, is better than other plant in controlling erosion, a key factor in choosing a ground cover for slopes. Turfgrasses are used on most roadside slopes because turfgrasses are the best species at controlling erosion. And in the case of roadsides, turfgrass is effective on slopes, when using an adapted species and cultivar, without requiring supplemental irrigation. The same came be said for turfgrass on slopes within a landscape.

Our final concern regards the single, nationwide ET factor for calculating a water budget. We believe strongly that builders seeking the Water Sense label will avoid the complexities of a water budget and related calculations and simply opt to limit turf. Furthermore, designating a single ET rate ignores the regional climatic variations and average rainfall levels in different regions of the country.

In addition, the new draft specs require that the user of the water budget tool, to determine monthly ETo, access the International Water Management Institute World Water and Climate Atlas. To utilize the tool, the user is required to input exact latitude and longitude, after which an estimate of monthly ETo is provided. This is interesting as the scientists that met with EPA on Feb. 10th discussed the lack of ETo data available nationwide. Therefore, it is highly questionable how useful this tool really is in providing accurate ETo, as well as if most people will go through the trouble of identifying their longitude and latitude. We feel most builders will opt for the 40% turf limit because this is easiest. This brings us full circle back to the many concerns listed above.

In summary, there is no research supporting any of the tenets of the Section 4.0. Turfgrass can be maintained with limited or no supplemental irrigation in many regions of the U.S, but this fact seems to get lost in the shuffle when the only concern is water savings on the outside portion of the home. As the scientists told you back on Feb. 10th, using the latest in irrigation technology, with smart controllers and efficient systems, will easily result in 20% (or more) water savings, without having to limit builders and consumers in their desire to plant turfgrass. The scientists also recommended that the outdoor requirements be instituted in phases, as more regional information on ETo is available. We think the turf limitation will have serious consequences on the success of Water Sense and its adoption. We want to see Water Sense succeed, but we also know that many people want to plant, cultivate and enjoy turfgrass at their homes. We feel the current draft of the outdoor portion of the new homes specs will not satisfy this desire and will ultimately lead to the demise of the Water Sense new homes program.

[1] The Lawn Institute; How The Environment Benefits From a Well-Maintained Lawn; http://www.turfgrasssod.org/lawninstitute/environmental_benefits.htm
2 Dr. Ranajit (Ron) Sahu; Technical Assessment of the Carbon Sequestration Potential of Managed Turfgrass in the United States;
www.opei.org/carbonreport/
3 University of Minnesota; Sustainable Urban Landscape Information Series; Environmental Benefits of a Healthy, Sustainable Lawn.
http://www.sustland.umn.edu/maint/benefits.htm.

Suggested Change (or Language): We respectfully request that EPA set aside the Outdoor Water Efficiency Criteria at this time. Based on reaction at the public hearings and the webinar the Agency hosted, the outdoor criteria has raised many concerns about the negative impacts these criteria will have on the environment and suppliers that serve the homebuilding industry. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water efficiency solutions that actually reduce water consumption and do not result in unintended consequences.

Commenter: Ron Wolfarth – Director- Landscape Irrigation Division
Affiliation: Rain Bird Corporation
Comment Date: July 2, 2009

These comments are based on comments prepared by the Irrigation Association, but modified by Rain Bird Corporation. Changes beyond the correction of typographical errors are noted.

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

As stated in California Assembly Bill 1881(enacted 2006): "…landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development…" we believe the statement within AB1881 can apply across the country and as such, we are hopeful the EPA will make constructive improvements that embrace the value of the outdoor living environment prior to publication of its WaterSense Model New Home Specification.

We recommend to the EPA that decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. We also recommend to EPA that the comments submitted by the Irrigation Association in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, we urge the EPA to take into consideration the comments below from the irrigation industry, as they are based on market data, best management practices and best available science.

Topic: 4.1 – At a minimum, the front yard shall be landscaped to meet the criteria in either option. The entire yard shall be landscaped to meet the criteria in either option where landscaping of the entire yard is financed, installed, or sold as an upgrade through the homebuilder. The entire yard shall also be landscaped to meet the criteria in either option when irrigation systems, pools, spas, or water features have been financed, installed, or sold by the homebuilder.

Comment:
If the EPA is going to support having any prescriptive requirements associated with the outdoor criteria, then the requirements should apply to the entire landscapable area, not just the front yard, regardless of whether an irrigation system, pool, spa or other water feature is installed.

Rationale:
We do not support any language that does not treat the entire landscape equally.

Suggested Change (or Language):
Any option associated with the outdoor criteria shall apply to the entire landscapable area.

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.
Comment:
We do not support any arbitrary limits on landscape plant material. This national criterion, voluntary or otherwise, is inappropriate and not based on best available science. For this reason, and as previously commented, we do not support the inclusion of Option 1.

Rationale:
We believe in the practice of "right plant in the right place," and work very closely with the green industry in promoting local and adapted plant materials appropriate for each climate and geographical location. The 40% turfgrass limitation, in our estimation, is an arbitrary limit placed on landscapes. Local geographies, climates and markets should guide the make-up of landscape materials, including types of turfgrass, trees and shrubs. As noted below in the topic "Alternative water supplies for landscape irrigation," plant materials can be very effective at "treating" non-potable water. Turf is especially good at this due to its root and shoot density which greatly reduces run-off.

Suggested Change (or Language):
The EPA should use best available science to produce a performance-based approach to landscape design criteria, rather than an arbitrary prescriptive approach. We urge the EPA to continue the dialogue with all segments of the green industry on best practices and stewardship to determine the best performance-based criteria to implement as part of the new homes specification.

Topic: 4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.
Comment:
Best available science dictates that evapotranspiration adjustment factors should be determined based on geography and climate. If a national water budget continues to be a part of the specification, we recommend that the ETAF be implemented at 80%.

In addition to the recommendation that the EPA use a 80% ETAF for the water budget calculator, we are also including, as part of these comments, significant comments focusing on the data and assumptions used within the proposed water budget tool. We urge the EPA to consider all recommendations associated with the water budget tool, in addition to the recommended change to 80% ETAF. We feel that an 80% ETAF would be a significant increase in efficiency (as much as 50%) from the current market norm. Any evapotranspiration adjustment factor that is implemented as a "one-size-fits-all" ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or applicable educational resources.

Rationale:
We believe that high irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. According to the EPA, many irrigation systems are using approximately 50% more water than what is needed by the landscape. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% water-use savings.

Suggested Change (or Language):
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic: Alternative water supplies for landscape irrigation

Comment:
The current draft is silent about incorporating the use of alternative water supplies and the addition of this section would provide an excellent opportunity to promote the use of such resources for landscape irrigation.

Rationale:
In addition to lessening the demand on domestic potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.

Suggested Change (or Language):
The specification should include an option, or incentives, to use alternate, non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes. Because of potential poor water quality, consideration should be made to accommodate the need for additional leaching fractions deemed appropriate to make the water useable in the landscape.

Topic: 4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.

Comment:
We believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) in strips less than four feet wide can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. We recommend the removal of this restriction and urge the EPA to employ performance-based criteria, rather than the prescriptive approach currently taken in the draft, to determine irrigation efficiency in these areas.

Rationale:
The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. In some areas of the United States four feet wide strips of turf may be inappropriate, in others it is a valuable part of the landscape that is much needed.

In many instances throughout the United States, areas of turfgrass four feet wide are efficiently irrigated using methods such as drip, spray strip nozzles, and rotator-style nozzles, among others.

Suggested Change (or Language):
4.1.2 Turfgrass – Irrigation installed in strips less than 4 feet wide shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create runoff.

Topic: 4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment:
We believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States turfgrass is used as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes with this prescriptive approach would significantly adversely change the market, without any assurance of less water-use or elimination of run-off. We believe that plant material for 4:1 slopes should be selected based on local climate, geography and markets.

Furthermore, we recommend the elimination of prescriptive choices of irrigation methods and that the choice of plant materials in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:
Based on years of research, science and best management practice development, the best applicable science indicates that all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with ~~little to~~ no increase in run-off.

Soil Erosion Control and Dust Stabilization
Turf protects nonrenewable soil resources from water and wind erosion. Turf's high shoot density and root mass stabilize surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turf's high biomass matrix provides resistance to lateral surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turf can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked nonpoint surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.)

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):
4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Topic: 4.2 Irrigation Systems

Comment:
We believe in the value of a labeled WaterSense irrigation partner. We also feel that these new home specifications should be a tool to expand the label's value, in addition to promoting water use efficiency compared to a conventional home. EPA has removed the WaterSense Partner as designer and installer from the original draft citing issues related to "cost" and "availability". The Irrigation Association and others have worked and continue to work toward expanding the number of WaterSense partners available to install and audit irrigation systems. However, we would like to see more expanded data regarding the claim that there is a significant difference in cost between a WaterSense® labeled and non-labeled irrigation professional's work especially when compared to best practice-approaches vs. human economic decision-making. We are happy to commit to working with the EPA in developing this data.

We recommend that the EPA should implement a requirement that all irrigation systems installed upon a WaterSense® labeled new home be designed, installed and audited by a WaterSense® labeled irrigation partner.

Rationale:
As a public-private partnership, the WaterSense® program's irrigation partner label continues to grow throughout the irrigation industry, thus increasing the amount of efficient irrigation education and best management practice implementation throughout the United States. We agree with the EPA in standing behind excellence in efficient irrigation and feel that an essential tool to ensure that the irrigation partner label enjoys a high brand value is the promotion of the label through the WaterSense® specifications for new homes.

We support the concept of the WaterSense® irrigation partner label. According to the EPA, "…all too often, landscape irrigation wastes water—up to 1.5 billion gallons every day across the country. WaterSense irrigation partners can help you reduce your water consumption, save money, and maintain a healthy and beautiful landscape..." The EPA continues by stating "…when every drop counts, we count on our partners...." An efficient irrigation system is multi-faceted; it needs high-level competence, best available technology and regular maintenance to ensure efficiency. We urge the EPA to stand behind the labeled partners, as they have done the labeled products, through the specifications for new homes.

Suggested Change (or Language):
4.2.10 Irrigation Partner Requirement – The WaterSense® program believes in the quality of work associated with the WaterSense® label. All irrigation systems shall be designed, installed inspected and audited by a WaterSense® labeled irrigation partner.

Topic: 4.2.1 Post-installation audit – All irrigation systems shall be audited by a WaterSense irrigation partner. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Comment:
Irrigation system audits are an important component of any water-use savings program.

Though calculating distribution uniformity (DU) does measure how well water is applied to a landscape; it does not calculate efficiency. We maintain that the WaterSense® program can be successful in significant water-use savings in new homes if a visual inspection is conducted on all installed irrigation systems and full audits conducted at random, with the irrigation system designer, installer and builder partner not knowing whether or not a full audit will be performed at the time of installation.

Rationale:
Variable conditions, including weather, play an important role when calculating DU. Weather in many areas often delays the test for days, sometimes weeks, until conditions allow a test to be performed. When there is a re-inspection/co-inspection required, this process may be delayed even further. If efficient products and services already included within the criteria, an assumption for high distribution uniformity exists. The goals of the *Water-Efficient Single-Family New Home Specification* will be achieved without having to calculate each irrigation system's DU. DU measures how evenly water is applied to an area, not the rate of application. Water savings will be achieved through proper irrigation scheduling.

We do believe in the use of proper audits and believe that "spot-checking" irrigation systems through a traditional audit protocol will allow the program to keep the high integrity it is striving to achieve without increasing costs and the likelihood of significant delays in the labeling process.

Suggested Change (or Language):
4.2.1 Post-installation audit – All irrigation systems shall be visually inspected by a WaterSense irrigation partner. All audits conducted on an installed irrigation system shall be conducted on a random basis and should be conducted by a WaterSense® partner who is not the installer of the irrigation system. The irrigation system designer, installer and the WaterSense® builder partner shall not be aware of whether or not a full audit protocol or a visual audit will be conducted on the system. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Topic: 4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment:
EPA can meet the goal of more than 20% water savings through a specification for the largest turf area to be a DULQ of .63 or greater.

Rationale:
The chart below, referenced from (http://www.ncwcd.org/ims/ims_info/SummaryEvaluationSprinklerSystems.pdf), represents the lower quarter distribution uniformity results from audits performed on residential sprinkler systems as well as large commercial type projects. Over 6800 audits are represented in this table with the average results shown.

Sprinkler System Performance

Residences		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	4500	**52**		1.4	.70-3.70	**58**		.70	.10-2.30
Utah USU	164	**52**	18-80	1.57	.50-3.20	**49**	15-86	.76	.20-1.70
Colorado	973	**53**	20-89	1.34	.22-4.06	**54**	19-92	.62	.12-1.60
Oregon	398	**55***				**54***			
Florida MIL	576	**54**	11-89						
U of FL Case Study	19	**40**				**48**			
California Case study	19	**41**	16-54	1.61	.66-2.97				
Commercial		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ}%	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	166	**55**	7-82	1.49	.26-3.10	**55**	8-84	.74	.13-2.46
Colorado	20	**52**	6-77	1.36	.60-2.12	**50**	3-88	.60	.10-1.12
Arizona	7					**41**	20-56	.76	.57-.92
Texas	6					**58**	27-79		

* reflects the lower-third distribution uniformity information of 61 and 60 reduced by 6 points (weighted average)

According to the data used in the table above, the weighted average DU_{LQ} for residential sprinkler systems is .524 and this is for the visually best performing sprinkler zones when the auditor selected a zone to do a catch can test. Case studies from Florida and California show even lower DU but these audits were for the entire turf area, not the visually best sprinkler zones.

Using the EPA WaterSense® goal to decrease water use by 20%, the DU_{LQ} of .524 x.20 = .105. The proposed value for sprinkler uniformity would be .629 rounded to .63. This will represent a significant improvement because of the challenges of achieving high uniformity on small, curvilinear turf areas that will be typical in the proposed specification. The audit of the sprinkler system should be on the largest turf area and the DU_{LQ} calculated for that area.

Suggested Change (or Language):
4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of .63 or greater. When an audit is performed, distribution uniformity will be measured on the largest turf area during the post-installation audit.

Topic: 4.2.5 Rainfall shutoff device – Irrigation systems shall be equipped with technology that inhibits or interrupts operation of the irrigation system during periods of rainfall (e.g., rain sensors).

Comment:
We support the inclusion of rainfall shutoff technologies.

Rationale:
N/A

Suggested Change (or Language):
N/A

Topic: 4.2.6 Irrigation controllers
Comment:
We support the inclusion of "smart controllers" in installed irrigation systems.

Rationale:
Smart controllers are an integral part of any efficient irrigation system.

Overall water usage in a landscape can be reduced with proper installation and programming of a smart controller.

Suggested Change (or Language):
4.2.6 Irrigation controllers –Irrigation systems shall be equipped with irrigation smart control technology.

Topic: 4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment:
There are many variables that are taken into consideration when determining the best and most efficient way to irrigate plant material in a landscape. Climate, geography, location in the landscape, etc., all play major roles and the responsibility should be on placed the irrigation designer to determine the best type of irrigation for each portion of the landscape.

Rationale:
Certified irrigation professionals should have the flexibility to make the correct determination for each individual site and location.

Suggested Change (or Language):
Sprinkler and microirrigation installed in turfgrass and other plant material shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic: Water Meters

Comment:
In order to truly assess performance and effectiveness, any water-use savings program should include the use of water meters.

Rationale:
Water meters are not required in all areas throughout the United States. The program should also promote using water wisely, which includes accurately knowing how much water has been used.

Water management and water budget adherence are simply not possible without water measurement.

Suggested Change (or Language):
Water Meters for Irrigation Systems – The WaterSense® labeled new home shall include the installation of a separate, dedicated water meter, sub-meter or equivalent device. ~~that meets applicable local standards or otherwise measures water use in billing units used by the local utility. In the event such use is not monitored by the local utility, measurement units in either gallons or cubic feet are acceptable.~~ Rain Bird believes that the lowest cost meter should be used that is reliable and gives the user relatively accurate information to manage irrigation water use. Meters that meet the standard for billing of water use will be a cost burden to the end-user and discourage use.

Topic: Soils

Comment:
A key component to landscape design and water-use efficiency in a landscape is appropriate soil preparation. Neglecting its inclusion in the final specification is equivalent to neglecting the key component to ensuring the landscape can thrive in a water efficient manner.

Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Many of the proposals set forth in these specifications (including but not limited to 40% turfgrass restriction, 4:1 turfgrass slope restriction, etc.) would not be needed if performance criteria were put forward and the proper soil preparation were included in the specification.

Suggested Change (or Language):
Soils – During the construction process, the WaterSense ® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant material, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist.

Topic: The Use of the Words "If Installed"

Comment:
Throughout the draft specifications, the words "if installed" are associated with the installation of irrigation systems. The words "if installed" should be removed from the specification.

Rationale:
Irrigation systems are the only equipment referenced in the specification that is singled out by stating "if installed."

Suggested Change (or Language):
Remove "if installed" and replace with language referencing "installed irrigation systems."

Topic: Definition of Landscapable Area

Comment:
The definition in the revised draft, though favorable to the landscape community, is confusing as it is not a widely-used definition. The specification should revert to the original definition as stated in the original draft specification. Due to the changes this will cause within the outdoor criteria, we urge the EPA to accept the recommended changes throughout this document, in addition to the recommended definition change.

Rationale:
The definition of "landscapable area" as the building lot area not under the roof is not based on science nor is it the market accepted definition of "landscapable area.

Suggested Change (or Language):
Landscapable Area: The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Topic: Water Budget Calculator – Peak Watering Month

Comment:
When performing steps 1B and 2A, it should be more clearly stated to use the same peak month data in each area. Also, it should state that the peak watering month in each section should be the same month to avoid any confusion that may occur.

Rationale:
The data entered into the calculator may be misapplied, thus providing incorrect data at the outset.

Suggested Change (or Language):
Explicitly state, in detail, that the peak watering month data should be used in each step and that the same month's data needs to be used to determine the LWA and LWR.

Topic: Water Budget Calculator – Run Time Multiplier (RTM)

Comment:
Run Time Multiplier should be defined as 1/[.4 + (0.6 x DULQ)].

Rationale:
The method for determining Run Time Multiplier (RTM) is stated incorrectly in the Water Budget Tool as $1/DU_{LQ}$. The correct method would be to use the equation as defined in the document Landscape Irrigation Scheduling and Water Management (IA 2005), which is 1 / .4 + (.6 x DU_{LQ}).

Suggested Change (or Language):
Run time multiplier (RTM) – 1/[.4 + (0.6 x DULQ)] (Landscape Irrigation Scheduling and Water Management IA 2005).

Topic: Water Budget Calculator – Distribution Uniformity (DU)

Comment:
The distribution uniformity for the new home specification should be .63 and should likewise be used in the water budget calculator so that the water budget tool reflects the performance standard for the irrigation system.

Rationale:
Distribution uniformity for the water budget calculator should match the specification for acceptable DU. Currently the calculator uses .65 but the specification calls for .70.

Suggested Change (or Language):
Change DU_{LQ} from .65 to .63, as recommended by the Irrigation Association.

Topic: Irrigation Audit Guidelines – Data

Comment:
The WaterSense® irrigation audit guidelines should reflect the changes recommended as part of the WaterSense® Specifications for New Homes.

Rationale:
There are many suggestions we have put forth that have bearing on the specifics of the irrigation audit guidelines. In order for there to be uniformity throughout the specifications, the EPA should reflect the changes in the guidelines as well as the specifications.

Suggested Change (or Language):
Incorporate the recommended changes in the audit guidelines as well as the Specifications for New Homes.

Topic: Irrigation Audit Guidelines

Comment:
The Irrigation Association has developed a set of minimum guidelines to create a standardized procedure to perform an audit of a landscape irrigation system. These guidelines were published in May 2009 and ASABE standards have been reviewed and incorporated wherever possible. Consultation and review of the guidelines has been conducted with many irrigation auditors, contractors, statisticians, educators, irrigation consultants and the Irrigation Association Certification Board. We urge the EPA to take the following changes into consideration for those irrigation systems that will be audited as part of the labeling process.

Rationale:
The guidelines were developed by the Irrigation Association and are intended to function as recommendations in the auditing of landscape irrigation systems. They have been designed to aid irrigation professionals in fieldwork procedures, techniques and performance calculations.

Recommendations and projections from the guidelines and their accuracy depend upon the quality of measurements and data provided by the individual user. It should be pointed out, the Irrigation Association makes no warranty, implied or expressed, as to the results obtained from these proposed procedures.

Suggested Change (or Language):
Implement the Irrigation Association recommended guidelines for an irrigation system audit, which can be found at http://www.irrigation.org/certification/pdf/AuditGuidelines_FINAL.pdf

Commenter: Donna Sheets, Executive Director
Affiliation: Indiana Nursery & Landscape Association
Comment Date: July 3, 2009

The 450 members of the Indiana Nursery & Landscape Association support the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: John L Marmorato
Affiliation: WaterSense Partner
Comment Date: July 3, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Thomas J. Emmerich
Affiliation: J. Emmerich Associates, Inc. – Irrigation Consultants
Comment Date: July 3. 2009

See Appendix B for a copy of the comments submitted.

Commenter: Robert Scott
Affiliation: WaterSense Partner, ASIC President, IA Member, Certified Irrigation Designer, Georgia Turfgrass Association Secretary
Comment Date: July 3, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Stacy Gardner
Affiliation: Irrigation Consulting, Inc.; WaterSense Partner; American Society of Irrigation Consultants
Comment Date: July 3, 2009

See Appendix B for a copy of the comments submitted.

Commenter: James White
Affiliation: White Engineering, Inc.
Comment Date: July 3, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Jim Barrett, WaterSense Partner, ASIC, CID
Affiliation: James Barrett Associates, Inc.
Comment Date: July 3, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Lee H. McBurnett
Affiliation: Superintendent, Stonebridge Meadows Golf Course
Comment Date: July 3, 2009

To whom it may concern,

I am writting in regards to the watersense program that I am assuming is going into legislation unless it is stopped. SInce we live a Democratic society I believe we the people should have a say so in how our water is used and what type of Landscapes are used. I am a golf course Superintendent in Northwest Arkansas at Stonebridge Meadows Golf Course. I know in my industry we take pride in our jobs and try to be as environmentaly friendly as we can, whether it be in water usage, or fertilizer applications. I have often wondered why the professionals in the field of turfgrass management or Horticulture aren't questioned as to how we can better use our water. As I drive to work every morning I pass by many fast food chains department stores and other business' that have there irrigations running during driving rain storms. I believe that maybe there should be some education as to how to use your water and some guidlines set as to when you can water, but don't take away the way we do our jobs, and don't punish the ones who understand and try to do what's right. Maybe make rain sensors a requirement to homeowner's and business' to take the guess work out of how and when to water. My job requires me to water at certain times and I try not to abuse my water resource because at times it can be skim. I also believe that as you take turfgrass away in the landscape you loose the best erosion control that there is. I think there is a remedy to this problem, but rushing in to anything without proper knowledge and information is not FAIR!!

Commenter: Eric D. Davis
Affiliation: American Society of Irrigation Consultants (ASIC)
Comment Date: July 3, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Barry Troutman, Patrick Gregg & John Law – Directors of Technical Services; Eric Santos – Irrigation Adviser
Affiliation: ValleyCrest Landscape Companies
Comment Date: July 3, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: ValleyCrest remains very concerned that restrictions on outdoor landscape components within the proposed 2nd draft of the WaterSense Specification still do not consider the environmental impact of such restrictions and we are ultimately concerned about the consequences. We believe the current specification still reflects a one-size-fits-all approach that does not take into account turf viability as well as climatic variability across the country. The current restrictions also fail to give proper consideration to the environmental importance of turfgrasses in the suburban and urban environments. The draft specification's limitation on turfgrass is arbitrary, not supported by science and may ultimately undermine the goals of the WaterSense program. Our concerns are specific to the 40% turfgrass limitation, the ban on turfgrass for steep slopes and the single, nationwide 0.7 evapotranspiration factor for calculating the water budget.

Rationale: The one-size-fits-all home specification imposes a 40% turfgrass limitation on landscapable areas of new home sites whether that home site is located in the arid, desert southwest or in cooler, damp climates of the Pacific Northwest and New England. Under the proposed criteria, a homebuilder constructing a house in Phoenix could install cool-season Kentucky bluegrass on 40% of the property -- a scenario that would require non-stop irrigation -- and qualify that house for the WaterSense label. Conversely, a homebuilder in New Hampshire could mulch and hardscape the entire landscapable area and also qualify for the label. We believe that these are outcomes that should be avoided. There are many other scenarios that we could provide that would fit the Water Sense criteria yet be environmentally unsound as well as undesirable to the consumer.

The proposed restrictions assign a negative environmental value to turfgrass and suggest that a yard covered in turf is somehow less preferable or less eco-friendly than other landscape choices. The current language also fails to give proper consideration to the environmental importance of turfgrasses in the suburban and urban environments.

a) The cooling benefits of turfgrass are well documented. In some instances, ground level temperatures of grass-covered land areas are 30 to 40 degrees cooler than bare soil. They are also 50 to 70 degrees cooler than hardscaped (asphalt or concrete) areas. Reducing turfgrass only contributes to the "heat island" effect that plagues urban areas across our nation.
b) In addition to its cooling properties, managed turfgrass plays a positive role in our efforts to confront climate change. A well maintained, growing lawn sequesters carbon from the atmosphere and helps to minimize the property's carbon footprint. Reducing the turf area and replacing it with mulch or hardscape renders an active carbon "sink" inactive and may actually increase the carbon released back into the atmosphere by exposing soils or using non-growing, decaying materials such as mulch. These alternative methods have great aesthetic value and help control water runoff and use, but they do not contribute to the reduction of greenhouse gas emissions, a major environmental concern today.

c) The superiority of turfgrassess for erosion control is well documented and widely recognized throughout the country by use on slopes and highway right-of-ways. The dense, fibrous root system of turfgrasses is more effective than other plants in controlling erosion, a key factor in choosing a ground cover for slopes. And in the case of roadsides, turfgrass is effective on slopes when using an adapted species and cultivar that does not require supplemental irrigation. The same came be said for turfgrass on slopes within a landscape. Eliminating the use of turfgrasses on slopes without defining alternate erosion control standards would be very damaging. Alternatives specified only as mulch, hardscapes, and landscape plantings are a serious oversight.

d) Urban environments generally lack the pervious surfaces to prevent excessive runoff, which taxes storm sewers and rushes runoff and the impurities contained within it to water bodies. It is well documented that turfgrasses slow runoff and filter water that recharges groundwater supplies. Restricting turfgrass use while allowing for unlimited use of hardscapes and mulch as alternatives would be very damaging to water quality.

e) Turfgrass is, for the most part, a perennial biological filter that constantly renews itself. If landscapes are designed with large mulched areas the mulch will have be renewed periodically. The impact of this production should be taken into account. Only organic-based mulches improve soil conditions while alternatives such as rocks, shells, crumb rubber or artificial turf increase heat-island effects and do little if anything to filter water percolating into the soil

Another of our concerns surrounds the stipulation of a lower quarter distribution uniformity (DU_{LQ}) of 70% or greater for installed irrigation systems. While such level of uniformity is often possible to achieve in instances where turfgrass area design is standardized -- such as athletic fields, etc -- this however is not a realistic standard for residential lawns which tend to be curvilinear in design to incorporate flow with mulch/plant beds and hardscapes.

Our final concern is in regard to the single, nationwide ET factor for calculating a water budget. We believe strongly that builders seeking the Water Sense label will avoid the complexities of a water budget and related calculations and simply opt to limit turf. A reduction in demand for turfgrasses would result in a far-reaching and negative impact for many stakeholders in the green industry, including seed companies, sod producers, equipment companies, and landscape management companies. Furthermore, designating a single ET rate ignores the regional climatic variations, differences in average rainfall, and variable soil characteristics across all regions of the country.

In summary, there is no research supporting any of the tenets of the Section 4.0. Turfgrass can be maintained with limited or no supplemental irrigation in many regions of the U.S, but this fact seems to get lost in the shuffle when the only concern is water savings on the outside portion of the home. Scientific studies have consistently proven that the latest irrigation technologies (smart controllers and efficient system design) result in considerable water savings and this can be accomplished without having to limit builders and consumers in their desire to plant turfgrass. We think the turf limitation will have serious consequences on the success of WaterSense and its adoption. Water wise management of landscapes should be an encompassing approach that considers erosion control, runoff management, solar heat gain, carbon sequestering, and overall sustainability. Turfgrasses positively impact all of these factors and should not be limited without proposing effective and equally functional alternatives. Climate diversity also should be accounted for when developing water management guidelines, as a blanket standard for all regions of the country would simply be irrational. We ultimately want to see WaterSense succeed, but we also know that many people want to plant, cultivate and enjoy turfgrass at their homes. We feel the current draft of the outdoor portion of the new homes specs will not satisfy this desire and will ultimately lead to the demise of the WaterSense new homes program.

Suggested Change (or Language): We respectfully request that EPA set aside the Outdoor Water Efficiency Criteria at this time. Based on reaction at the public hearings and the webinar the Agency hosted, the outdoor criteria has raised many concerns about the negative impacts these criteria will have on the environment and suppliers that serve the homebuilding industry. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water efficiency solutions that actually reduce water consumption and do not result in unintended consequences.

Commenter: Kevin Malone
Affiliation: Part of the green industry
Comment Date: July 3, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: Water conservation is a must but this is the wrong way to go about it.

Rationale: The proposed options under the new plan "Turfgrass shall not exceed 40 percent of the landscapable area" will do more harm than good. I fell very strongly this will be a step backwards for the direction we all want to go for protection the planet. The benefits of turfgrass are quickly overlooked. Health lawns produce oxygen, reduce the urban heat island effect, store and retain carbon, trap dust and air pollution, reduce noise, provides a fire barrier, filters ground water supplies, and controls erosion. It seems all the research on turfgrass has been pushed to the side.

Suggested Change (or Language): If the EPA wants to manage our water we need to look into education for homeowners that have no idea how to care for there lawn. Too many lawns are overwatered just in our local area. How about having a permit for homeowner? The permits will fund enforcement on basic state codes. A general specification for the country is not possible due to climatic condition and the growing living plants. Any new home buyer would require a basic classroom time to educate them on proper techniques on mowing, fertility and proper watering. We all need to do our part for the future.

Commenter: L. D. Hawkridge
Affiliation: Unknown
Comment Date: July 3, 2009

I speak to the issue of 40% limit on trufgrass on new homes construction. Covering the soils with an erosion control agent like turf grass is an important part of keeping topsoil out of our waters, stream, ponds, lakes, and oceans. Turfgrass also plays an important roll establishing areas where the family may recreate, sports, games and the like. Turfgrass does not need to be watered in New York State and others states as well although irrigation does keep it green and growing, it is not necessary to keeping it alive. Turf grass is also an establish positive component in the reduction of carbon in the air and helps balance and pushes towards carbon neutrality of a property.

Therefore for these reasons and more, the do not believe there should be a blanket standard or guide established to cover the whole country. A guide takes on a life of it's own when other agencies use the guide to establish their own ranking criteria as in LEED credits. I do believe in arid areas where irrigation is needed to keep grass alive, that alternative should be used to conserve water. These is are important to these areas but these conditions do not exist in areas of the country where rainfall is ample and these restrictions are unnecessary and in fact, harmful to the environment.

Commenter: Allan G. Schildknecht
Affiliation: WaterSense Partner, Irrigation Consultant/Designer; Member of ASIC, ASLA & Certified IA Irrigation Designer
Comment Date: July 3, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Seth Thomas
Affiliation: Unknown
Comment Date: July 3, 2009

I'm writing this email to inform you that I highly disagree with the section in your new water sense program that would require new landscapes to only have 40% turfgrass. Although I do agree that there are definitely things that need to be done to save our precious resource known as water, I do not think this is a wise way to conserve water.

As you probably know, grass serves as a cooling agent to the environment, but many people are not aware of the heat mountain theory. This theory suggests that as a certain area heats up, the heat rises and literally blocks and pushes rain clouds from entering the area.

I have not read what the water sense proposal recommends putting in the other 60% of the landscape, but I would imagine people are thinking that rocks, crushed granite, mulch, and artificial turf would be an alternative that would conserve water. However, just a teaspoon of common sense can be used to debunk these ideas. Rocks, crushed granite, and artificial turf absorb heat from the sun and makes the surrounding areas hotter so that when precipitation does occur, much of it will be lost to evaporation and/or runoff. Mulch contains high amounts of minerals, which is a good thing until the nitrogen and phosphorus, which can be harmful, is leached into waterways or other undesired areas especially since it won't have grass to take up most of those minerals.

Also, grass has received a black eye from water conservationists and it seems to be the first to be picked on when considering where we can cut water usage. The fact is, grass can survive extremely harsh drought conditions as proven by the San Antonio Water System (SAWS) 60 day drought study on turfgrasses.

With that said, I do believe that many people highly over water their lawns. Most of these people just need to be educated on how to make the most of their water. Also, I think that people should have a licensed and trained irrigation professional install irrigation systems, and then have them inspected to ensure efficiency and uniformity. Another solution is investing in at least a 6" layer of topsoil that has good water retention and filtration characteristics, if the existing soil is of poor quality. Other remedies would be simple cultural practices including annual aeration and raising the mowing height.

Water conservation is a serious matter in the United States, and I do believe that things need to be done to improve our efficiency. However, before we make a foolish decision, we should first conduct and/or review unbiased scientific research and then act upon the results.

Commenter: Glenn Dobbs
Affiliation: ASIC member, President of Valve And Filter Corp.
Comment Date: July 3, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Owen Regan
Affiliation: President, New York State Turfgrass Association
Comment Date: July 3, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

As President of the New York State Turfgrass Association, I am writing to voice our concerns regarding the U.S. Environmental Protection Agency's WaterSense draft specification for new home construction, section 4.0 "Outdoor Water-Efficiency Criteria." The WaterSense draft specification requires builders to limit the amount of turfgrass to 40% of the landscape area or utilize a complicated water budget. The idea of capping allowable turf coverage to 40% and replacing it with mulch or other hardscape options defeats the purpose of protecting the environment. At a time when attention to global warming, air pollution and concerns are making worldwide news, it is important to understand the many environmental, health, economic and community benefits turfgrass offers.

Our association provides grants for top university researchers to study all aspects of turfgrass maintenance and the impact of turfgrass on our environment. We have learned that lawns help minimize a property's carbon footprint by pulling carbon from the atmosphere and providing retention and storage. According to the NASA Ames Research Center, if people recycled grass clippings, leaving them to decompose on their lawn, the U.S. lawn area could store up to 37 billion pounds of carbon each year. In addition, Dr. Thomas Watschke with Pennsylvania State University has discovered that just 55 square feet of turfgrass provides enough oxygen for one person for an entire day. He also found that turfgrasses trap an estimated 12 million tons of dust and dirt released annually into the atmosphere.

Turfgrass plays an important part in improving our climate. Grassed surfaces moderate temperature by absorbing the sun's heat during the day and releasing it slowly in the evening. Also, roughly 50% of the sun's heat striking the turf is eliminated because grass plants absorb solar radiation during the photosynthesis process. According to a Maryland Turfgrass Survey, "The front lawns on a block of eight average homes have the cooling effect of 70 tons of air conditioning!"

We also believe that the steep slope ban on turfgrass in the specification should be eliminated. Turfgrass is better that any other plant in controlling soil erosion because of its fibrous root system. In addition turfgrasses actually preserve water quality because of its superior capability to trap and hold runoff. Water is filtered through the turfgrass ecosystem preserving our streams and rivers. Without turfgrass, there is no reduction to storm water runoff which puts our streams and rivers at risk.

In 2003, our association conducted a survey which found that the turf industry contributed 5 billion dollars in turf maintenance expenses to the economy in New York State. Although the proposed specification is currently "voluntary," already local governments have begun efforts to codify the measure. This would have a significant impact on a broad segment of the economy including turfgrass producers, landscapers, nurseries, and small businesses.

Turfgrass should not be reduced to enhance the effects on the environment because the rationalization is not based on sound science. According to Dr. Watschke, "The strategic use of turfgrass is the most sensible and economically feasible approach to countering the greenhouse effect in urban areas." Turfgrass provides a wild life habitat, reduces pest and allergy related problems, alleviates noise, provides a protective fire barrier around homes and creates a comfortable living space. We believe that the proposed specification which limits turfgrass is severely flawed and will create far reaching negative impacts on both the economy and the environment.

Commenter: John W. Ossa, CID, CLIA
Affiliation: Irrigation Essentials
Comment Date: July 3, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Allan G. Schildknecht
Affiliation: IA Certified Irrigation Designer, EPA Water Sense Partner, Former President of the Hawaii Chapter, ASLA and a member of the ASIC Education Committee
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Ryan Hanna
Affiliation: Dave Jones Plumbing & Heating (Tim O'Brien Homes, WI)
Comment Date: July 5, 2009

Topic: Service pressure and the use of a pressure-reducing valve.

Comment: Would the system still operate according to specifications if a PRV was only required at 80 PSI instead of 60 PSI?

Rationale: A PRV would be added expense, and would need to be installed on a fairly regular basis. The PRV may also require the use of an expansion tank that would increase costs even further.

Suggested Change (or Language): Increase limitations to 80 PSI max?

Topic: R4 Insulation

Comment: In the preliminary guidelines, the use of R4 insulation was needed for the insulation of the water piping. Is this still a requirement?

Rationale: Insulation may be needed in most scenarios to meet the guidelines, but when it's used, will it still require a value of R4? The R4 increases materials costs.

Suggested Change (or Language): Not require a R4 value.

Commenter: Ann Bates, Executive Director
Affiliation: Idaho Nursery & Landscape Association
Comment Date: July 6, 2009

The members of the Idaho Nursery & Landscape Association support the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: Jack MacKenzie
Affiliation: President of the Minnesota Turf and Grounds Foundation
Comment Date: July 6, 2009

To what end is the EPA attempting to create a "one size fits all" water management program and for what reason not include science based information that is readily available? The logic behind the creation of new regulations concerns me greatly. Why, when there is a responsible professional industry ready and willing to help formulate logical self regulation, is the EPA ignoring the vast knowledge and practical experiences available to them. The following material is an excellent example of how partnering with industry can benefit all.

Isn't the final goal of all entities working together the most optimum outcome? Thank you for your responsible actions regarding my/our concerns.

See Appendix A for a copy of the comments submitted.

Commenter: Michael Harrington
Affiliation: Harco Fittings, President Elect, Irrigation Association
Comment Date: July 6, 2009

Topic:
4.1 – At a minimum, the front yard shall be landscaped to meet the criteria in either option. The entire yard shall be landscaped to meet the criteria in either option where landscaping of the entire yard is financed, installed, or sold as an upgrade through the homebuilder. The entire yard shall also be landscaped to meet the criteria in either option when irrigation systems, pools, spas, or water features have been financed, installed, or sold by the homebuilder.

Comment:
If the EPA is going to support having any prescriptive requirements associated with the outdoor criteria, then the requirements should apply to the entire landscapable area, not just the front yard, regardless of whether an irrigation system, pool, spa or other water feature is installed.

Rationale:
Any language should treat the entire landscape equally.

Suggested Change (or Language):
Any option associated with the outdoor criteria shall apply to the entire landscapable area.

Topic:
4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment:
Any arbitrary limit on landscape plant material is not supported and should be removed from the specification. This national criterion, voluntary or otherwise, is inappropriate and not based on best available science

Rationale:
The practice of “the right plant in the right place,” works promotes local and adapted plant materials appropriate for each climate and geographical location. The 40% turfgrass limitation is an arbitrary limit placed on landscapes; local geographies, climates and markets should guide the make-up of landscape materials, including types of turfgrass, trees and shrubs.

Suggested Change (or Language):
The EPA should use best available science to produce a performance-based approach to landscape design criteria, rather than an arbitrary prescriptive approach. The EPA should continue the dialogue with all segments of the green industry on best practices and stewardship to determine the best performance-based criteria to implement as part of the new homes specification.

Topic:
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.

Comment:
The EPA should use the best available science, which will dictate that evapotranspiration adjustment factors should be determined based on geography and climate.

Rationale:
High irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. According to the EPA, many irrigation systems are using approximately 50% more water than what is needed by the landscape. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% water-use savings.

Suggested Change (or Language):
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic:
4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.

Comment:
This section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) in strips less than four feet wide can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. Therefore, the EPA should remove this restriction and employ performance-based criteria, rather than the prescriptive approach currently taken in the draft, to determine irrigation efficiency in these areas.

Rationale:
The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. In some areas of the United States four feet wide strips of turf may be inappropriate, in others it is a valuable part of the landscape that is much needed.

In many instances throughout the United States, areas of turfgrass of four feet wide are efficiently irrigated using methods such as drip, spray strip nozzles, and rotator-style nozzles, among others.

Suggested Change (or Language):
4.1.2 Turfgrass – Irrigation installed in strips less than 4 feet wide shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic:
4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment:
This section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States turfgrass is used as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes with this prescriptive approach would significantly adversely change the market, without any assurance of less water use or elimination of run-off. The Irrigation

Association believes that plant material for 4:1 slopes should be selected based on local climate, geography and markets.

Furthermore, the EPA should eliminate all prescriptive choices of irrigation methods and that the choice of plant materials in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:
Based on years of research, science and best management practice development, all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with little to no increase in run-off.

Soil Erosion Control and Dust Stabilization
Turf protects nonrenewable soil resources from water and wind erosion. Turf's high shoot density and root mass stabilize surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turf's high biomass matrix provides resistance to lateral surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turf can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked nonpoint surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.)

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):
4.1.3 <u>Slopes</u> – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Topic:
4.2 <u>Irrigation System</u>

Comment:
The EPA should believe in the value of a labeled WaterSense irrigation partner in these new home specifications, should use these specifications as a tool to expand the label's value. EPA has removed the requirement for WaterSense Partner designers and installers from the original draft citing issues related to "cost" and "availability." The green industry has worked and continues to work with the EPA in expanding the number of WaterSense partners available to install and audit irrigation systems. However, we would like to see more expanded data

regarding the claim that there is a significant difference in cost between a WaterSense® labeled and non-labeled irrigation professional especially when compared to best practice-approaches vs. human economic decision-making.

The EPA should implement a requirement that all irrigation systems installed upon a WaterSense® labeled new home be designed, installed and audited by a WaterSense® labeled irrigation partner.

Rationale:
As a public-private partnership, the WaterSense® program's irrigation partner label continues to grow throughout the irrigation industry, thus increasing the amount of efficient irrigation education and best management practice implementation throughout the United States. The Irrigation Association agrees with the EPA in standing behind excellence in efficient irrigation and feels that an essential tool to ensure that the irrigation partner label enjoys a high brand value is through the promotion of the label through the WaterSense® specifications for new homes.

According to the EPA, "…all too often, landscape irrigation wastes water—up to 1.5 billion gallons every day across the country. WaterSense irrigation partners can help you reduce your water consumption, save money, and maintain a healthy and beautiful landscape...." The EPA continues by stating "…when every drop counts, we count on our partners...." The Irrigation Association believes that an efficient irrigation system is multi-faceted; it needs high-level competence, best available technology and regular maintenance to ensure efficiency. The EPA should stand behind the labeled partners, as they have done the labeled products, through the specifications for new homes.

Suggested Change (or Language):
ADD Irrigation Partner Requirement – The WaterSense® program believes in the quality of work associated with the WaterSense® label. All irrigation systems shall be designed, installed, inspected and audited by a WaterSense® labeled irrigation partner.

Topic:
4.2.1 Post-installation audit – All irrigation systems shall be audited by a WaterSense irrigation partner. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Comment:
Irrigation system audits are an important component of any water-use savings program.

Though calculating distribution uniformity (DU) does measure how well water is applied to a landscape; it does not calculate efficiency. The WaterSense® program can be successful in significant water-use savings in new homes if a visual inspection is conducted on all installed irrigation systems and full audits conducted at random, with the irrigation system designer, installer and builder partner not knowing whether or not a full audit will be performed at the time of installation.

Rationale:
Variable conditions, including weather, play an important role when calculating DU. Weather in many areas often delays the test for days, sometimes weeks, until conditions allow a test to be performed. When there is a re-inspection/co-inspection required, this process may be delayed

even further. The Irrigation Association believes that based on the efficient products and services already included within the criteria, an assumption for high distribution uniformity exists. The Irrigation Association feels that the goals of the *Water-Efficient Single-Family New Home Specification* will be achieved without having to calculate each irrigation system's DU. DU measures how evenly water is applied to an area, not the rate of application. Water savings will be achieved through proper irrigation scheduling.

However, "spot-checking" irrigation systems through a traditional audit protocol will allow the program to keep the high integrity it is striving to achieve without increasing costs and the likelihood of significant delays in the labeling process.

Suggested Change (or Language):

4.2.1 Post-installation audit – All irrigation systems shall be visually inspected by a WaterSense irrigation partner. All audits conducted on an installed irrigation system shall be conducted on a random basis and should be conducted by a WaterSense® partner who is not the installer of the irrigation system. The irrigation system designer, installer and the WaterSense® builder partner shall not be aware of whether or not a full audit protocol or a visual audit will be conducted on the system. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Topic:
4.2.6 Irrigation controllers

Comment:
"Smart controllers" should be installed in irrigation systems.

Rationale:
Smart control technology is an integral part of any efficient irrigation system.

Overall water usage in a landscape can be reduced with proper installation and programming of a smart controller.

Suggested Change (or Language):
4.2.6 Irrigation controllers –Irrigation systems shall be equipped with irrigation smart control technology.

Topic:
4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment:
There are many variables that are taken into consideration when determining the best and most efficient way to irrigate plant material in a landscape. Climate, geography, location in the landscape, etc., all play major roles and the responsibility should be placed the irrigation designer to determine the best type of irrigation for each portion of the landscape.

Rationale:
Certified irrigation professionals are the most qualified to make the correct determination for each individual site and location.

Suggested Change (or Language):
Sprinkler and microirrigation installed in turfgrass and other plant material shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic:
Soils

Comment:
A key component to landscape design and water-use efficiency in a landscape is appropriate soil preparation. Neglecting its inclusion in the final specification is equitable to neglecting the key component to ensuring the landscape can thrive in a water-efficient manner.

Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Many of the proposals set forth in these specifications (including but not limited to 40% turfgrass restriction, 4:1 turfgrass slope restriction, etc.) would not be needed if performance criteria were put forward and the proper soil preparation were included in the specification.

Suggested Change (or Language):
<u>Soils</u> – During the construction process, the WaterSense® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant material, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist.

Topic:
The Use of the Words "If Installed"

Comment:
Throughout the draft specifications, the words "if installed" are associated to the installation of irrigation systems. The words "if installed" should be removed from the specification.

Rationale:
Irrigation systems are the only equipment referenced in the specification that is singled out by stating "if installed."

Suggested Change (or Language):
Remove "if installed" and replace with language referencing "installed irrigation systems."

Topic:
Definition of Landscapable Area

Comment:
The definition in the revised draft, though favorable to the landscape community, is confusing as it is not a widely-used definition. The specification should revert to the original definition as stated in the original draft specification. Due to the changes this will cause within the outdoor criteria, the EPA should accept the recommended changes throughout this document, in addition to the recommended definition change.

Rationale:
The definition of "landscapable area" as the building lot area not under the roof is not based on science nor is it the market accepted definition of "landscapable area."

Suggested Change (or Language):
Landscapable Area: The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Topic:
Water Budget Calculator – Peak Watering Month

Comment:
When performing steps 1B and 2A, it should be more clearly stated to use the same peak month for evapotranspiration and rainfall data in each area.

Rationale:
The data entered into the calculator may be misapplied, thus providing incorrect data at the outset.

Suggested Change (or Language):
Explicitly state, in detail, that the peak watering month data should be used in each step and that the same month's data needs to be used to determine the LWA and LWR.

Topic:
Irrigation Audit Guidelines – Data

Comment:
The WaterSense® Irrigation Audit Guidelines should reflect the changes recommended as part of the WaterSense® specifications for new homes.

Rationale:
There are many suggestions put forth have bearing on the specifics of the irrigation audit guidelines. In order for there to be uniformity throughout the specifications, the EPA should reflect the changes in the guidelines as well as the specifications.

Suggested Change (or Language):
Incorporate the recommended changes in the audit guidelines as well as the specifications for new homes with respect to visual inspections, DU, random audits, audit area, etc.

Topic:
Irrigation Audit Guidelines

Comment:
The Irrigation Association has developed a set of minimum guidelines to create a standardized procedure to perform an audit of a landscape irrigation system. These guidelines were published in May 2009 and ASABE standards have been reviewed and incorporated wherever possible. Consultation and review of the guidelines has been conducted with many irrigation auditors, contractors, statisticians, educators, irrigation consultants and the Irrigation Association Certification Board. The Irrigation Association urges the EPA to take the following changes into consideration for those irrigation systems that will be audited as part of the labeling process.

Rationale:
The guidelines were developed by the Irrigation Association and are intended to function as recommendations in the auditing of landscape irrigation systems. They have been designed to aid irrigation professionals in fieldwork procedures, techniques and performance calculations.

Recommendations and projections from the guidelines and their accuracy depend upon the quality of measurements and data provided by the individual user. However, the Irrigation Association makes no warranty, implied or expressed, as to the results obtained from these proposed procedures.

Suggested Change (or Language):
Implement the Irrigation Association recommended guidelines for an irrigation system audit, which can be found at http://www.irrigation.org/certification/pdf/AuditGuidelines_FINAL.pdf.

Commenter: William H. Sparrow, Jr.
Affiliation: Certified Irrigation Designer, Redmill Landscape and Nursery, Inc.
Comment Date: July 6, 2009

Dear Sirs:

As a Certified Irrigation Designer and an irrigation contractor, I would urge you to carefully consider the comments sent to you by The Irrigation Association (IA). The IA has long advocated sound irrigation practices and programs to increase the efficiency of irrigation, raise the awareness of proper irrigation methods, and promote professionalism within the irrigation industry. The comments submitted by the IA take into consideration the real world concerns and considerations of the industry while furthering EPA's goal to conserve water and resources. Any new government regulation will be better received if it is realistic in its methods and application.

By considering the comments of the Irrigation Association, your final rules can better reflect standards more easily incorporated into and adopted by the irrigation industry.

Commenter: William Wise
Affiliation: Irrigation Association of New Jersey - President
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Dean Weaver
Affiliation: The IrriTurf Co., Irrigation Contractor
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: The Ohio Irrigation Association
Affiliation: The Ohio Irrigation Association
Comment Date: July 6, 2009

The Ohio Irrigation Association

JC Wheaton	President	EPA WaterSense Partner
Bob Berghauer	Vice President	EPA WaterSense Partner
Martin Thomas	Treasurer	EPA WaterSense Partner
John Newlin	Secretary	EPA WaterSense Partner
Scott Knowles	Director	EPA WaterSense Partner
Bob Stidham	Director	EPA WaterSense Partner

We as the current Officers and Board Members of the Ohio Irrigation Association have adopted the following comments from The Irrigation Association concerning the second draft of the WaterSense Specifications for New Homes. As WaterSense Partners we see the value that this program has added for the consumer in increased sprinkler efficiency and reduced water waste and feel that the current draft leaves out many advantages of this program. We also feel that by incorporating the following changes into the final specifications the WaterSense program will better provide the full value available to the consumer.

See Appendix A for a copy of the comments submitted.

Commenter: Mike Schumacher
Affiliation: Unknown
Comment Date: July 6, 2009

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

Furthermore, the draft in its current form appears to be too much of a "one size fits all" approach. Climate, rainfall, and irrigation needs clearly vary widely across the U.S., yet the draft does not reflect these differences.

See appendix A for a copy of the comments submitted.

Commenter: Christopher Wright
Affiliation: Ewing Irrigation Products, ASIC Associate Member
Comment Date: July 6, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Daniel F. Benner
Affiliation: Hydro Environmental Inc
Comment Date: July 6, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Michael D. Dukes, Ph.D., P.E., Richard Beeson, Ph.D.
Affiliation: University of Florida
Comment Date: July 6, 2009

Topic: Water budget tool and documentation definition of ETo

Comment: Suggest pointing to one method accepted by the scientific community for a reference ET (ETo) approach. Suggest the ASCE-EWRI ETos for a short reference grass.

Rationale: Many "local" sources of ETo still use older methods that may under or over-estimate depending on given conditions. As an example one large water management district in Florida uses the Blaney Criddle approach which has been documented as overestimating ETo and is not appropriate for that climate. The ETos approach has been extensively tested and validated across a range of climates across the U.S. This one gap could result in 20% error and thus an over-estimate of the landscape water allowance. The ASCE-EWRI methodology has been adopted by the IA.

Topic: DU_{lq}

Comment: Suggest changing reference to DU_{lq} to DU_{lh} to be consistent with IA LISWM approach.

Rationale: Although the values for DU in the calculations appear to be somewhat conservative with respect to water conservation they could probably be a bit higher and match existing system DU_{lh} (especially if soil moisture uniformity is considered). You may be criticized in this version (as was done in the last) that the DU_{lq} numbers are too high for "realistic" systems. Switching to DU_{lh} would alleviate much of this problem and is supported by research and field results.

Topic: Irrigation type

Comment: Add rotary spray head nozzle as a choice.

Rationale: These nozzles are becoming increasingly popular. In some parts of Florida they have been incorrectly been labeled as "microirrigation". In reality, they have a similar uniformity as rotors. Adding this equipment as a specific type would eliminate the ambiguity I have pointed out.

Topic: Overall use of the tool

Comment: It still does not seem conservative with respect to water use. I input values that might be typical for a new landscape in Florida, 80% high water requirement turf (although I could argue that the turf is medium water requirement; see comment below), 20% low water requirement shrubs all spray irrigated and passed at 12,850 gal required compared to 13,090 gal allowed.

Rationale: If existing landscapes are not conservative in their water needs then the tool should force this to happen. As it exists, the tool does not do this.

Suggested Change (or Language): Suggest comparing the tool to "typical" regional landscapes to assess the water conservation potential. Then, elements of the tool could be tweaked to ensure 70% water budget of a "high" water use landscape (existing landscapes?). A 0.5 or 0.6 ETAF would appear to do this. Decreasing DU values of irrigation equipment would also achieve the same result.

Topic: Defining plants to various "water use" categories

Comment: This version of the tool eliminates uncertainties of the science behind crop coefficient values by assigning "low", "medium", and "high" categories to shrubs, turf and groundcover. Now, there is likely going to more confusion in the assignment of a particular plant species to these categories. Will Water Sense publish a master list of plant materials and what might be considered low and high water use? This type of master list probably isn't possible since the scientific data don't exist in much of the U.S.

Rationale: Subjective determination of "low", "medium" and "high" water use plants will limit the validity over the tool from one site to another.

Suggested Change (or Language): Suggest gathering a panel of experts and assigning a landscape plant coefficient with perhaps examples of plant species in each category that aren't exclusive but provide guidance for practitioners.

Commenter: Ed Lee
Affiliation: Summit Seed
Comment Date: July 6, 2009

Reducing lawns to 40% of the landscape makes as much sense as reducing Car Drivers to 40% of today drivers because of environment and safety issues.

- No, we are building cars with better gas mileage
- Promoting public transportation

The same approach should be taken with managing the water on lawns.

Turf is one of our solutions to better environment. We all known it is a very effective water purification systems and helps reduce global warmer by cooling our environment. Why are many cities promoting green roofs while the EPA wants to reduce green vegetation on the ground?

Yes, there needs to be a debate about improved water usage systems.

- What about systems that collect rain water that can be later used for irrigation? This will reduce the water running in our storm sewers and using a natural filtration system to purify the water. Salt Lake City Sewer Treatment facility grows turf that is used for water purification in a controlled scientific matter just for water purification. Why would we want to reduce our lawn size?
- Promote lawn core aeration for improved water infiltration for once again less rain runoff and more natural water purification.
- More regulations and education on proper use of irrigation.
  - o Maybe a separate meter is needed for irrigation?
  - o There is no question many lawns are over irrigated. IF water was more expensive we would become more creative in using water wisely.
- Tax credits for updating irrigation systems that uses water correctly. Just like there are tax credits for improving our energy consumption in our homes.
- Provide incentives to build a lawn with the correct soil profile that will encourage the turf to develop deeper roots and to increase water infiltration. The increase water infiltration will reduce water runoff into to our storm sewers and will make the turf less irrigation needy.
- Provide incentives to use turf species and varieties that are not as irrigation needy.

The last point is the water management needs to manage on a region to region area. The needs of Arizona are going to be different than Minnesota. The needs of Western Washington is going to be different that Eastern Washington. The better management of our water resources is needed.

Reducing the lawn by 60% is not a solution for a better environment. Net, net it will have an adverse impact on our environment.

Plants don't waste water – People do.

Commenter: Ruth Quade, Water Conservation Coordinator
Affiliation: City of Greeley Water & Sewer
Comment Date: July 6, 2009

Topic: Static Pressure

Comment: p. 5 says 60 says 80 psi for homes and p. 8 says 80 psi shower heads

Rationale: If you reduce the house to 60 psi, you can't make is 80 psi for the house

Suggested Change (or Language): Make it consistent.

Topic: WaterSense builder partner p. 3

Comment: Will the EPA certify them and supply a list of builders?

Rationale: Just a question.

Topic: Automatic compensating valves (p.8, Section 3.8)

Comment: The inspection of the ACV needs to be done before the drywall goes up.

Suggested Change (or Language): Move the inspection of this measure earlier up in the process.

Topic: Showerheads (p.8, Section 3.8)

Comment: Showerhead standard should be 1.5 gpm rather than 2.5 gpm

Rationale: 1.5 gpm will save more water and are still a good shower.

Suggested Change (or Language): Just change the 2.5 to 1.5

Topic: Dual showerheads (p.8, Section 3.8)

Comment: There shouldn't be dual showerheads in a WaterSense home

Rationale: That is anti conservation

Suggested Change (or Language): Eliminate that section or say no dual showerheads.

Topic: Dual showerheads and maximum flow rate (p.8, Section 3.8)

Comment: If you choose to leave the dual showerheads, clarify the maximum flow rate. Is it saying you can't have two 2.5 gpm showerheads? Is isn't clear.

Topic: Indoor Appliances (p. 9, Section 3.7.1 and .2)

Comment: All appliances should be WaterSense certified—not ENERGY STAR! Or use www.cee1.org standards in the meantime. Just because it is ES does not mean it is water conserving.

Rationale: Cee1.org at least is independently tested and doesn't just accept what the manufacturer says it is.

Topic: Evaporative Coolers (p. 10, Section3.8.1)

Comment: Plumbers tell me that the reservoir discharge outlet will not be easily visible.

Rationale: It will is usually installed on a roof or some other inaccessible place.

Topic: Irrigation Systems

Comment: Why only the front yard? The homeowner could move it in and install something horrible in the back yard. We see it all the time. The whole system should be installed and audited by a certified IA designer, installer and auditor.

Rationale: By not installing it right the first time, you are leaving the door open.

Topic: Turfgrass percentage (p.11, Section 4.1.1.1)

Comment: There should be a cap on the amount of total amount of sq ft of turf. 40% of 10,000 is still 4000sf of turf and 72,000 gallons of water if watered to ET which we know won't happen.

Topic: Turfgrass (p. 12, Section 4.1.2)

Comment: Grass should not be installed is strips less than 8 feet wide

Rationale: 4 foot wide strips of grass are impossible to water without overspray

Suggested Change (or Language): Change 4 to 8, unless watered by subsurface drip irrigation. This is pretty standard in municipal landscape codes.

Topic: Slopes (p. 12, Section 4.1.3)

Comment: A 4:1 slope is still pretty steep to put turfgrass.

Rationale: A slope of 4:1 draining to a greenbelt in the back of a property would be less wasteful than a 4:1 slope in the front yard draining to the street.

Suggested Change (or Language): Change the slope to 6:1 or 8:1 and specify that it can't drain to non permeable surfaces.

Topic: Irrigation System (p. 14, Section 4.2)

Comment: Two watering schedules posted

Rationale: I like the idea of two schedules, however since the establishment phase of landscaping is relatively short, I think the two schedules should be set up to water during the heat of the summer and during early spring and fall.

Topic: Irrigation system pressure

Comment: Operating pressure on the irrigation system is not addressed.

Rationale: Incorrect pressure on irrigation systems is the single biggest waste of water that we have found with our irrigation audits. Almost every house has too high of pressure.

Suggested Change (or Language): Recommend pressure or require pressure compensating heads.

Commenter: Michael Richardson, Ph.D., Doug Karcher, Ph.D, and Aaron Patton, Ph.D
Affiliation: University of Arkansas, Department of Horticulture
Comment Date: July 6, 2009

Topic: 4.1.1 Landscape design
4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment: We fail to understand why turfgrass has been chosen from the thousands of landscape plant options as the only plant to be limited in the design of a WaterSense home. What about petunias, roses, Bradford pears, oak trees etc.? Many of these plants have been documented to have water use requirements that are many-fold higher than drought-resistant turfgrasses. Using Option 1, a home-owner or builder can design a landscape in which all the plants are high water-use plants and the resulting landscape would still be considered a part of a WaterSense home, even though it would require excessive amounts of water to sustain. Even in the 40 percent allowable area for turfgrasses, if I plant a drought-sensitive Kentucky bluegrass on that 40%, the water requirements for that landscape would be higher than a landscape in which I planted 100% of the landscapable area to a drought tolerant bermudagrass or buffalograss. How does this promote water conservation in the landscape?

Rationale: There is no scientific basis for Option 1 in this document. The 40% number is pulled from thin air, it does not take into account the water use of the turfgrass or other plants in the landscape, and does not take into account geographic regions where natural rainfall would supply all the needs of the landscape without supplemental irrigation. We have been conducting research (see citations below) that clearly shows that specific turfgrasses within each major species and across species have very large water requirement differences and that drought-tolerant turfgrasses are already defined in the scientific literature. Why would these proven cultivars be eliminated from use in a water conservation program while allowing other plant species and cultivars, with no proven water savings, to be used in their place.

Richardson, M. D., D.E. Karcher, K. Hignight, and D. Rush. 2009. Drought tolerance of Kentucky bluegrass and hybrid bluegrass cultivars. Online. *Applied Turfgrass Science* doi:10.1094/ATS-2009-0112-01-RS.

Richardson, M.D., D.E. Karcher, K. Hignight, and D. Rush. 2008. Drought tolerance and rooting capacity of Kentucky bluegrass cultivars. *Crop Science* 48:2429–2436.

Karcher, D.E., M.D. Richardson, K. Hignight, and D. Rush. 2008. Drought tolerance of tall fescue populations selected for high root:shoot ratios and summer survival. *Crop Science* 48:771-777.

Suggested Change (or Language): Option 1 should be removed completely from this document.

Topic: 4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.

Comment: Although we are not familiar with local building ordinances around the country, it seems that most cities desire to have the sidewalk offset from the road and leave a strip of landscaped area between the sidewalk and the street curb. Whether this is the right approach or not is a question for another discussion. However, you have once again arbitrarily removed a plant from use in that area, but provide no solutions for what to plant in that area. Should it be trees, shrubs, mulch only? There is a safety component of using turfgrasses near the street in that drivers have a clear line of sight along the street and are able to anticipate animals or children moving into the street and can avoid accidents. The reverse is also true in that a clear line of site allows humans a better view of the street for safety reasons. If people start planting other types of landscape plants in these zones to be WaterSense compliant, there is a real danger that drivers would not be able to see clearly and be unable to avoid potential accidents.

Also, what about lots in which there are narrow lot-lines between houses and adjacent properties? If turf cannot be planted in narrow strips, then how would the homeowner move around their house?

In both of these instances, you have removed a plant that provides a function in these unique landscape sites and could still provide that function in a WaterSense home if appropriate grasses are chosen that require less water. It would seem more appropriate to encourage municipalities to change sidewalk design features rather than removing the only plant that can function in this niche location.

Suggested Change (or Language): Remove this language from the document.

Topic: 4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment: We recognize that slopes are some of the most difficult-to-handle sites in a landscape. The major problem with sloped sites is the potential for erosion and runoff that could carry sediments, nutrients, and other pollutants offsite and into surface water supplies. When sloped sites are prevalent in a landscape, the most functional plant to use on those sites is a plant with a fibrous root system. Trees, shrubs, and other plants have a reduced root architecture (taproot system) and are unable to hold soil, trap sediment and reduce runoff. Turfgrasses and other plants in the monocot family are the most effective plants for retaining soils on sloped sites. Are they difficult to maintain in those situations? Yes. Is there a potential for water runoff from those sites if the irrigation system is not designed appropriately? Yes. However, there is no plant that can hold soil better on sloped sited than turfgrass and you have now removed those plants in a WaterSense home. The use of mulch will not be feasible on 4:1 slopes as heavy rains will first carry the mulch, then the soil to the bottom of the slope and potentially offsite.

One of the disadvantages to properties with greater than a 4:1 slope is that there is increased potential for runoff from the property which places a higher load on urban storm water runoff. There has recently been increased interest in the use of rain gardens or collection berms to reduce water runoff from properties. A rain garden is a specially constructed area with a berm, planted with various plants, and designed to capture rain water from the roof of a house or building. Rain gardens fill with water after a significant rainfall event and the water slowly filters through the soil rather than running directly into a storm drain. The idea is that by capturing the rain water, it is possible to reduce storm water runoff and help protect the environment by recharging ground water, reducing flooding, etc. As with the DRAFT of the WaterSense document turfgrass is not traditionally recommended for rain gardens and instead native plants and wild flowers are commonly planted in these gardens. Some articles even state or imply that turfgrass on lawns has a negative impact on water quality. The research on this subject states just the opposite. Turfgrass is often used on farms and in urban areas to trap sediment and reduce runoff in efforts to improve water quality. Research on turfgrass systems states that

there is less runoff and sediment loss after rainfall from lawn areas compared to bare soil, shredded mulch and simulated urban forests, and that there is less runoff from turf than from prairie vegetation and crops. Turf affects the overland flow process of water to such a degree that runoff is from lawns insignificant and infrequent. Pesticide and nutrient concentrations in runoff from turf are low because most chemicals applied to turfgrass are trapped within the leaf, thatch and rootzone areas and do not contaminate water supplies. Despite some of this evidence, turf is not commonly used in rain gardens. Recent research out of the University of Wisconsin-Madison has documented the successful use of turf in rain gardens. Their reserach found that both (native plants and Kentucky bluegrass) bermed (rain garden type) treatments significantly reduced the amount of runoff and increased the amount of leachate when compared to both unbermed treatments. The unbermed native mixture treatments produced over two times more runoff than did the unbermed Kentucky bluegrass treatments. Water quality and use were similar for turf and native plants. These results indicate that the presence of a berm appears to be the major determining factor behind rain garden effectiveness, regardless of vegetation type.
http://www.soils.wisc.edu/soils/archives/abstr-07/P34716.pdf

The beneficial effects of turfgrass on water quality have been documented in the past and now research confirms that they can successfully be used in rain gardens to reduce runoff and increase the amount of water naturally filtered through the soil, which results in less urban runoff and can also result in reduced water use in the landscape.

Rationale: The best thing you could do here is not allow slopes of 4:1 in a WaterSense landscape.

Suggested Change (or Language): It is suggested that you set a maximum slope in the landscape such that builders are required to use retaining walls, terraces, etc. to eliminate steep slopes and eliminate the problems associate with those slopes. The addition of terraces will retain rain and irrigation water on the site and make the use of appropriate plants more feasible. If a sloped site is allowed, turfgrasses SHOULD be used in those areas, not eliminated, to reduce runoff water and retain sediments and nutrients.

Commenter: Kevin Johnson
Affiliation: American Society of Irrigation Consultants, IA & Water Sense Partner
Comment Date: July 6, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Kathy Nguyen
Affiliation: Water Efficiency Manger Cobb County Water System
Comment Date: July 6, 2009

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment.

Cobb County is committed to finding a way to build and grow in a more sustainable way and encourage the proper certification and training for professionals in the green industry and building industry. We see the WaterSense® *Water-Efficient Single-Family New Home Specification* as a vital opportunity to make that happen and appreciate an opportunity to participate in the public comment period.

Topic: 3.0 Indoor Water Efficiency

Comment:
There should be some general guidelines on plumbing systems. There are certainly new technologies emerging on the scene to improve both the efficiency of water using fixtures as well as the condition of the plumbing system and its ongoing reliability. If not in this draft, future consideration should be given to a requirement on manifold (home run) plumbing systems. These offer multiple potential savings in allowing the home owner the ability to isolate certain appliances and fixtures for repair and lessen loss associated with line failure. The PEX material is far more resistant to catastrophic failure due to frozen water lines. Individual service lines to each water using appliance and fixture, can greatly shorten the amount of time for hot water generation and arrival. It would seem the WaterSense® *Water-Efficient Single-Family New Home Specification* would be the appropriate means by which to encourage this building / plumbing practice.

Rationale:
Research done by the Partnership for Advancing Technology in Housing (PATH) indicates it is comparable if not more cost-effective for the builder.

Suggested Change:
An option either encouraging or requiring, where applicable, the adoption of a PEX Manifold or (home run) plumbing system, with a valve upstream of the manifold to allow for flushing.

Topic: 4.1 – At a minimum, the front yard shall be landscaped to meet the criteria in either option. The entire yard shall be landscaped to meet the criteria in either option where landscaping of the entire yard is financed, installed, or sold as an upgrade through the homebuilder. The entire yard shall also be landscaped to meet the criteria in either option when irrigation systems, pools, spas, or water features have been financed, installed, or sold by the homebuilder.

Comment:
If the EPA is going to support having any prescriptive requirements associated with the outdoor criteria, then the requirements should apply to the entire landscapable area, not just the front yard, regardless of whether an irrigation system, pool, spa or other water feature is installed.

Rationale:
Any language should treat the entire landscape equally.

Suggested Change (or Language):
Any option associated with the outdoor criteria shall apply to the entire landscapable area.

Topic: 4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.

Comment:
The EPA should use the best available science, which will dictate that evapotranspiration adjustment factors should be determined based on geography and climate. If a national water budget continues to be a part of the specification, we recommend that the ETAF be implemented at 80%.

In addition to the recommendation that the EPA use a 80% ETAF for the water budget calculator, significant comments are also included in this document focusing on the data and assumptions used within the proposed water budget tool. The EPA should consider all recommendations associated with the water budget tool, in addition to the recommended change to 80% ETAF. An 80% ETAF would be a significant increase in efficiency (as much as 50%) from the current market norm. Any evapotranspiration adjustment factor that is implemented as a “one-size-fits-all” ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or educational focuses of the green industry.

Rationale:
High irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. According to the EPA, many irrigation systems are using approximately 50% more water than what is needed by the landscape. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% water-use savings.

Suggested Change (or Language):
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic: Alternative water supplies for landscape irrigation

Comment:
The current draft is silent about incorporating the use of alternative water supplies and the addition of this section would provide an excellent opportunity to promote the use of such resources for landscape irrigation. The WaterSense® *Water-Efficient Single-Family New Home Specification* is missing a vital opportunity to encourage the use of these systems in compliance with local ordinances.

Rationale:
In addition to lessening the demand on domestic potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.

Suggested Change (or Language):
The specification should include an option, or incentives, to use alternate, non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes. Because of potential poor water quality, consideration should be made to accommodate the need for additional leaching fractions deemed appropriate to make the water useable in the landscape.

Topic: 4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment:
This section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States turfgrass is used as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes with this prescriptive approach would significantly adversely change the market, without any assurance of less water use or elimination of run-off. The Irrigation Association believes that plant material for 4:1 slopes should be selected based on local climate, geography and markets.

Furthermore, the EPA should eliminate all prescriptive choices of irrigation methods and that the choice of plant materials in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:
Based on years of research, science and best management practice development, all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with little to no increase in run-off.

Soil Erosion Control and Dust Stabilization
Turf protects nonrenewable soil resources from water and wind erosion. Turf's high shoot density and root mass stabilize surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turf's high biomass matrix provides resistance to lateral surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turf can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked nonpoint surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.)

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):
4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Topic: 4.2 Irrigation System

Comment:
The EPA should believe in the value of a labeled WaterSense irrigation partner in these new home specifications, should use these specifications as a tool to expand the label's value. EPA has removed the requirement for WaterSense Partner designers and installers from the original draft citing issues related to "cost" and "availability." This seems absolutely incongruous with the WaterSense program. An incentive program like the New Homes Program is exactly the kind of program that should insist upon the use of WaterSense Irrigation Partners for design and installation. If it is not required by WaterSense itself how can the program expect other municipalities and state governments to able to require it? Also without being given a competitive edge for getting their certifications, it becomes a defacto disincentive. Cobb County Water System continues to work with the green industry and EPA in expanding the number of WaterSense partners available to install and audit irrigation systems. We would like to see more expanded data regarding the claim that there is a significant difference in cost between a WaterSense® labeled and non-labeled irrigation professional especially when talking about the long-term potential savings of having certified professionals design and install the system. It is Cobb County's feeling much of the prescriptive requirements in the outdoor section could become mute if the system an landscape were designed form the outset by trained, licensed and certified professionals.

It is deeply disappointing to see WaterSense backing off this vital component that is essential to the ongoing vitality and integrity of the landscape and irrigation industry.

The EPA should implement a requirement that all irrigation systems installed upon a WaterSense® labeled new home be designed, installed and audited by a WaterSense® labeled irrigation partner.

Rationale:
As a public-private partnership, the WaterSense® program's irrigation partner label continues to grow throughout the irrigation industry, thus increasing the amount of efficient irrigation education and best management practice implementation throughout the United States. The Irrigation Association agrees with the EPA in standing behind excellence in efficient irrigation and feels that an essential tool to ensure that the irrigation partner label enjoys a high brand value is through the promotion of the label through the WaterSense® specifications for new homes.

According to the EPA, "…all too often, landscape irrigation wastes water—up to 1.5 billion gallons every day across the country. WaterSense irrigation partners can help you reduce your water consumption, save money, and maintain a healthy and beautiful landscape....” The EPA continues by stating “…when every drop counts, we count on our partners....” The Irrigation Association believes that an efficient irrigation system is multi-faceted; it needs high-level competence, best available technology and regular maintenance to ensure efficiency. The EPA should stand behind the labeled partners, as they have done the labeled products, through the specifications for new homes.

Suggested Change (or Language):
ADD Irrigation Partner Requirement – The WaterSense® program believes in the quality of work associated with the WaterSense® label. All irrigation systems shall be designed, installed, inspected and audited by a WaterSense® labeled irrigation partner.

Topic: 4.2.1 Post-installation audit – All irrigation systems shall be audited by a WaterSense irrigation partner. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Comment:
Irrigation system audits are an important component of any water-use savings program.

Though calculating distribution uniformity (DU) does measure how well water is applied to a landscape; it does not calculate efficiency. The WaterSense® program can be successful in significant water-use savings in new homes if a visual inspection is conducted on all installed irrigation systems and full audits conducted at random, with the irrigation system designer, installer and builder partner not knowing whether or not a full audit will be performed at the time of installation.

Rationale:
Variable conditions, including weather, play an important role when calculating DU. Weather in many areas often delays the test for days, sometimes weeks, until conditions allow a test to be performed. When there is a re-inspection/co-inspection required, this process may be delayed even further. The Irrigation Association believes that based on the efficient products and services already included within the criteria, an assumption for high distribution uniformity exists. The Irrigation Association feels that the goals of the *Water-Efficient Single-Family New Home Specification* will be achieved without having to calculate each irrigation system’s DU. DU measures how evenly water is applied to an area, not the rate of application. Water savings will be achieved through proper irrigation scheduling.

However, “spot-checking” irrigation systems through a traditional audit protocol will allow the program to keep the high integrity it is striving to achieve without increasing costs and the likelihood of significant delays in the labeling process.

Suggested Change (or Language):
4.2.1 Post-installation audit – All irrigation systems shall be visually inspected by a WaterSense irrigation partner. All audits conducted on an installed irrigation system shall be conducted on a random basis and should be conducted by a WaterSense® partner who is not the installer of the irrigation system. The irrigation system designer, installer and the WaterSense® builder partner shall not be aware of whether or not a full audit protocol or a visual audit will be conducted on the system. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Topic: 4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment:
The EPA can meet the goal of more than 20% water savings through a specification for the largest turf area to be a DULQ of .63 or greater.

Rationale:
The chart below, referenced from (http://www.ncwcd.org/ims/ims_info/SummaryEvaluationSprinklerSystems.pdf), represents the lower quarter distribution uniformity results from audits performed on residential sprinkler systems as well as large commercial type projects. Over 6,800 audits are represented in this table with the average results shown.

Sprinkler System Performance

Residences		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	4500	**52**		1.4	.70-3.70	**58**		.70	.10-2.30
Utah USU	164	**52**	18-80	1.57	.50-3.20	**49**	15-86	.76	.20-1.70
Colorado	973	**53**	20-89	1.34	.22-4.06	**54**	19-92	.62	.12-1.60
Oregon	398	**55***				**54***			
Florida MIL	576	**54**	11-89						
U of FL Case Study	19	**40**				**48**			
California Case study	19	**41**	16-54	1.61	.66-2.97				
Commercial		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ}%	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	166	**55**	7-82	1.49	.26-3.10	**55**	8-84	.74	.13-2.46
Colorado	20	**52**	6-77	1.36	.60-2.12	**50**	3-88	.60	.10-1.12
Arizona	7					**41**	20-56	.76	.57-.92
Texas	6					**58**	27-79		

* reflects the lower-third distribution uniformity information of 61 and 60 reduced by 6 points (weighted average)

According to the data used in the table above, the weighted average DU_{LQ} for residential sprinkler systems is .524. This is for the visually best performing sprinkler zones when the auditor selected a zone to do a catch can test. Case studies from Florida and California show even lower DU but these audits were for the entire turf area, not the visually best sprinkler zones.

Using the DU_{LQ} from the table above, one can meet the EPA WaterSense® goal to improve performance by 20%, by setting the value for sprinkler uniformity to .629, or rounded to .63.

Example:

DU_{LQ} x desired performance improvement:	.524 x .20 = .105
DU_{LQ} + increased performance:	.524 + .105 = .629 (proposed sprinkler DU)

This will represent a significant improvement because of the challenges of achieving high uniformity on small, curvilinear turf areas that will be typical in the proposed specification. The audit of the sprinkler system should be on the largest turf area and the DU_{LQ} calculated for that area.

Suggested Change (or Language):
4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of .63 or greater. When an audit is performed, distribution uniformity will be measured on the largest turf area during the post-installation audit.

Topic: 4.2.5 Rainfall shutoff device – Irrigation systems shall be equipped with technology that inhibits or interrupts operation of the irrigation system during periods of rainfall (e.g., rain sensors).

Comment:
We support the inclusion of rainfall shutoff technologies.

Rationale:
N/A

Suggested Change (or Language):
We would recommend adding a sentence that requires the rain shutoff sensor must be tested and found to be functioning correctly at time of evaluation.

Topic: 4.2.6 Irrigation controllers

Comment:
"Smart controllers" should be installed in irrigation systems.

Rationale:
Smart control technology is an integral part of any efficient irrigation system.

Overall water usage in a landscape can be reduced with proper installation and programming of a smart controller.

Suggested Change (or Language):
4.2.6 Irrigation controllers –Irrigation systems shall be equipped with irrigation smart control technology.

Topic: 4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment:
There are many variables that are taken into consideration when determining the best and most efficient way to irrigate plant material in a landscape. Climate, geography, location in the landscape, etc., all play major roles and the responsibility should be placed the irrigation designer to determine the best type of irrigation for each portion of the landscape.

Rationale:
Certified irrigation professionals are the most qualified to make the correct determination for each individual site and location.

Suggested Change (or Language):
Sprinkler and microirrigation installed in turfgrass and other plant material shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic: Soils

Comment:
A key component to landscape design and water-use efficiency in a landscape is appropriate soil preparation. Neglecting its inclusion in the final specification is equitable to neglecting the key component to ensuring the landscape can thrive in a water-efficient manner.

Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Many of the proposals set forth in these specifications (including but not limited to 40% turfgrass restriction, 4:1 turfgrass slope restriction, etc.) would not be needed if performance criteria were put forward and the proper soil preparation were included in the specification. Proper planting and soil preparation are further reasons a requirement for licensed or certified trained professionals is an essential need in the outdoor section.

Suggested Change (or Language):
Soils – During the construction process, the WaterSense® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant material, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist.

Topic: Definition of Landscapable Area

Comment:
The specification should revert to the original definition as stated in the original draft specification. Due to the changes this will cause within the outdoor criteria, the EPA should

accept the recommended changes throughout this document, in addition to the recommended definition change.

Rationale:
The definition of "landscapable area" as the building lot area not under the roof is not based on science nor is it the market accepted definition of "landscapable area."

Suggested Change (or Language):
Landscapable Area: The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Topic: Water Budget Calculator – Run Time Multiplier (RTM)

Comment:
The run time multiplier should be defined as $1/[.4 + (0.6 \times DU_{LQ})]$.

Rationale:
The method for determining run time multiplier (RTM) is stated incorrectly in the water budget tool as $1/DU_{LQ.}$ The correct method would be to use the equation as defined in the document *Landscape Irrigation Scheduling and Water Management* (IA 2005), which is $1/[.4 + (0.6 \times DU_{LQ})]$.

Suggested Change (or Language):
Run time multiplier (RTM) – $1/[.4 + (0.6 \times DU_{LQ})]$ (*Landscape Irrigation Scheduling and Water Management* IA 2005).

Topic: Water Budget Calculator – Distribution Uniformity (DU)

Comment:
Distribution uniformity for the new home specification should be .63 and should likewise be used in the water budget calculator so that the water budget tool reflects the performance standard for the irrigation system.

Rationale:
Distribution uniformity for the water budget calculator should match the specification for acceptable DU. Currently the calculator uses .65 but the specification calls for .70.

Suggested Change (or Language):
Change DU_{LQ} from .65 to .63.

Topic: Irrigation Audit Guidelines – Data

Comment:
The WaterSense® Irrigation Audit Guidelines should reflect the changes recommended as part of the WaterSense® specifications for new homes.

Rationale:
There are many suggestions put forth have bearing on the specifics of the irrigation audit guidelines. In order for there to be uniformity throughout the specifications, the EPA should reflect the changes in the guidelines as well as the specifications.

Suggested Change (or Language):
Incorporate the recommended changes in the audit guidelines as well as the specifications for new homes with respect to visual inspections, DU, random audits, audit area, etc.

Topic: Irrigation Audit Guidelines

Comment:
The Irrigation Association has developed a set of minimum guidelines to create a standardized procedure to perform an audit of a landscape irrigation system. These guidelines were published in May 2009 and ASABE standards have been reviewed and incorporated wherever possible. Consultation and review of the guidelines has been conducted with many irrigation auditors, contractors, statisticians, educators, irrigation consultants and the Irrigation Association Certification Board. The Irrigation Association urges the EPA to take the following changes into consideration for those irrigation systems that will be audited as part of the labeling process.

Rationale:
The guidelines were developed by the Irrigation Association and are intended to function as recommendations in the auditing of landscape irrigation systems. They have been designed to aid irrigation professionals in fieldwork procedures, techniques and performance calculations.

Recommendations and projections from the guidelines and their accuracy depend upon the quality of measurements and data provided by the individual user. However, the Irrigation Association makes no warranty, implied or expressed, as to the results obtained from these proposed procedures.

Suggested Change (or Language):
Implement the Irrigation Association recommended guidelines for an irrigation system audit, which can be found at http://www.irrigation.org/certification/pdf/AuditGuidelines_FINAL.pdf.

Topic: 5.0 Homeowner Education:

Comment:
Cobb County is concerned that there is no way to ensure the behavioral or subjective items in the new homes protocol will be accurately followed by homeowners once the home is in their possession. This would be particularly true if only a portion of the property is landscaped or has installed irrigation. The property owner can then install incorrectly high water use plant materials and inefficient irrigation methods.

Rationale:
Water savings from technology are typically sustainable, as the technology has an enforced threshold. Savings from choices or human operation are far more susceptible to fluctuation and variation.

Suggested Change:
Homebuyer will be given a list of acceptable landscape and irrigation options as well as a list of water saving appliances, if not provided by the builder to complete the landscape and fixtures purchases of their WaterSense Home.

Topic: Add 5.3 Realtor Education Section

Comment:
The realtor is the one who will be showing these homes and encouraging customers. The correct framework for sustainable water savings begins at point of sale. A course or instructional video could walk realtors through the benefits and special water saving features of the home.

Suggested Change:
Add 5.3 Realtor Education: Builder will host training walk through tours for real estate professionals or create a training video in order to educate those selling the WaterSense homes.

General Comments on the Inspection Process:

As it is currently laid out Cobb County has concerns about the training of those who will be inspecting.
How will this be handled?
Who is training?
Concerns about the cumbersome process particularly when talking about entire subdivisions: It seems unlikely to be able to get a builder to agree to this inspection schedule, the timeline is quite drawn out. Who ultimately signs off on the inspection paper work. It is not clear in the accompanying document.
Overall Cobb County supports the WaterSense New Homes Criteria but has some concerns over the sustainability of the water savings due to behavioral and maintenance practices of homebuyers. Also some concerns about the certification process and its likelihood to prevent wide acceptance of the program or to be overseen by untrained personnel.
Again Cobb County appreciates the opportunity to comment on the New Homes specification.

Commenter: Steven C. Augerot, CID, CLIA
Affiliation: Irrigation Association
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Jenna Smith
Affiliation: Seattle Public Utilities
Comment Date: July 6, 2009

Topic: 4.0 Outdoor Criteria

Comment: The purpose of the design criteria is to promote the most water efficient landscapes. If lots with less than 1000 sqft of landscapable area are exempt from landscape design criteria, then it is possible that they could install 100% turf and still qualify as a WaterSense home.

Rationale: Since keeping turf grass green is an intensive use of water, new homes with 1000 sqft of landscapable area in which 100% is turf do not represent a water efficient landscape.

Suggested Change (or Language): Require that properties with less than 1000 sqft of landscapable areas have at least some percentage in non turf (10% to 20%, for example).

Topic: 4.0 Outdoor Criteria – 4.2.7 Sprinkler irrigation

Comment: No popup sprayheads should be installed in areas smaller than 8 ft. Also, only high distribution uniformity type sprayheads should be allowed in areas used to maintain turfgrass.

Rationale: The design of the irrigation system should utilize the most efficient irrigation technologies available. Regular sprayheads are not consider very efficient so high DU heads should be used. High DU heads are not available for areas smaller than 8 ft.

Suggested Change (or Language): Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water planting other than maintained turfgrass. Sprinkler heads should have high DU rotary nozzles, 4-inch or greater pop up height and matched precipitation.

Topic: Homeowner Education – 5.2 Irrigation System

Comment: The record drawing of the system should include an itemized list of irrigation components.

Rationale: If a component of the irrigation system malfunctions or breaks, the homeowner should have an accurate description of the part to be replaced.

Suggested Change (or Language): If an irrigation system is installed, the builder shall provide the homebuyer with a record drawing (schematic) of the system, copies of the irrigation schedules, and a list of all sprinkler products installed (i.e. part description, make & model).

Topic: Water Budget Tool

Comment: The reference ET number from NOAA is an inch higher than the historical data I have in Seattle.

Rationale: Climate change may have an impact on ET. If so, using current data would produce a more accurate average peak ET number.

Suggested Change (or Language): Allow for more current data from local sources to be used.

Topic: Water Budget Tool

Comment: Fixed sprayheads should be replaced with high DU sprayheads.

Rationale: Sprayheads with the lowest DU do not represent water efficiency in irrigation. High DU spray nozzles can achieve a DU closer to rotors, have very little overspray and reduce run-off.

Suggested Change (or Language): Eliminate any use of Fixed Spray with the lowest DU coefficient in the water budget tool.

Topic: Audit Guidelines or 4.2 Irrigation Systems

Comment: There's no mention of whether the system appears to have a pressure problem. Before the irrigation system is designed, an on-site reading of the pressure should be taken to make sure the system is designed for proper pressure, or if too high or low, includes a pressure compensating valve.

Commenter: David McDonald
Affiliation: Seattle Public Utilities
Comment Date: July 6, 2009

Topic: Section 7.0 Definitions; Mulching material

Comment: This definition should make clear that, while non-organic mulches exist, organic mulches are preferred.

Rationale: Mulching material [why not just "mulch"] - Organic and/or inorganic permeable materials that will retain soil moisture, suppress weeds, and allow free movement of oxygen into and out of the soil.

Suggested Change (or Language): Suggested Revision (additions underlined, comments in brackets): Organic mulches are preferred because they also slowly feed the soil ecosystem as they break down, supporting beneficial soil organisms, improving soil structure and moisture-holding capacity, and enhancing plant growth. Organic mulches can be recycled locally from a variety of agricultural, forest, or landscape waste materials.

Topic: Section 4.1 Landscape

Comment: This section omits any mention of soil preparation, a critical element for root development, moisture-holding capacity and long-term water conservation. For national standards, WaterSense can reference the Sustainable Sites soil criteria (which EPA is a partner in) -- draft available now and full criteria slated to be published next November, at www.SustainableSites.org ; or the current Washington standards at www.BuildingSoil.org ; or basic information for homeowners in http://www.epa.gov/oppfead1/Publications/catalog/greenscaping.pdf

Suggested Change (or Language): 4.1.0 Soil Preparation - Soils will be prepared before planting by:
4.1.0.1 Discing or otherwise breaking up construction-caused compaction to a minimum 12-inch depth, and incorporating 1-3 inches of compost to restore soil organic matter, or by
4.1.0.2 Placing a minimum of 12 inches of reused or imported topsoil containing organic matter levels similar to native topsoils in the region, and
4.1.0.3 Protecting topsoils from recompaction by equipment after they are placed or tilled.
Refer to complete soil restoration standards and resources at www.SustainableSites.org

Commenter: Christopher Pine, CID, CIC, CLIA
Affiliation: C.Pine Associates, Inc. (also members of the Irrigation Association, Irrigation Association of New England and a WaterSense Partner)
Comment Date: July 6, 2009

The following comments have been researched and submitted by the Irrigation Association, which I fully support.

See Appendix A for a copy of the comments submitted.

Commenter: Neil Wilson
Affiliation: Distributor: Hydrologic, provider of Hc3 Smart System technology
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Sarah West
Affiliation: California Sod Producers Association
Comment Date: July 6, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's limitation on turfgrass is not supported by science, does not consider regional differences and requirements and may undermine the goals of the Water Sense Program. Our concerns are specific to the 40 percent turfgrass limitation, the ban on turfgrass for steep slopes and the nationwide .7 evapotranspiration rate for calculating the water budget without considering water management.

Rationale: The one-size-fits-all home specification imposes a 40 percent turfgrass limitation on landscapable areas of new home sites whether that home site is located in the arid desert of Palm Springs or in cooler, damp climates such as Fort Bragg, California. Under the proposed criteria, a homebuilder constructing a house in Phoenix could plant cool season Kentucky Bluegrass on 40 percent of the property-a scenario that would require non-stop irrigation--and qualify that house for the Water Sense label.

The proposed restrictions assign a negative environmental value to turfgrass. On the contrary, studies demonstrate the critical and many environmental benefits of turfgrass. Consider, for example, its cooling benefits. In some instances, ground level temperatures of grass-covered land areas are 50 to 70 degrees cooler than hardscaped (asphalt or concrete) areas[1]. Reducing turfgrass only contributes to the "heat island" effect that plagues urban areas across our nation and causes increased use of air conditioning.

In addition to its cooling properties, well-managed turfgrass plays a positive role in our efforts to confront climate change. A growing lawn that is fed by nutrients from grass clippings, sequesters carbon from the atmosphere, minimizing the property's carbon footprint[2]. Reducing the turf area and replacing it with mulch or hardscape makes an active carbon "sink" inactive, and it increase the carbon released back into the atmosphere by exposing decaying materials such as mulch. It also causes increased use of energy from increased use of air conditioning.

The benefits of turfgrass in regard to soil erosion are also well documented. According to the University of Minnesota[3], storm water runoff due to increased impervious surfaces has reduced the quality of runoff water that ends up over-burdening our storm sewer systems and ultimately pollutes our beaches, estuaries, and rivers. However, research shows that a healthy, well-managed lawn, with dense turfgrass, has near zero storm water runoff.

Fire safety in areas near the wildland/urban fringe requires low, fire resistant vegetation around the home, a critical benefit of lawns in much of the West.

A single, nationwide ET factor for calculating a water budget is ineffective for two reasons. First, we believe strongly that most of areas of the country do not have the necessary infrastructure to implement an ET-based water budget system. Second, a plant pallet necessary to fit a .7ETo water budget would die from overwatering by rain in some areas of the country.

The new draft specs require the user of the water budget tool to determine monthly ETo, access the International Water Management Institute World Water and Climate Atlas. To utilize the tool, the user must input exact latitude and longitude, after which an estimate of monthly ETo is provided. Please remember that the scientists who met with EPA on Feb. 10th discussed the lack of ETo data available nationwide. Therefore it is highly questionable how useful this tool can be in providing accurate ETo. We believe very few builders will go through the trouble of identifying their longitude and latitude and will opt instead for the 40% turf limit because it is easier.

Finally, an effort to create water efficient landscapes without addressing water management is senseless. To create a system that will harm the landscape industry, including those who maintain turf, without first addressing the primary source of water waste is premature and will be ineffective.

In summary, there is no research supporting the tenets of the Section 4.0. Turfgrass can be maintained with limited or no supplemental irrigation in many regions of the U.S. As reported by scientists on Feb. 10th, using the latest in irrigation technology, with smart controllers and efficient systems, will result in 20% (or more) water savings, without harming our industry or infringing on Americans' love of their lawns. It is also critical that the outdoor requirements be instituted in phases, as more regional information on ETo is available. We think the turf limitation will have serious consequences on the success of Water Sense and its adoption. We want to see Water Sense succeed, but we also know that American families need their lawns to provide safe play areas, to cool their neighborhoods, provide fire safe zones around their homes and to prevent storm water runoff. Water Sense should focus on the irrigation equipment and education necessary to ensure we don't use more water than our lawns need.

[1] The Lawn Institute; How The Environment Benefits From a Well-Maintained Lawn; http://www.turfgrasssod.org/lawninstitute/environmental_benefits.htm
[2] Dr. Ranajit (Ron) Sahu; *Technical Assessment of the Carbon Sequestration Potential of Managed Turfgrass in the United States; www.opei.org/carbonreport/*

Commenter: Andrew Smith
Affiliation: Individual WaterSense Partner
Comment Date: July 6, 2009

Topic: General comment

Comment: The replacement text previously offered to EPA by a broad coalition of industry experts and stakeholders is still valid and supportable and should become the basis for this specification.

Rationale: In September of 2008, comments were submitted on behalf of large landscape industry coalition, citing several concerns with the program's overall environmental impact and pointing out several suggested changes to the text to remedy these relevant concerns. Each change is supported not only by the best available science, but by a broad range of affected stakeholders. It is my position that the replacement text offered in September of 2008 is still valid and supportable at this time

In total, the document suggested the change, deletion or insertion of at least 25 separate items. It was the belief at the time that these suggested changes represented the opportunity to save a tremendous volume of water in the landscape. I still support these changes. In my analysis of the current draft, I have determined that of all the suggested changes offered previously on behalf of the coalition, EPA only accepted one suggestion from our group. That was the inclusion of a rain sensor.

Suggested Change (or Language): Adopt the suggested alternative criteria offered below which is based largely upon the coalition comment from September of 2008.

Topic: Deferral of the implementation of outdoor water-efficiency criteria

Comment: I will not be able to support the implementation of the outdoor water-efficiency criteria unless the document is altered substantially in a fashion that recognizes best available science, technology and practices.

Rationale: The perceived lack of inclusion and collaboration by EPA has caused justifiable and significant concerns to arise within the landscape industry. It can also be said that this real or perceived lack of inclusion has damaged the WaterSense brand within the landscape industry and many related trades. This is of great concern to me as the efficacy of any voluntary program relies upon the support of the affected industries. I have been and continue to be a strong supporter of the partner program and equipment labeling initiatives and I have invested significant time and resources in assisting EPA with the establishment and promotion of this program. Unfortunately, the draft specification as currently published will be an element of the program that I will not be able to support unless significant changes are made prior to implementation. Given the need for significant change, supplemental public comment period(s) will be necessary to ensure the validity of the text.

Suggested Change (or Language): Alter the current draft to incorporate the suggested replacement section 4.0 criteria or defer the implementation of the outdoor portions of this text until such time relevant input can be cultivated from an identified panel of stakeholders, with subsequent public comment periods as necessary.

Topic: Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment: This standard does not represent the EPA projected goal of "being a step ahead of the current market."

Rationale: The basis for this determination and the realities of the limitations on available equipment in combination with the nature of smaller home sites, renders this type of performance beyond the reach of the target audience.

Suggested Change (or Language): Adopt the suggested alternate language included below.

Topic: Alternative Water Supplies

Comment: The current draft is silent about incorporating the use of alternative water supplies.

Rationale: In addition to lessening the demand on domestic potable water, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.

Suggested Change (or Language): I suggest a very high profile role for alternative water strategies by advocating such use as an easy way for homes to earn the WaterSense label under the primary choices related to landscape design considerations.

Topic: Soils

Comment: The current draft text lacks the inclusion of criteria related to soils. This is a critical element that must be included.

Rationale: This is an area in which anecdotal evidence suggests little emphasis is placed. If the draft remains silent on soils, it is missing a significant key to water efficiency as the soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development.

Suggested Change (or Language): I have included a suggested basis for inclusion in the alternate text provided below.

Topic: Stormwater Management

Comment: The current draft seems to unintentionally reward hard, impermeable and non-vegetated surfaces.

Rationale: The draft specification is silent on this issue and it is the belief of many affected stakeholders and subject matter experts that homes meeting the draft criteria could create significant stormwater loading and diminished ground and surface water recharge.

Suggested Change (or Language): Work with appropriate stakeholders to create specific guidance for the purposes of reducing potential stormwater loading and runoff through the use of appropriate grading, soil, plant cover and drainage strategies.

Topic: Landscape Water Use Measurement

Comment: The draft text is silent on water use measurement. Any water efficient home should be equipped with equipment to facilitate the accurate measurement of water use.

Rationale: Water management is simply not possible without water measurement.

Suggested Change (or Language): I have included a suggested basis for inclusion in the alternate text provided below.

Topic: EPA's removal of the requirement to utilize recognized WaterSense partner for the design, installation and auditing of irrigation systems

Comment: EPA should reinstate the requirement to use a WaterSense partner the design, installation and auditing of irrigation systems using a phased in approach.

Rationale: The use of WaterSense partners in all applicable roles is critical to the success of this program. No advancement in efficient landscape irrigation practice or technology can achieve optimum performance unless capable and competent individual are engaged in the process. EPA has cited issues with cost and availability as being barriers to the use of WaterSense partners.

Suggested Change (or Language): To allay such concerns and allow the market time to adapt, I am suggesting a phased in requirement for the use of WaterSense partners that would take full effect in May of 2011 as outlined in the suggested replacement text below.

Topic: Science based policy

Comment: The current draft has been defended and supported by a series of opinions circulated by EPA staff and contractors. It has also been said by EPA staff that some effort has been made to mimic existing green building programs that have also been created by collective opinions rather than science or vetted industry standards.

Rationale: The new administration has expressed a commitment to develop policy based upon the best available science. The revised draft specification is still lacking scientific rigor. The suggestions offered in this document can all be supported by both science and affected stakeholders. The landscape industry recognizes the need to maximize water use efficiency in the residential landscape as part of an environmental management system. I believe this can be done without the significant lifestyle changes that would be required to comply with the current draft text. I am committed to the use of best practices and science as the foundation of the WaterSense program. There is little doubt the pressures of a growing population are forcing us to think differently about overall human impact. As we engineer solutions to the problems we face they should include the tremendous environmental benefits derived from a healthy, viable urban landscape which has the potential to offset many of the impacts that come with urban development.

Suggested Change (or Language): Adopt the entire alternate section 4.0 text supplied later in this document.

Topic: Net environmental impact

Comment: EPA has neglected significant concerns for some areas of the text that could create serious environmental harm.

Rationale: An irrigation system is part of a broader system that deserves consideration in order to maximize the net ecosystem service benefits and minimize the overall environmental impact of homes that would meet the proposed criteria. Below is a sampling of some areas of concern:

- Carbon sequestration potential
- Oxygen production
- Dust abatement
- Passive cooling
- Erosion control
- Wildlife habitat
- Ground water recharge
- Surface water recharge
- Storm water management
- Recreational opportunity

Suggested Change (or Language): Adopt and embrace the suggested section 4.0 replacement text supplied as part of this document as a means to maximize ecosystem service benefits while limiting potential environmental harm.

Topic: Section 4.0, Outdoor Water-Efficiency Criteria

Comment: It is my position that the entire draft outdoor water efficiency criteria, section 4.0, be stricken and replaced using the text below.

Rationale: The landscape criteria currently lack flexibility to adapt to local conditions. EPA has asserted that using a flat ETAF fulfills the desire for flexibility. This is a false assumption on the part of EPA as ETAF is derived through calculations including plant factor. A static ETAF implies a static plant factor. Local climate conditions vary significantly and consequently, so does the palette of native and adapted plants and turfgrasses. The deployment of a static plant factor would have the consequence of limiting plant selection to a very narrow band of plants that could be used throughout the US that may not be effective choices on a national scale. The suggestion that limiting the use and application of turfgrass has been justified by the suggestion that the irrigation industry is not capable of watering turfgrass effectively, particularly on slopes and in narrow bands. This is also a false assumption. Several other issues with the current text are addressed elsewhere in this document. Coalition comments from September of 2008 offered a full replacement text as part of the comment process. This suggested replacement text is founded in supported science and broad support from affected stakeholders.

Suggested Change (or Language): Delete the entire section 4.0 and replace as follows:

4.0 Outdoor Water Efficiency Criteria

4.1 Landscape – The goal of the water-efficient landscape criteria is to maximize landscape water use efficiency. EPA has developed two options for designing the landscape of WaterSense labeled new homes. Builders shall choose and implement one or both of the options. Option 1 allows the builder/landscape professional to design a landscape that is sustainable with a specified amount of potable water, i.e., a water budget. Option 2 allows builders to utilize locally acceptable non-potable water sources or forego supplemental irrigation. The entire yard shall be landscaped to meet the criteria.

4.1.1 Landscape Design

4.1.1.1 Option 1 – Develop the landscape design using a water budget approach. The evapotranspiration (ET) limit for the landscapable area shall be no more than 80 percent of the locally calculated reference ET (ETo).

4.1.1.2 Option 2 – Use alternate, non-potable water for all supplemental irrigation or utilize no supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes.

4.1.2 Mulching – Non-turf, non-hardscape areas shall include a 2- to 3-inch layer of mulching material. Mulch shall be organic or inorganic, permeable materials that will retain soil moisture, suppress weeds, and allow free movement of oxygen into/out of the soil. Measures shall be taken to prevent on- and off-site migration of mulching materials to undesirable locations.

4.1.3 Pools/spas – If installed prior to owner occupancy, it shall include furnished and installed cover assemblies designed to limit evaporative losses.

4.1.4 Ornamental water feature – Ornamental water features shall meet one or more of the following specifications:

- Incorporate a closed recirculation system.
- Sustain aquatic life.
- Provide support for local wildlife.
- Utilize reclaimed water.
- Utilize a naturally occurring water source on site where allowed by local, state or federal law. (i.e., spring, stream, rainwater) Water shall not be returned to source.

4.1.5 Soils – Whenever possible during the construction process, minimize site disturbance to preserve existing topsoil. Landscapable areas shall receive appropriate soil preparation according to locally accepted best management practices including soil amendments and tillage requirements to create an acceptable planting medium for shrubs, trees, ground covers, flowers or turfgrasses etc.

4.1.6 Grading/Site Preparation – Throughout the construction process, care shall be taken to minimize overall site disturbance. Grading and topsoil installation shall be performed when conditions are locally suitable for such activities and care shall be exercised to prevent excessive soil compaction. Any excessively compacted soils shall be corrected prior to landscape installation by tilling or other suitable means.

4.1.7 Slope considerations – Slopes in excess of 1 foot vertical rise per 4 feet of horizontal run shall be stabilized with low maintenance plant materials or native grasses. Alternative measures such as hardscape terracing are acceptable.

4.1.8 Plant selection – Plants shall be selected which are suitable to local climatic conditions, soil type, localized exposure and expected future cultural practice.

4.2 Irrigation System Design – The irrigation system, if installed, shall meet the following criteria:

4.2.1 Design and Installation

4.2.1.1 By May of 2011, the irrigation system shall be designed, installed, and audited by a WaterSense Irrigation Partner with the appropriate partner certification. A listing of irrigation partners by state can be found at http://www.epa.gov/watersense/pp/irrprof.htm EPA strongly suggests the utilization of WaterSense partners for design, installation and auditing of irrigation systems until this requirement is phased in.

4.2.1.2 The irrigation system shall be designed to sustain the landscape without creating runoff or direct overspray during a minimum continuous operating duration. This will be measured during the irrigation post-installation inspection. The minimum continuous operating duration shall be 5 minutes per zone.

4.2.1.3 Sprinklers and emission devices (e.g., drip, microirrigation) shall be selected to deliver uniform application of water, i.e., "matched precipitation." Distribution uniformity shall meet or exceed published guidelines in the most current version of the Irrigation Association's *Turf and Landscape Irrigation Best Management Practices.* http://www.irrigation.org/gov/default.aspx?pg=BMPs.htm&id=104

4.2.1.4 Sprinklers and emission devices shall be selected to eliminate overspray on hard surface and other non-target areas.

4.2.1.5 Sprinklers, emission devices and control mechanisms shall be integrated into the design in such a fashion that will prevent irrigation applications in excess of soil infiltration rate.

Preventing runoff through the use of appropriate programming of the control system is acceptable.

4.2.1.6 The irrigation system shall be equipped with technology that inhibits or interrupts operation of the landscape irrigation system during periods of sufficient moisture or rainfall (e.g., rain sensors, soil moisture sensors). The technology must incorporate adjustment mechanism(s) that allow local calibration to address specific site needs.

4.2.1.7 All irrigation system components shall be installed and operated according to manufacturer's specifications, locally applicable codes and industry accepted standards. Sprinkler heads installed adjacent to traffic areas and in turfgrass must be installed flush with grade to prevent physical damage from traffic and/or mowing activities.

4.2.1.8 The irrigation system shall include the installation of separate, dedicated water meters, sub-meters or flow sensors that meet applicable local standards or otherwise accurately measure irrigation water use in billing units used by the local utility. In the event such use is not monitored by the local utility, measurement units in either gallons or cubic feet are acceptable.

4.2.1.9 The irrigation system shall employ appropriate technology, as needed, to increase (e.g., booster pump) or decrease (e.g., pressure regulation) irrigation system operating pressure to assure sprinklers and emission devices operate within the manufacturer's suggested optimum pressure at the point of delivery.

4.2.1.10 The irrigation system using potable water shall limit maximum sustained design flow based upon acceptable plumbing standards for the safe operation of the type and size of water meter and/or service line.

4.2.1.11 Slope considerations**.** Any irrigation installed on slopes shall employ low application rate strategies in combination with "cycle and soak" control capabilities to minimize runoff potential. Sprinklers installed on slopes shall incorporate integral anti-drain valves to prevent loss of water contained in lateral pipes.

4.2.2 Irrigation Controller

Irrigation controllers shall contain the following features:

- Multiple programming capabilities – shall be capable of storing a minimum of 3 different programs to allow for separate hydrozone schedules.

- Multiple start times (cycling, cycle/soak, stackable start times) – shall be capable of a minimum of 3 different start times to allow for multiple irrigation cycles on the same zone for areas prone to runoff.
- Variable run times – shall be capable of varying run times, for example from 1 minute to 1 hour, in no more than 1 minute increments.
- Variable scheduling – shall be capable of interval scheduling to allow for watering on even day scheduling, odd day scheduling, calendar day scheduling, or interval scheduling.
- Percent adjust (water budget) feature – shall include a "Percent Up/Down Adjust" feature (or "Water Budget" feature) such as a button or dial that permits the user to increase or decrease the run-times or for each zone by a prescribed percentage, by means of one adjustment without modifying the settings for that individual zone.
- Capability to accept external soil moisture sensors, rain shut off devices, excess flow or leak detection devices or other sensors.
- Non-volatile memory or self-charging battery circuit.
- Complete shut off capability for total cessation of outdoor irrigation.

These criteria will be revised if and when EPA develops a final specification for weather-based or sensor-based irrigation control technology. Information on the development of a draft specification for these technologies can be found at http://www.epa.gov/watersense/specs/controltech.htm.

Note: Until such time, irrigation controllers having posted test results on the Irrigation Association's SWAT website (http://www.irrigation.org/SWAT/Industry/ia-tested.asp) shall be acceptable for use in WaterSense labeled home construction.

4.2.3 Final Inspection – Upon completed installation, the irrigation system shall be inspected for compliance with the design intent and all listed criteria during a walk-through inspection involving all interested parties including WaterSense partners utilized during construction as well as owner or owner's agent.

4.2.4 Management – Specific instructions shall be developed for ongoing irrigation system management that meet the following criteria:

- Specific instructions providing when and how to alter programming from lawn and landscape establishment programming to an ongoing, supplemental irrigation schedule.
- Programming measures employed to prevent runoff such as "cycle and soak" strategies.
- Precipitation rates for each zone, along with expected or calculated distribution uniformity for each zone
- Relevant information related to soil intake rate and suggested cycle and soak times necessary to prevent runoff.
- References to locally applicable weather data that includes ETo or other baseline data for determining irrigation programming.

- Crop coefficients (Kc) for each zone based upon plant water needs.
- Water budget calculation showing the amount of water needed each month based upon historical ETo using the billing units that the customer will see in their bill to facilitate comparison of water use to water budget.

4.2.5 Maintenance – Periodic maintenance is critical to ongoing irrigation efficiency. As part of homeowner education, a template checklist for self inspection of the irrigation system shall be submitted to owner or owner's agent. More comprehensive follow-up irrigation audits are highly recommended for water use exceeding the calculated water budget.

Topic: Section 7.0, Definitions

Comment: There are three definitions that require changes.

Rationale:

- The new definition of landscapable area is not based in science and does not provide a true representation of the actual landscapable area. This definition should revert to its previous form.
- DULQ incorporates reference to soil moisture audit analysis for which no vetted protocol exists. I support the notion of soil moisture audits, but cannot support the inclusion of this methodology until such time an agreed upon protocol can be developed.
- The water budget definition should be altered to conform with previous suggested replacement text.

Suggested Change (or Language):

Landscapable Area: The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Lower quarter distribution uniformity (DULQ) – Distribution uniformity is the measure of uniformity of applied irrigation water over an area. DULQ is the ratio of the average of the lowest 25 percent of measurements to the overall average measurement, often determined through the use of catch cans that evaluate the coverage of one or more sprinklers or drip systems.

Water budget – For the purposes of this document and the desire for simplicity, a simple equation of 80 percent of ETo is suggested as a solid baseline for plant selection and design purposes. If a state or local unit of government has established local guidance for determining a landscape water budget, then the local methodology shall supersede EPA's determination. This factor also includes allowances for distribution uniformity and management effectiveness. Additional guidance can be offered to translate projected water budget into gallons or cubic feet as necessary.

Commenter: Don Bermant
Affiliation: Granite Seed Company
Comment Date: July 6, 2009

See Appendix C for a copy of the comments submitted.

Commenter: Warren S. Gorowitz
Affiliation: Ewing Irrigation Products
Comment Date: July 6, 2009

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*.
I participated on the California Assembly Bill 2717 Landscape Task Force as the Vice-Chair of the Irrigation Workgroup. Assembly Bill 1881 was developed by the direction of AB 2717 Landscape Task Foce. As stated in California Assembly Bill 1881(enacted 2006): "…landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development…" I believe the statement within AB1881 can apply across the country and as such, I am hopeful the EPA will make constructive improvements that embrace the value of the outdoor living environment and recognition of its eco-system benefits prior to publication of its WaterSense® *Water-Efficient Single-Family New Home Specification*

We recommend to the EPA that decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. In our opinion a "One Size Fits All" approach will not work successfully. We can't stress enough that as the EPA moves forward with the final publication of this specification, that this specification is based on market data, best management practices and best available science.

See Appendix A for a copy of the comments submitted.

Commenter: Michael Igo, PE, LEED AP, CID, CIC, EPA WaterSense Partner
Affiliation: Irrigation Consulting, Inc., Pepperell, MA
Comment Date: July 6, 2009

Given the draft of the WaterSense Specifications for New Homes, it is the opinion of the writer of these comments that it is virtually impossible to make widespread and blanket criteria for a nationwide program in a country with greatly varying climates and irrigation markets. The EPA decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. We also recommend to EPA that the comments submitted by the Irrigation Association in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, we urge the EPA to take into consideration the comments below from the irrigation industry, as they are based on market data, best management practices and best available science.

See Appendix A for a copy of the comments submitted.

Commenter: Nate Nivens
Affiliation: City Meter, Inc
Comment Date: July 6, 2009

Dear Mrs. Frace,

I have reviewed the Revised Draft Water-Efficient Single Family New Home Specification document dated May 8, 2009. I believe the specification implements many policies and practices which will improve water system efficiency through water usage reduction. I commend the US EPA's efforts to implement policy which will lead to improved water usage efficiency and conservation of our valuable water resources. Water system infrastructure is comprised of both water and sewer systems. The revised specification focuses primarily on the water supply side efficiency and does not address sewer system efficiency directly. Improvements in the water supply side efficiency and reduced usage will have a positive indirect impact on sewer system capacity utilization; these improvements do little to mitigate the source of sewer system capacity issues - wet weather infiltration and inflow. Wet weather infiltration and inflow is ground water or rain water which finds its way into the sewer system through damaged piping or illegal plwnbing connections. Several major studies have found that between sixty to eighty percent of infiltration and inflow flows emanate from private property sources. Peak wet weather infiltration inflow flow capacity is necessarily used to size wastewater collection and treatment system assets. Eliminating extraneous wet weather flows increases wastewater system efficiency, reduces the size of infrastructure necessary to serve a community and decreases ongoing operational expenses.
The revision of this standard gives the US EPA the opportunity and a suitable platform to require sewer metering as a means of ensuring efficient usage of wastewater system resources. Comparison of sewer meter readings to water meter readings over a finite period of time allows the following:
• Estimation of water used for irrigation purposed (in a water tight system) or the determination of leaking private property lines. (Water Meter Volume> Sewer Meter Volume)
• Determination and quantification of wet weather infiltration and inflow. (Water Meter Volume < Sewer Meter Volume)
I request the US EPA consider requiring sewer metes be used in all WaterSense approved homes. More information on sewer meter technology can be found at http://www.city-meter.com

Commenter: Todd D. Cradit
Affiliation: Irrigation by Design, Inc.
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: R. David Pearl
Affiliation: President / CEO, The *CISCO* Companies; Members of The American Seed Trade Association; Indiana Seed Trade Association; Midwest Regional Turf Foundation; Ohio Turfgrass Foundation; Michigan Nursery and Landscape Association
Comment Date: July 6, 2009

I represent a company that has a major portion of our business based upon the turfgrass industry. We distribute millions of pounds of seed throughout the Midwest region of the United States, in addition to many allied products such as fertilizers, chemicals and erosion control products. The language contained herein would result in detrimental harm to our company as well as multiple other companies in our region. I would urge the EPA to re-evaluate their stance on this criteria immediately.

See Appendix C for a copy of the comments submitted.

Commenter: Dale Devitt
Affiliation: University of Nevada Las Vegas
Comment Date: July 6, 2009

Topic: Simplify the current version

Comment: 1) Present a first version that is much simpler than the current approach but with the goal of attaining the desired water savings. If the goal is 20% I believe this will be very easy. However, if the goal is significantly higher some tighter thresholds will have to be implemented.

Topic: Standardized ET approach

Comment: 2) Move forward with the idea of irrigating based on potential ET. However, it will be critical that a standard ET approach be taken, otherwise some regions will be rewarded greater amounts of water based on inaccuracies associated with outdated potential ET equations. Clearly the Penman Monteith (grass) equation is the gold standard and should be recommended.

Topic: Sophisticated irrigation clocks

Comment: 3) Sophisticated irrigation clocks that run off of potential ET estimates should be recommended. However, these clocks do require plant information that is based on very soft science. Our studies still have demonstrated a 20% savings. With time these coefficients can be improved upon within each region. These clocks should also have rain-out sensors.

Topic: Uniformity of irrigation systems

Comment: 4) Set a standard for the uniformity of the irrigation system such as a DU of 0.65. This would be required on the largest turfgrass areas. However, the DU would not be used in the landscape water balance approach.

Topic: Irrigation design

Comment: 5) Require that the irrigation system be designed based on a zonal irrigation approach.

Topic: Leaching fractions

Comment: 6) In regions where water quality is an issue (southwest, parts of southeast) allow for a leaching fraction run time multiplier. Although we recommend a 15% leaching fraction, this is based on an irrigation system that meets high uniformity standards, such as a Hart and Reynolds CUC of 0.80 (~DU of 0.75). So, if the DU standard is set at 0.65, I would feel more at ease if the leaching fraction were raised to 20%.

Topic: Deficiencies in the landscape coefficient approach

Comment: 7) Avoid the landscape coefficient approach; this was a point of great concern, as there is really very little data to support this approach. Clearly the program should be based on sound science. Perhaps in the future - Phase 2,3,4 this could be addressed. However, as stated earlier we recognize that the irrigation clocks require plant information - this will need to be provided by Cooperative Extension on a region by region basis.

Topic: Use information from climatologists

Comment: 8) If effective rainfall is to be included it will need to be based on feedback form climatologists in each region.

Topic: Potential ET allowance

Comment: 9) The final decision is to select what percentage of potential ET the landscape will be allowed. The current value of 0.60 is too low. Although there was a general agreement on a value of 0.80, I would suggest that this be decided on a region by region basis. I think the group was convinced that even if the landscape is irrigated at 100% of potential ET, significant savings would be achieved. I think upfront you will need to indicate the water savings the program is shooting for to justify the steps included. I think if all of the above steps are incorporated, saving of perhaps 40% might be realized in many cases.

Topic: Landscape area

Comment: 10) I can only speak for myself but I think stating that only 80% of the landscapable area be landscaped is also a good idea (regardless of plant type). This would prevent wall to wall plants, forcing the landscapers to incorporate open areas in the design. Again, my research would suggest that this alone should lead to 20% savings compared to the 100% plant cover.

Topic: Plant lists

Comment: 11) Some effort should be taken to generate acceptable plant lists for each region. In the southwest we want to discourage the planting of tall fescue. We also want to discourage the planting of ornamental trees that develop canopies that grow larger than the rooftops. Although studies have demonstrated energy savings with large trees that shade the house they have not demonstrated that the energy savings justify the cost of additional water.

Topic: Cooperative Extension

Comment: 12) Develop a strong tie to Cooperative Extension. Although EPA can implement the program, the long term success of the program will be linked to Cooperative Extensions willingness to embrace this tool as a way of achieving water savings on a community basis throughout the entire United States.

Topic: Funding

Comment: 13) I think this is an area of research that needs funding. I am not suggesting that EPA be the funding agency but perhaps EPA could assist in finding potential federal funding opportunities.

Commenter: Terry J. Little, ASLA ASIC
Affiliation: WaterSense Partner, IA certified golf irrigation designer, Licensed Landscape Architect – Texas & Kansas
Comment Date: July 6, 2009

See Appendix B for a copy of comments submitted.

Commenter: Kurt K. Thompson, Water Sense Partner, IA Certified Contractor, Designer, Auditor, Conservation Manager, IWMS Certified Site Water Planner
Affiliation: K Thompson & Associates
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Denne Goldstein
Affiliation: Irrigation & Green Industry Magazine
Comment Date: July 6, 2009

Please enter my objection to your proposal. As publisher of an industry trade magazine, I feel that you have not really taken the time to investigate all aspects of your proposal and the impact it will have. Our industry employs hundreds of thousands, generating more than $75 billion into the economy on an annual basis. Are you suggesting another round of unemployment for members of our industry? I urge you to reconsider some of what you are proposing.

See Appendix A for a copy of the comments submitted.

Commenter: Jeff Miller, Executive Director
Affiliation: Virginia Nursery & Landscape Association
Comment Date: July 6, 2009

The 729 members of the Virginia Nursery & Landscape Association support the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: Jeff Miller, Executive Director
Affiliation: Virginia Green Industry Council, Inc
Comment Date: July 6, 2009

The members of the Virginia Green Industry Council, representing the green industry associations in the Commonwealth of Virginia, support the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: Joel D. Jackson, CGCS
Affiliation: Executive Director, Florida Golf Course Superintendents Association
Comment Date: July 6, 2009

Dear Sirs,
I completed the comment form on the EPA website, but am not sure that message went to this address. Let me summarize by saying that the Water Sense initiative is an excellent opportunity to educate the public about landscaping and irrigation design and system use.
But setting absolute limits on how and what private citizens can have on their private property goes a step to far. People waste water, not turfgrass. People with only 40% turf will still overwater if they don't know any better. That's where good education and promotion comes in.

Also, setting one rule for irrigation management without regard to varying regional, climatic conditions is well pretty darn ludicrious. One set of plant management guide lines to cover semi-arid to sub-topical plants and climates just isn't reasonable, practial, logical or very smart. I suggest that those restrictive sections of the Water Sense proposal utilize and refer residents and others to use best management practices and/or agronomic/horticultural guidelines developed by state land grant universities across the country. They have pertinent scientific data on water and nutrient requirements needed in the various regions of the country.

Let's be smart about this Water Sense initiative and get it right from the get go! Thank you.

Commenter: Kathy M. McCarthy
Affiliation: Turf Seed Manager, The *CISCO* Companies; Members of The American Seed Trade Association, Immediate Past Chair of Lawn Seed Division of ASTA; Indiana Seed Trade Association; Midwest Regional Turf Foundation; Ohio Turfgrass Foundation; Michigan Nursery and Landscape Association.
Comment Date: July 6, 2009

I represent a company that has a major portion of our business based upon the turfgrass industry. We distribute millions of pounds of seed throughout the Midwest region of the United States, in addition to many allied products such as fertilizers, chemicals, and erosion control products. The language contained herein would result in detrimental harm to our company as well as multiple other companies in our region. I would urge the EPA to re-evaluate their stance on this criterion immediately.

See Appendix C for a copy of the comments submitted.

Commenter: Eddy Edmondson
Affiliation: Texas Nursery and Landscape Association
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Aaron Gagne, Irrigation Designer
Affiliation: Irrigation Consulting, Inc. EPA WaterSense Partner
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted

Commenter: Tom A. Reynolds, CID
Affiliation: Water Balance, LLC
Comment Date: July 6, 2009

The following comments are to serve as my official comments as an irrigation specialist since 1977 and a professional consultant since 1993. My comments reflect my preference for science-based regulations and specifications. I also favor and prefer establishment of a specification that is somewhat more difficult to achieve than one that is too easy to achieve. Those persons in the nation which are new to precision irrigation may need to work harder than some of us who have been steeped in that objective for some time. This could lead to certain existing products becoming obsolete, e.g. buried barb-fittings. I subscribe to robustness in design and construction, not merely “flash-in-the-pan” initial performance. I oppose paths of least resistance in favor of paths of continuous improvement. New systems must have very high initial performance because physical performance only declines over-time. Fortunately, this can occur just as closed-loop feedback from the system, the soil, and the plant begins to perfect water management.

In Arizona, a few problems exist in landscape design, irrigation system designs, system construction, and soil and water management practices in “master planned” common areas surrounding the homes which this specifications aims at. One would expect common area irrigation systems to be addressed ASAP.

In general, I applaud your efforts, and await further fair, scientific, yet challenging refinements.

Topic: 4.1.1 Landscape Design

Comment: Plant density, also canopy area, has not been factored, nor has canopy expansion during five or more years a new home’s landscape is maturing.

Rationale: Though an inconvenient truth, I concur with Burt and Styles, that only when canopy cover reaches 65%-75% is it proper to use the entire area.

Suggested Change (or Language): Apply a percent area cover to the water budget tool, and challenge stakeholders to create water budgets for Years 0-3 (or 4, or 5), and Years 5 and beyond.

Topic: 4.1.1.2 Option 2 Water Budget Tool

Comment: The ETAF has been simplified to a fault. A rather concise work is available to correct that which has be omitted.

Rationale: This is too important and not trivial. An expansion of the specification is warranted, by reference, in a footnote, if the authors concur.

Suggested Change (or Language): Incorporate the white paper by California staff regarding the ET Adjustment Factor (ETAF White Paper_012508_2_.doc / author reported to be malemi). Provides suitable scientific evidence for the setting of the factor, as well as excellent context for this discussion and the diversity of stakeholders.

Topic: 4.1.1.2 Option 2 Water Budget Tool

Comment: Step1B: No apparent resource for "approved" local ET_O. No mention of species-specific adjustment factors (coefficients). Considerable work has been completed throughout the irrigated West, affording reasonable basis for design and maintenance.

Rationale: Medium and low-water use ground-cover, trees and shrubs need to be grouped in like-water requirement classes, and then discretely irrigated by separate valves, albeit a path of certain resistance and slightly higher development cost. Some ET_O sources are very robust, while others are not.

Suggested Change (or Language): Give a "nod" to those who will design systems that are capable of irrigating according to plant needs, especially increasingly popular, and lovely, individual plants irrigated by drip systems. Landscape designers might wish to begin laying out plants in this manner, keeping irrigation infrastructure front of mind.

Topic: 4.1.2 Turfgrass

Comment: Why should this specification dictate a landscape design feature? We urge the EPA to employ performance-based criteria, rather than the prescriptive approach currently taken in the draft, to determine irrigation efficiency in these areas.

Rationale: If the system complies with 4.2.3, and meets the requirements of 4.1.1.1 or 4.1.1.2 then what difference does it make?

Suggested Change (or Language): Strike 4.1.2 entirely.

Topic: 4.2.1 Post-installation audit – All irrigation systems shall be audited by a WaterSense irrigation partner. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Comment:
Irrigation system audits are an important component of any water-use savings program.

Though calculating distribution uniformity (DU) does measure how well water is applied to a landscape; it does not calculate efficiency. The WaterSense® program can be successful in significant water-use savings in new homes if a visual inspection is conducted on all installed irrigation systems and full audits conducted at random on a minimum of 60% of non-custom homes. The irrigation system designer, installer and builder partners must not know whether or not a full audit will be performed at the time of installation. All custom-built homes require rigorous irrigation auditing.

Rationale:
DU measures how evenly water is applied to an area, not the rate or frequency of application. Water savings will only be achieved through proper irrigation scheduling, which demands soil moisture monitoring, proper plant nutrition, and soil management (albeit a path of resistance among those merely profit-driven).

Suggested Change (or Language):
4.2.1 Post-installation audit – All irrigation systems shall be visually inspected by a WaterSense irrigation partner. All audits conducted on an installed irrigation system shall be conducted randomly on a **minimum of 60% of non-custom homes.** These audits and visual inspections should be conducted by a WaterSense® partner who is not the installer of the irrigation system. The irrigation system designer, installer and the WaterSense® builder partner shall not be aware of whether or not a full audit protocol or a visual audit will be conducted on the system. All custom-built homes require rigorous irrigation auditing. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Topic: 4.2.3 Runoff/overspray

Comment: Sidewalks leading to front entrances, smaller, curvilinear turf areas, and even the best, new rotating multi-angle, multi-stream nozzles make this specification dubious. I suppose the narrow sidewalks could have a slight side-slope so water spraying across them doesn't just run straight to the gutter. All turf areas could have some kind of plant border so that the necessary over-streams would land in a plant area, or turf heads could be in-set from turf edges, and drip irrigation installed around most turf edges. Wind conditions during auditing could cause false determinations.

Rationale: Some over-spray can and should be tolerated. Run-off is primarily a function of system (run-time and cycle & soak), plant (thatch) and soil (chemical and physical) management. If 60% of the landscape is drip-irrigated, and EU's of 85% are typical, the weighted "DU/EU" for the entire project follows the drip zones, not the sprinkler zones.

Suggested Change (or Language): Consider Gold and Platinum Ratings for those that accept the challenge of DU_{LQ} of 70 percent or greater, and intend to aim higher. Some over-spray will be tolerated, and even perhaps necessary to achieve high DU's certain plant edges.

Topic: 4.2.4 Distribution Uniformity

Comment: Should be "Area-Weighted Distribution Uniformity/Emission Uniformity (DU/EU)." But, really the problem here is that DU/EU is not a single precision factor, subject to measurement errors and other temporal factors. Even more dynamic and illusive is Emission Uniformity for the drip irrigated zones. The size of the area will affect the determinations of DU. It serves nobody to gloss over the vagaries of the determinations of DU and EU. But, find comfort that we are refining the concepts and the practical means for making these estimates, and more effective and efficient means of irrigating will replace obsolete irrigation devices.

Rationale: We are evolving to meet the challenges.

Suggested Change (or Language): Consider Gold Ratings for those that accept the DU_{LQ} of 70 percent easily, but a Platinum Rating for those intending to aim even higher. When an post-installation audit is performed, distribution uniformity will be measured on the largest turf area at the site.

Topic: 4.2.6 Irrigation controllers

Comment: If the market only understood and demanded what landscape water managers could be providing, we think they might do an excellent job irrigating according to plant needs with the system performance data, historical and recent climatologically data, and a bit of soil moisture monitoring presently within their grasp. Any of several conventional irrigation controller products, along with a meeting with the Certified Irrigation Designer could be brought to bear on this important subject. It requires real change, a fair bit of competent field work, and rejection of counter-measures thrown up by some intended, I think, to fog out the opportunities.

Unfortunately, water providers depend on water sales to keep afloat. Either public or private, returns to investments in water use efficiency may not last long enough to return the investment. Others just think promotion of measure and verify paths are over-thinking.

Flow monitoring, particularly accumulative flow accounting by station is vital, but can wait.

Rationale: Last week's Reference ET data is the best estimator of this week's ET requirements, and available on-line in about 2 minutes across much of the West. Historical Eto is a good check. Only soil moisture monitoring can perfect that estimate.

Suggested Change (or Language): Your explanation of the current requirements is adequate, and your forecast for the future is also helpful.

Topic: 4.2.7 Sprinkler Irrigation

Comment: Pop-up height restriction goes too far.

Rationale: Depending on turfgrass variety, blend etc, geographic location and season of the year, turf is maintained at different heights of cut. Since lifting the spray pattern higher into the air contributes to more rapid evaporation and more pattern distortion, why not allow for the lowest pop-up height that is practical? Let the system designer pick the best equipment since s/he is liable.

Suggested Change (or Language): Modify last sentence to "…have a 3-inch minimum pop-up height…."

Topic: 4.2.7 Sprinkler Irrigation

Comment: Consider adding a bit more context. Remind the audience that sprinkler irrigation is subject to a prior restriction on turf areas.

Rationale: Let professional designers, correctly using available technology design the irrigation system, and get to the higher Area-Weighted DU/EU, while living within tighter Site Irrigation Water Budgets, in no small way, through use of precision drip-micro irrigation.

Suggested Change (or Language): It is OK to be a bit more redundant, and clear.

Topic: 4.2.9 Schedule

Comment: Best Management Practices demand that an irrigation system be properly designed. While this can be very brief, at minimum it should include mainline routing, wire-path routing, pipe-size, valve, sleeve, sprinkler locations, as well as a Projected Base Irrigation Schedule, with Water Budgets. The Post-installation Audit produces real data for a competent

Irrigation Schedule, with particular attention to Application Rates of each valve, or irrigation zone.
These Irrigation Schedules, Initial Grow-in and Established Landscape should state what these application rates were determined to be. Another Schedule, particularly important considering that possibly 60% of the landscape area is comprised of expanding shrubs and trees, needs to be provided for Post-Initial Grow-in, Years 0.5 to Year 3 (or 4, or 5).

Rationale: Application rates will be available, so they should be provided. Some views holds that application rates decline as emitter number and emitter inlet pressures remain constant and canopies expand.

Suggested Change (or Language): Three water schedules, developed by the system installer and the WaterSense partner performing the audit shall consider the irrigation system designer's Base Irrigation Schedule found in the Irrigation Design. These Schedules, with or without input from the System Designer, should be conditioned with the Post-installation Audit Data, and the Installer's aversion to risk and liability for plant losses/mortalities during any Plant Warranty Period. Application Rates, as well a Projected Run Times to meet Projected Eto, should be stated in each Schedule.

Topic: 4.2. X Water Meters

Comment:
Any voluntary water-use savings program should include the use of water meters.

Rationale:
Water meters are not required in all areas throughout the United States. The program should also promote using water wisely, which includes accurately knowing how much water has been used.

Water management is simply not possible without water measurement.

Suggested Change (or Language):
Water Meters for Irrigation Systems – The WaterSense® labeled new home shall include the installation of a separate, dedicated water meter, sub-meter or flow sensor that meets applicable local standards or otherwise measures water use in billing units used by the local utility. In the event such use is not monitored by the local utility, measurement units in either gallons or cubic feet are acceptable.

Topic: General

Comment: Why is there no requirement for the irrigation system designer or installer to be a WaterSense irrigation partner? Isn't this an important program? What incentive is there for designers or installers to become WaterSense partners if the EPA does require it in their own specification?

Rationale: If a goal of the EPA WaterSense program is to increase awareness and proficiency in water conservation of irrigation designers and installers then they should promote the program in their own specifications.

Suggested Change (or Language): Require that all designers and installers are WaterSense partners (qualified in the appropriate category). Also stipulate that no person/ entity can audit its own irrigation system installation.

Topic: Definition of Turfgrass

Comment: At least six references are made to "Turfgrass" within the paragraphs of this specification but no definition of "Turfgrass" is included. Turfgrass is a collective term for a large collection of varieties and blends of grasses. There is no one universal "turfgrass" suitable to all regions of the United States, we know it when we see it, but there is no universal water requirement. Some groundcovers can be mowed and walked upon, therefore they function like turf.

Topic: General

Comment: Make public a "wish list" of areas needing more work, and which you will aim to accomplish by 2012.

Commenter: Will Leonard, ASIC, CID, LEED AP
Affiliation: Leonard Technical Inc. (dba, LTS Design Group)
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Cheryl Goar
Affiliation: Arizona Nursery Association
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Dr. David M. Kopec
Affiliation: University of Arizona Cooperative Extension / Turfgrass Scientist
Comment Date: June 6, 2009

Topic:
Outdoor Landscape Water efficiency calculations / assumptions / environmental issues.

Comment:
The landscape area for turf (2 options) are not based on MUCH OF THE AVAILABALE PUBLISHED SCIENTIFIC LITERATURE already in existence that your staff needs to SERIOUSLY review, (some of which has already been presented, formally).

The "value" option of 40% allowable maximum turf coverage is essentially, unfounded and arbitrary. There is ample scientific and meteorological data available for the EPA to

1. obtain reasonable long term and near real time ET estimates.
2. know the amount of irrigation water used for a lawn on a square foot basis.
   (this is regional , and is affected by amount of usable rainfall and type of turfgrass- warm season vs. cool season vs both). This is ignored as far as I can tell.

   The current document cannot effectively address these issues as written, due to the vast differences in climate and rainfall patterns across the US, which treats all "grasses" as one type of grass.

Because there is much more scientific data on GRASS WATER USE than that of tree and shrubs, turf is being penalized.

A builder or developer is NOT going to partake in the particulars of longitude and latitude for obtaining Ref ET estimates.

Overall, a builder or developer will not follow the complexity of the requirements, but simply choose to provide an infrastructure able to squeak buy at applying outdoor water for 40% of the landscape area ! Time is money. I have worked in residential construction myself.

If you look at the EPA's decision in the Water Sense document to resend their position on insulating hot water pipes (builders don't have to do it as originally required as part of WATER SENSE), the same logic will follow, the easy way out.

Instead the EPA should be MANDATING that NEW HOMES BE STUBBED (plumbing fitted) for domestic grey water re-use and water harvesting. No plumbers need extra training to do this! It's all straight forward. Domestic Gray Water RE-use is a tremendous source of using non-potable water, which the EPA and the builders/developers are failing to address.

Also, the banning of turf for slopes is a big environmental mistake. Peer reviewed scientific literature shows that turfs maintained on slopes slows the movement of water, nutrients, and off site sediment loading. The same effect happens on four foot wide sidewalk strips. The turf is an environmental buffer, in a majority of the cases.

In times when the whole world is concerned about GLOBAL WARMING and free CARBON, EPA should realize that

1. turfgrass removes carbon dioxide, and release oxygen in the process.
2. mulches (proposed ground cover in the WATER SENSE DOCUMENT) release carbon dioxide (number one greenhouse gas) as they respire, without ever providing oxygen.
3. gravel surfaces are phenomenally HOTTER than turf surfaces, even if the turf is severely drought stressed, This is also in the scientific literature.

As a turfgrass scientist and academician, I urge the EPA to stop the process at this point. It is clear to me that the EPA has not given any serious thought to the information provided them from the three plant and soil scientists who visited with the EPA earlier in 2009 in Washington D.C., in which items were described to the EPA which need to be addressed in the effort to go forward with a viable and scientifically based program. We all want to save water. The science is available but not incorporated as it should be. The EPA would be more heroic in having Grey Water use plumbing and water harvesting programs employed in “new houses”.

Commenter: Brian Lennon
Affiliation: Irrometer Co., Inc.
Comment Date: July 6, 2009

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

As stated in California Assembly Bill 1881(enacted 2006): "…landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development…." The green industry believes the statement within AB1881 can apply across the country and as such, is hopeful the EPA will make constructive improvements that embrace the value of the outdoor living environment prior to publication of its WaterSense model new home specification.

The green industry is also united in recommending to the EPA that decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. We also recommend to the EPA that the comments submitted by the green industry in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, we urge the EPA to take into consideration the comments below, as they are based on market data, best management practices and best available science.

Topic:
Alternative water supplies for landscape irrigation

Comment:
The current draft is silent about incorporating the use of alternative water supplies and the addition of this section would provide an excellent opportunity to promote the use of such resources for landscape irrigation.

Rationale:
In addition to lessening the demand on domestic potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.

Suggested Change (or Language):
The specification should include an option, or incentives, to use alternate, non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site

collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes. Because of potential poor water quality, consideration should be made to accommodate the need for additional leaching fractions deemed appropriate to make the water useable in the landscape.

Topic:
4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.

Comment:
This section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) in strips less than four feet wide can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. Therefore, the EPA should remove this restriction and employ performance-based criteria, rather than the prescriptive approach currently taken in the draft, to determine irrigation efficiency in these areas.

Rationale:
The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. In some areas of the United States four feet wide strips of turf may be inappropriate, in others it is a valuable part of the landscape that is much needed.

In many instances throughout the United States, areas of turfgrass of four feet wide are efficiently irrigated using methods such as drip, spray strip nozzles, and rotator-style nozzles, among others.

Suggested Change (or Language):
4.1.2 Turfgrass – Irrigation installed in strips less than 4 feet wide shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic:
4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment:
This section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States turfgrass is used as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes with this prescriptive approach would significantly adversely change the market, without any assurance of less water use or elimination of run-off. The Irrigation Association believes that plant material for 4:1 slopes should be selected based on local climate, geography and markets.

Furthermore, the EPA should eliminate all prescriptive choices of irrigation methods and that the choice of plant materials in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:
Based on years of research, science and best management practice development, all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with little to no increase in run-off.

Soil Erosion Control and Dust Stabilization
Turf protects nonrenewable soil resources from water and wind erosion. Turf's high shoot density and root mass stabilize surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turf's high biomass matrix provides resistance to lateral surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turf can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked nonpoint surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.)

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):
4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Topic:
4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment:
The EPA can meet the goal of more than 20% water savings through a specification for the largest turf area to be a DULQ of .63 or greater.

Rationale:
The chart below, referenced from (http://www.ncwcd.org/ims/ims_info/SummaryEvaluationSprinklerSystems.pdf), represents the lower quarter distribution uniformity results from audits performed on residential sprinkler systems as well as large commercial type projects. Over 6,800 audits are represented in this table with the average results shown.

Sprinkler System Performance

Residences		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	4500	**52**		1.4	.70-3.70	**58**		.70	.10-2.30
Utah USU	164	**52**	18-80	1.57	.50-3.20	**49**	15-86	.76	.20-1.70
Colorado	973	**53**	20-89	1.34	.22-4.06	**54**	19-92	.62	.12-1.60
Oregon	398	**55***				**54***			
Florida MIL	576	**54**	11-89						
U of FL Case Study	19	**40**				**48**			
California Case study	19	**41**	16-54	1.61	.66-2.97				
Commercial		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ}%	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	166	**55**	7-82	1.49	.26-3.10	**55**	8-84	.74	.13-2.46
Colorado	20	**52**	6-77	1.36	.60-2.12	**50**	3-88	.60	.10-1.12
Arizona	7					**41**	20-56	.76	.57-.92
Texas	6					**58**	27-79		

* reflects the lower-third distribution uniformity information of 61 and 60 reduced by 6 points (weighted average)

According to the data used in the table above, the weighted average DU_{LQ} for residential sprinkler systems is .524. This is for the visually best performing sprinkler zones when the auditor selected a zone to do a catch can test. Case studies from Florida and California show even lower DU but these audits were for the entire turf area, not the visually best sprinkler zones.

Using the DU_{LQ} from the table above, one can meet the EPA WaterSense® goal to improve performance by 20%, by setting the value for sprinkler uniformity to .629, or rounded to .63.

Example:
DU_{LQ} x desired performance improvement: .524 x .20 = .105
DU_{LQ} + increased performance: .524 + .105 = .629 (proposed sprinkler DU)

This will represent a significant improvement because of the challenges of achieving high uniformity on small, curvilinear turf areas that will be typical in the proposed specification. The audit of the sprinkler system should be on the largest turf area and the DU_{LQ} calculated for that area.

Suggested Change (or Language):
4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of .63 or greater. When an audit is performed, distribution uniformity will be measured on the largest turf area during the post-installation audit.

Topic:
4.2.5 Rainfall shutoff device – Irrigation systems shall be equipped with technology that inhibits or interrupts operation of the irrigation system during periods of rainfall (e.g., rain sensors).

Comment:
We support the inclusion of rainfall shutoff technologies but believe that the use of soil moisture sensors can not only serve the purpose of shutoff during periods of rain but will also serve to inhibit further programmed irrigation events until the water from the rainfall event has been depleted.

Rationale:
N/A

Suggested Change (or Language):
4.2.5 Rainfall/moisture shutoff device – Irrigation systems shall be equipped with technology that inhibits or interrupts operation of the irrigation system during periods of rainfall or as the result of significant rainfall (e.g., rain sensors and/or soil moisture sensors).

Topic:
4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment:
There are many variables that are taken into consideration when determining the best and most efficient way to irrigate plant material in a landscape. Climate, geography, location in the landscape, etc., all play major roles and the responsibility should be placed the irrigation designer to determine the best type of irrigation for each portion of the landscape.

Rationale:
Certified irrigation professionals are the most qualified to make the correct determination for each individual site and location.

Suggested Change (or Language):
Sprinkler and microirrigation installed in turfgrass and other plant material shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic:
Soils

Comment:
A key component to landscape design and water-use efficiency in a landscape is appropriate soil preparation. Neglecting its inclusion in the final specification is equitable to neglecting the key component to ensuring the landscape can thrive in a water-efficient manner.

Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Many of the proposals set forth in these specifications (including but not limited to 40% turfgrass restriction, 4:1 turfgrass slope restriction, etc.) would not be needed if performance criteria were put forward and the proper soil preparation were included in the specification.

Suggested Change (or Language):
Soils – During the construction process, the WaterSense® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant material, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist.

Topic:
The Use of the Words "If Installed"

Comment:
Throughout the draft specifications, the words "if installed" are associated to the installation of irrigation systems. The words "if installed" should be removed from the specification.

Rationale:
Irrigation systems are the only equipment referenced in the specification that is singled out by stating "if installed."

Suggested Change (or Language):
Remove "if installed" and replace with language referencing "installed irrigation systems."

Topic:
Definition of Landscapable Area

Comment:
The definition in the revised draft, though favorable to the landscape community, is confusing as it is not a widely-used definition. The specification should revert to the original definition as stated in the original draft specification. Due to the changes this will cause within the outdoor criteria, the EPA should accept the recommended changes throughout this document, in addition to the recommended definition change.

Rationale:
The definition of "landscapable area" as the building lot area not under the roof is not based on science nor is it the market accepted definition of "landscapable area."

Suggested Change (or Language):
Landscapable Area: The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Topic:
Water Budget Calculator – Peak Watering Month

Comment:
When performing steps 1B and 2A, it should be more clearly stated to use the same peak month for evapotranspiration and rainfall data in each area.

Rationale:
The data entered into the calculator may be misapplied, thus providing incorrect data at the outset.

Suggested Change (or Language):
Explicitly state, in detail, that the peak watering month data should be used in each step and that the same month's data needs to be used to determine the LWA and LWR.

Topic:
Water Budget Calculator – Run Time Multiplier (RTM)

Comment:
The run time multiplier should be defined as $1/[.4 + (0.6 \times DU_{LQ})]$.

Rationale:
The method for determining run time multiplier (RTM) is stated incorrectly in the water budget tool as $1/DU_{LQ.}$ The correct method would be to use the equation as defined in the document *Landscape Irrigation Scheduling and Water Management* (IA 2005), which is
$1/[.4 + (0.6 \times DU_{LQ})]$.

Suggested Change (or Language):
Run time multiplier (RTM) – $1/[.4 + (0.6 \times DU_{LQ})]$ (*Landscape Irrigation Scheduling and Water Management* IA 2005).

Topic:
Water Budget Calculator – Distribution Uniformity (DU)

Comment:
Distribution uniformity for the new home specification should be .63 and should likewise be used in the water budget calculator so that the water budget tool reflects the performance standard for the irrigation system.

Rationale:
Distribution uniformity for the water budget calculator should match the specification for acceptable DU. Currently the calculator uses .65 but the specification calls for .70.

Suggested Change (or Language):
Change DU_{LQ} from .65 to .63.

Commenter: Thomas J. Delaney
Affiliation: Professional Landcare Network
Comment Date: July 6, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's limitation on turfgrass is arbitrary, not supported by science and may undermine the goals of the WaterSense program. This is supposed to be a positive program and now it has turned into a negative program to those who may have been its best supporters. EPA can not cherry pick from specific programs around the country to fit its goal to reduce the amount of turfgrass used in WaterSense landscapes.

Our concerns are specific to the 40 percent turfgrass limitation, the ban on turfgrass for steep slopes and the single, nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale: We heard from EPA at your face to face meeting and the webinar that changes or recommendations may be made periodically to the program. Therefore there should be no rush to have the 40 percent turfgrass limitation, the ban on turfgrass for steep slopes and the single, nationwide .7 evapotranspiration factor for calculating the water budgets. Before these three items are listed as landscape criteria for the entire county you need to have sufficient data to make the program valid and respected and a fit for more local conditions.

This portion of the WaterSense program proposal will present significant negative environmental consequences by diminishing and/or eliminating the role and presence of properly managed turf in the landscape. Such turf reduction would diminish one of nature's best tools for protecting against soil and contaminant run-off, creating cooling effect, storing carbon, generating oxygen, controlling dust, and more.

The program will and should not have negative economic impact to the industry. The diminishing of turf will first be significant to sod and seed producers, lawn and landscape owners and other turf managers, over time, to equipment manufacturers and small businesses engaged in proper turf management while not adding sufficient benefit to the WaterSense program.

The result of this WaterSense specification will not result, in most cases, in water savings, and in some cases will cause the use of more water, defeating the purpose of the program.   Also, with the diminished use of turfgrass and no proper guidance in plant selection, the national stormwater runoff problem will only be exacerbated.

Suggested Change (or Language): We recommend that in order to have a significant impact on water conservation and efficient use, EPA should only:

- Drive deployment of best technology solutions through WaterSense approved products.
- Support use of certified irrigation professionals for installation and audit, when practical.
- Support education of all stakeholders including homebuilders, landscape contractors, consumers, and others in the selection and management of appropriate turf and plants for a given location, utilizing BMPs for water use, and understanding the importance of water audits. Enlist the affected industries to drive proper water use messages and results.
- Work with USDA and state universities to develop research leading to appropriate water use for turf and landscapes.

At a minimum delete the 40% turf reduction and if a national water budget continues to be a part of the specification, we recommend that the ETAF be implemented at 80% as advised by the scientific experts provided to you by industry.

Commenter: John Sullivan, Managing Partner, Wes Maxwell, Managing Partner
Affiliation: GreenWave Associates
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Norman Bartlett
Affiliation: Creative Sensor Technology
Comment Date: July 6, 2009

Good Day,

As a manufacturer and supplier to the irrigation industry and a long time supporter of water conservation , I wish to offer the attached comments regarding you draft specification for new homes.

While I applaud your efforts, I feel that there are many things in the specification that should be changed. I don't understand the lack of support for your own WaterSense irrigation partners program. Why not require that designers and installers be members of this program? I also feel that you should leave all the design details of the landscape and its irrigation system to professionals. You don't dictate how to design plumbing or cooling systems inside the structure, why are you doing so outside. I feel that your specification should be focused on performance and conservation goals rather than details. No one set of specifications can cover the vast differences in climate, geography or personal preferences.

The one device that seems conspicuous by its absence is any type of flow measurement device. No where are you sub-metering or measuring flow through the irrigation system (or residence for that matter) so that the homeowner can measure his conservation efforts. Also, there is no requirement for the irrigation control system to sense a high flow caused by a pipe, fitting or valve malfunction and take action to shut the system down. This type of device would make sense.

Please consider delaying the release of this specification until these and the many issues raised by others in the landscape and irrigation industries can be further studied and incorporated.

See Appendix B for a copy of the comments submitted.

Commenter: Amanda Griffin, CIC, CLIA, TXLi #10969
Affiliation: Dallas Irrigation Association member, TexasTurf Irrigation Association member, Irrigation Association member
Comment Date: July 6, 2009

To Whom It May Concern,

I urge the EPA to extend the comment period for the New Home WaterSense certification specifications. I am an EPA WaterSense Partner, and I have some concerns about the state of the current specifications, and urge the EPA to pursue answers and solid science on the following issues. I further urge the EPA to seek counsel from the Irrigation Association.

See Appendix A for a copy of the comments submitted.

Commenter: John Griffin, CLIA, TXLi#13326
Affiliation: Dallas Irrigation Association member, Texas Turf Irrigation Association member, Irrigation Association member
Comment Date: July 6, 2009

To Whom It May Concern,

I urge the EPA to extend the comment period for the New Home WaterSense certification specifications. I am an EPA WaterSense Partner, and I have some concerns about the state of the current specifications, and urge the EPA to pursue answers and solid science on the following issues. I further urge the EPA to seek counsel from the Irrigation Association.

See Appendix A for a copy of the comments submitted.

Commenter: Paul A Huggett
Affiliation: Pauls Turf & Tree Nursery
Comment Date: July 6, 2009

Hi EPA Representative

I am involved in the turf and landscape industry. We live in Wisconsin where 1/3 of the year we are in winter and 1/3 of the year summer and somewhere in between for the remaining months. We average well over 30” of rain fall a year. Lawns in our area are a good thing. They prevent erosion, they filter pollutants and are the most economical of plants to stabilize the soil especially after new construction. Your 40 % proposal is ludicrous for our area. What would you suggest for the other 60 % ? Bricks? Wild flowers? Shrubs? All very nice but extremely expensive to install and maintain. Not to mention the fact the brick would increase run off. Have you thought about Arizona. Why would you consider treating a desert state the same as the mid west bread basket. One farm to another may be different in their water needs and use. How can you blindly apply recommendations across a country when my farm is different than the one a mile away.

Commenter: James Dowd, Executive Director
Affiliation: Texas Turf Irrigation Association
Comment Date: July 6, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Gail Donaldson
Affiliation: Texas licensed Irrigator, CLIA, WaterSense Partner
Comment Date: July 6, 2009

EPA:
You should not put this final draft into reality, until you gather more facts! Please look at the attached comment sheet, but further, someone needs to be in touch with the research universities concerning some of your proposals in these new homes guidelines. Please, take your time in putting this together. While some of this is fine in Nevada and California, it does not fit the entire country and if a national guideline is to be made, then the entire area should be taken in consideration. Many municipalities may look at this as a standard for their city and put it in ordinance without regard to fact, simply because the EPA has stamped their name on it. Many items you have on this draft are good intentions for water savings, but may not be practical or wise in all areas and eliminates the ability of a professional horticulturist to design a proper landscape for the site.
Gail Donaldson

Topic: 4.2.4 Irrigation systems shall achieve… DU LQ of 70%

Comment: Eliminates the use of spray heads ever in a landscape because they can not achieve this. At best 58-60%.

Suggested Change (or Language): Change to read DU LQ of 60%.

Topic: 4.1.2 “Turfgrass should not be installed in strips less than 4 feet wide”

Comment: Confusing! Are you meaning only big roll sod can be installed? Are you meaning not to install turf in areas less than 4 feet wide?

Rationale: Do not eliminate parkway(between street and sidewalk) of many municipalities—some cities require planting and maintenance in this area. Turf can be maintained easily, and subsurface irrigation is required in this area in Texas now, so there is not a water waste.

Suggested Change (or Language): “Turfgrass should not be installed in areas less than 2 feet wide”

Rationale: It is too hard to maintain and no way to irrigate other than subsurface.

Topic: TURFGRASS IN GENERAL IN THIS DOCUMENT AND OTHERS

Comment: TURFGRASS DOES NOT WASTE WATER, PEOPLE DO! Your wording in this draft and other areas including recommended change to artificial turf, like was suggested on the last WaterSense forum is one of the worst things you can do to the environment. Look at the research from Colorado State, Ohio State, Michigan State, Washington State, Rutgers, and others. Why would you suggest removing a plant that has the capability of producing enough Oxygen for a family of four; reduce tonnage of air conditioning; capturing CO2; filtering storm water run off; recharging ground water(and cleaning it on the way), and others? NOT ALL TURF IS BAD! It just needs to be planted in the proper place. Yes, outlaw Ky Bluegrass in the desert! ONE SIZE DOES NOT FIT THE ENTIRE COUNTRY! Not all areas in the country have postage size lots(yes everything is bigger in Texas ☺).

Suggested Change (or Language): "GIVE FREEDOM TO THE KNOWLEDGED HORTICULTURISTS AND IRRIGATION PROFESSIONALS TO DESIGN WATER EFF. LANDSCAPES!"

Commenter: Dave Giddens
Affiliation: ASIC, IA
Comment Date: July 6, 2009

See Apppendix A for a copy of the comments submitted.

Commenter: Demie Moore
Affiliation: Aquatrols Corporation of America
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Thomas D. Edwards, CIC, CID, CLIA, CWCM-L
Affiliation: Virginia Irrigation Association
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

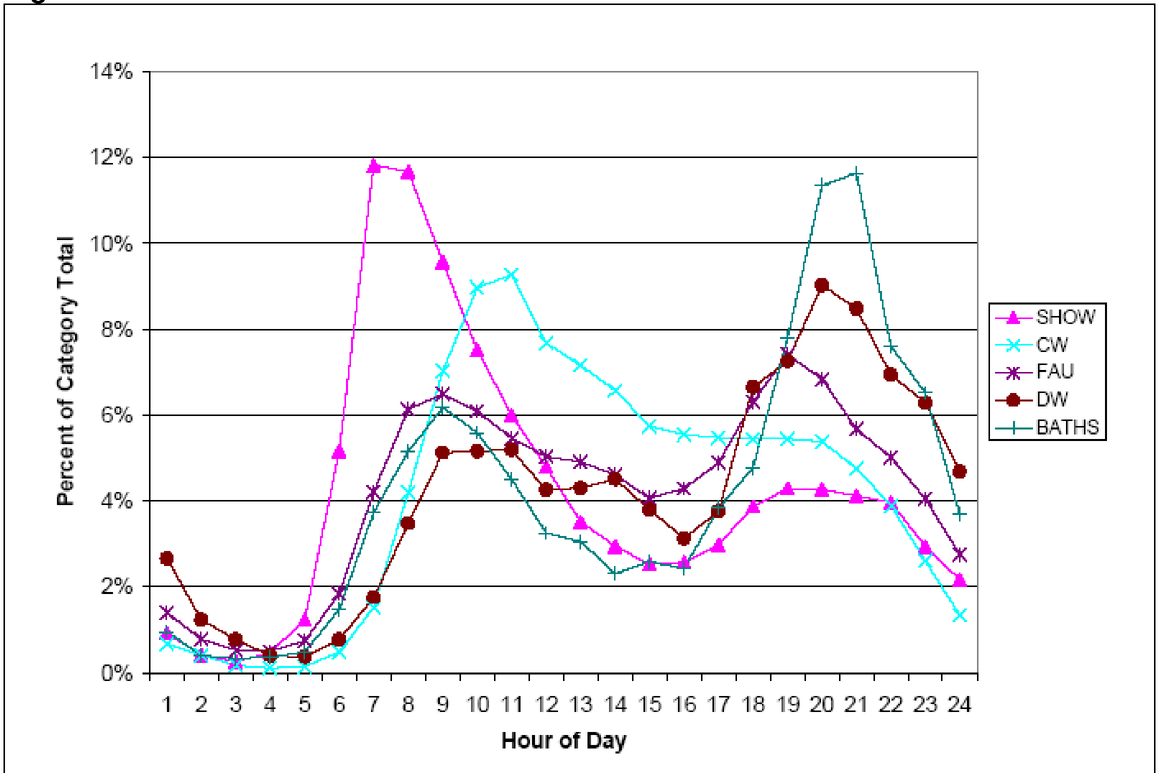
Commenter: Mike Resetar, Roger Schmidt, Shawn Dunahue
Affiliation: Armacell LLC., K-Flex USA, and Nomaco Insulation
Comment Date: July 7, 2009

Topic: "Water Efficient Single Family New Home Specification", Hot Water Delivery System, Section 3.3

Comment: We are very concerned with the proposed changes to the 2008 EPA Water Sense draft, "Water Efficient Single Family New Home Specification" regarding Section designated as: Hot Water Delivery System (section 3.5 in original 2008 draft and section 3.3 in the revised 2009 draft). We raise objections to the elimination of the insulation requirement for the Hot Water delivery piping system. The changes proposed are giving up energy efficiency gains achieved and are not consistent with the current standards being implemented from other national organizations. This would negate the energy conservation efforts of the Department of Energy to reduce energy consumption by 30% as well as the conservation efforts of the International Code Council, United States Green Building Council, and ASHRAE to promote more efficient buildings.

Pipe insulation is an economical option that not only helps conserve energy, but will aid in water conservation efforts by extending or slowing the cool down phase of hot water lines during peak periods of use. By maintaining a line temperature above 105°F for a longer time period the average daily hot water waste can be greatly reduced. A household's usage pattern is the variable that is unpredictable, but several studies have identified average peak use patterns, daily hot water events, and average hot water consumption in residential structures. In the 2001 publication, "The End Uses Of Hot Water In Single Family Homes From Flow Trace Analysis" by William B. DeOro, P.E. and Peter W. Mayer is a follow-up to the Residential End Uses of Water Study (REUWS), which was sponsored by the American Water Works Association Research Foundation (Mayer et. al.1999) provides clarification on hot water consumption by appliance or fixture and also provides data of peak demands by the time of day (Figure 1 and Figure 2).

Figure 1



DeOro, William B, PE , Mayer, Peter W. 2001. "The End Uses Of Hot Water In Single Family Homes From Flow Trace Analysis" Aquacraft, Inc. Water Engineering and Management

Figure 2

Category	Per Capita (gcd)	Household Use (gal per day)	Percent of Total Hot Water Use	Percent of Overall Water Use that is Hot Water
Bath	4.2	10.9	16.7	78.2
Clothes Washer	3.9	10.1	15.5	27.8
Dishwasher	0.9	2.3	3.6	100
Faucet	8.6	22.4	34.3	72.7
Leak	1.2	3.1	4.8	26.8
Shower	6.3	16.4	25.1	73.1
Toilet	0.0	0	0	0.0
Other	0.01	.03	0	35.1
Indoor Total	25.1	65.3	100%	39.6%
Sample size	*10*			
Avg. # of residents	*2.6*			

DeOro, William B, PE , Mayer, Peter W. 2001. "The End Uses Of Hot Water In Single Family Homes From Flow Trace Analysis" Aquacraft, Inc. Water Engineering and Management

Expanding on previous usage studies Oak Ridge National Laboratory (ORNL) developed "Typical Residential Usage Patterns" detailed in Figure 3 which support the benefits pipe insulation can provide during the peak hot water time periods.

Figure 3

	Event Description	Flowrate (gpm)	Time Before Event (min)			Event Description	Flowrate (gpm)	Time Before Event (min)
1	**MBR shower**	**2.25**	**0**		**10**	**MBR sink-1**	**1.25**	**540**
2	**MBR sink-1**	**1.25**	**15**		**11**	**K sink**	**2.5**	**15**
3	**MBR sink-2**	**1.25**	**15**		**12**	**K sink**	**2.5**	**15**
4	**BR2 shower**	**2.25**	**20**		**13**	**K sink**	**2.5**	**20**
5	**BR2 shower**	**2.25**	**15**		**14**	**K sink**	**2.5**	**30**
6	**BR2 sink**	**1.25**	**15**		**15**	**MBR sink-2**	**1.25**	**60**
7	**BR2 sink**	**1.25**	**15**		**16**	**BR2 sink**	**1.25**	**20**
8	**BR2 sink**	**1.25**	**15**		**17**	**BR2 sink**	**1.25**	**25**
9	**K sink**	**2.5**	**25**		**18**	**BR2 sink**	**1.25**	**15**

Typical Residential Usage Pattern
Oak Ridge National Laboratory (ORNL)

The delivery of hot water has two distinct aspects, the physical and the conditional. The physical is the actual draw and delivery of hot water to the fixture and the conditional is the end users personal temperature acceptance of the hot water being delivered. The addition of pipe insulation has been proven by several studies to curtail a rapid cool down of hot water during peak periods. Pipe insulation extends the usefulness of standing hot water in the piping system thus, providing hotter water, above 105°F, sooner which satisfies the end users conditional need and reduces hot water waste.

R-3 (½” thick) pipe insulation when applied to ½”, ¾” and 1” copper, PEX, or CPVC tubing provides a minimum of 50% efficiency gain verse bare tubing. R-6 (1” thick) pipe insulation when applied to the same tubing sizes can provide over 60% efficiency gain verse bare tubing. What this means is that the heat loss (BTU/hr/ft) can be greatly reduced during peak hours of hot water delivery. Pipe insulation can help eliminate water waste by reducing full draws from the water heater, allowing for water lines to retain hot water longer, reduce conditional water waste by providing a faster physical delivery of hot water to the fixture.

Suggested Change (or Language): We ask that the review committee consider retaining the R-4 requirement published in the 2008 draft or at least implement a minimum of R-3 insulation for all hot water lines. Pipe insulation is an economical choice to aid in conservation of both energy and water throughout the structures of the United States and should be included in the conservation efforts of the EPA Water Sense program.

Commenter: Scot Eubanks
Affiliation: Assistant Director of Agricultural Policy, Florida Farm Bureau
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The Water Sense landscape criteria propose to limit turfgrass coverage on new home sites in two primary ways. One, they provide builders with two options on changing plant composition: limit the amount of turf coverage to 40 percent of the home site's yard or utilize a complex water budget that lacks scientific basis. These approaches apply whether the home is built in Arizona, Oregon, or Maine, all within vastly different climatic zones illustrating the challenge of a national "one size fits all" standard. Further, weather is a dynamic, not a static, variable. Conditions within a state or region may be wet one year and dry the next, again illustrating the challenge with a static standard. Trees and turfgrass are not engineered like a low-flow toilet or shower head but are natural, living things which require maintenance based on need at a given time and place.

Secondly, the specification bans turfgrass on so-called "steep slopes," which are defined as exceeding one foot of drop per four feet of landmass. Given the well recognized role that a turfgrass play in controlling soil erosion on inclines, this criterion undermines sound environmental practices.

Rationale: This portion of the WaterSense program proposal will present significant negative environmental consequences by diminishing and/or eliminating the role and presence of properly managed turf in the landscape. Such turf reduction would diminish one of nature's best tools for protecting against soil and contaminant run-off, creating cooling effect, storing carbon, generating oxygen, controlling dust, and more.

The economic impact of diminishing turf would be significant to sod and seed producers and, over time, to equipment manufacturers and small businesses engaged in proper turf management.

Suggested Change (or Language): Instead, to have a significant impact on water conservation and efficient use, EPA should:

- Drive deployment of best technology solutions through WaterSense approved products.
- Support use of certified irrigation professionals for installation and audit, when practical.
- Support education of all stakeholders including homebuilders, landscape contractors, consumers, and others in the selection and management of appropriate turf and plants for a given location, utilizing BMPs for water use, and understanding the importance of water audits. Enlist the greenscape industry to drive messages and results. Work with USDA to develop research leading to optimum water use for turf and landscapes.

Commenter: Ed Lee
Affiliation: Summit Seed, Inc
Comment Date: July 7, 2009

Regarding EPA WaterSense Water-Efficient Single-Family New Home Specification

This really should be named Non Sense Water!

What percent of lawns are now irrigated? Unfortunately I was unable to find a number; but I would estimate it is well under 50%.

What percent of lawns that are irrigated need water? Based on my own observations a high percent of lawns should not be irrigated around the country. And the ones that are irrigated in some regions should be considering alternative turf including native plants.

Reducing lawns to 40% of the landscape is Non Sense. It makes as much sense as reducing Car Drivers to 40% of today because of environment and safety issues.

- No, we are building cars with better gas mileage
- Promoting public transportation
- Promoting car pooling and even biking

The same approach should be taken with managing the water on lawns.

The turfgrass industry has adapted already when regarding lawn clippings going into landfills. Much of the public was educated on the benefits of mulching lawn clippings and not collecting. Fixed the deposal problem and improved lawn quality at the same time. Now that makes Sense!

Turf is one of our solutions to better environment. We all known it is a very effective water purification systems and helps reduce global warmer by cooling our environment. Why are many cities promoting green roofs while the EPA wants to reduce green vegetation on the ground?

Yes, there needs to be a debate about improved water usage systems.

- High percent of lawns that are irrigated probably should not be irrigated. When the correct turfgrass specie and varieties are selected for the climate it is intended well perform fine.
- Most of the northern half of the United States is cool season grass species that really DO NOT REQUIRE irrigation. In the hot – dry periods the turf will go dormant to protect itself. And when things cool down and rains again the turf will wake back up. Mother Nature is smart!
- What about systems that collect rain water that can be later used for irrigation? This will reduce the water running in our storm sewers and using a natural filtration system to purify the water. Salt Lake City Sewer Treatment facility grows turf that is used for water purification in a controlled scientific matter just for water purification. Why would we want to reduce our lawn size?
- Promote lawn core aeration for improved water infiltration for once again less rain runoff and more natural water purification.
- More regulations and education on proper use of irrigation.

    - Maybe a separate meter is needed for irrigation? We all get wiser when it's costing money.
    - There is no question many lawns are over irrigated. IF water was more expensive we would become more creative in using water wisely.
- Tax credits for updating irrigation systems that uses water correctly. Just like there are tax credits for installing improved energy efficient consumption in our homes.
- Provide incentives to build a lawn with the correct soil profile that will encourage the turf to develop deeper roots and to increase water infiltration. The increase water infiltration will reduce water runoff into to our storm sewers and will make the turf less irrigation needy.
- Provide incentives to use turf species and varieties that are not irrigation needy.

The last point is the water management needs to manage on a region to region area. The needs of Arizona are going to be different than Minnesota. The needs of Western Washington is going to be different that Eastern Washington. The better management of our water resources is needed.

Reducing the lawn by 60% is not a solution for a better environment. Net, net it will have an adverse impact on our environment.

Plants don't waste water – People do.

Commenter: Brent Edens
Affiliation: President, Golf Course Superintendents Association of Arkansas
Date of Submission: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's limitation on turfgrass is not supported by science and we are concerned about the unintended consequences. Mainly our concerns regard the turfgrass limitation, the ban on turfgrass for steep slopes and the .7 evapotranspiration factor for calculating the water budget.

Rationale: The restrictions assign a negative environmental value to turfgrass and suggest that a yard covered in turf is less preferable than other landscape choices. This goes against many studies that prove the cooling effects of turfgrass. Also, turfgrass helps to minimize an areas carbon footprint as well as soil erosion.

The benefit of soil erosion control makes the steep slope ban on turgrass in the specification perplexing. Turfgrass has a fibrous root system and requires less water than most plants making it the best choice to plant on slopes.

We are also concerned about the nationwide ET factor for calculating a water budget. Having a single ET rate does not take into account the regional climatic variations and rainfall levels in different areas of the country.

The turf limitation will have serious consequences on the success of Water Sense and its adoption. We want to see Water Sense succeed but only when it is based on sound, scientific evidence. We feel the current draft of the outdoor portion of the new homes specs will not satisfy this desire.

Suggested Change: We respectfully request that the EPA set aside the Outdoor Water Efficiency Criteria at this time. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water efficiency solutions taht actually reduce water consumption and do not result in unintended consequences.

Commenter: Jon Whillock
Affiliation: President, Arkansas Turfgrass Association
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: We feel the goals of the Water Sense program will be undermined because of the limitation on turfgrass. The 40% turfgrass limitation is not supported by science. We are also concerned about the ban on turfgrass for steep slopes and the nationwide evapotranspiration factor for calculating the water budget.

Rationale: The draft specification imposes a 40% turfgrass limitation on landscapable areas of new home sites with no consideration given to the areas climate or rainfall amounts.
The proposed restrictions assign a negative environmental value to turfgrass and suggest that a yard covered in turf is less preferable or less eco-friendly than other landscape choices. There are many studies that show numerous benefits of turfgrass including but not limited to the cooling effects of grass. It has also been proven that a well maintained lawn helps reduce a property's carbon footprint.

We are also concerned about the steep slope ban on turfgrass. Turfgrass is better than most other plants in controlling soil erosion. Turfgrass has a fibrous root system and requires less water making it the best choice for steep slopes.

We believe that builders will avoid the complexities of a water budget and related calculations and simply opt to limit turf. Futhermore, designating a single ET rage ignores climate variations in different regions of the country.

Suggested Change: We respectfully request that the EPA set aside the Outdoor Water Efficiency Criteria at this time. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water effciency solutions that actually reduce water consumption and do not result in unintended consequences.

Commenter: Mary Rogers
Affiliation: Arkansas Irrigation Association
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: We are concened about the Water Sense draft specification's limit on turfgrass and the single, nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale: The one-size-fits-all home specification imposes a 40% turfgrass limitation on landscapable new home sites regardless of the area's climate or rainfall averages. We feel that turfgrass is the best choice in most cases because of its cooling effects, minimal carbon footprint and soil erosion benefits.

We are greatly concerned about the single, nationwide ET factor for calculating a water budget. We feel that builders seeking the Water Sense label will avoid the complexities of a water budget and related calculation and simply limit turf. Designating a single ET rate ignore the regional climatic variation and average rainfall levels in different regions of the country.

Also, the new draft specifications require that the user of the water budget tool, to determine monthly ETo, access the International Water Management Institute World Water and Climate Atlas. To use this tool, the user is required to input exact longitude and latitude, after which an estimate of monthly ETo is provided. There is a lack of ETo data available nationwide. Therefore, it is highly questionable how useful this tool really is in providing accurate ETo, as well as if most people will go through the trouble of identifying their longitude and latitude. We feel most builders will just opt for the 40% turf limit because that is the easiest way to go.

Using the latest in irrigation technology with smart controllers and efficient systems, you can easily see a 20% or more water savings without having to limit turfgrass.
We want to see Water Sense succeed but feel the current draft will not satisfy the goals of the program.

Suggested Change: We respectfully ask the EPA to set aside the Outdoor Water Efficiency Criteria at this time to allow time for a stakeholder process to forge solutions that actually reduce water consumption and do not result in unintended consequences.

Commenter: Wesley W. Ory , President Heritage Lawns & Irrigation
Affiliation: IA and PLANET
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: James M. Skillen
Affiliation: Director of Science & Regulatory Affairs
Comment Date: July 7, 2009

RE: Revised DRAFT Water-Efficient Single-Family New Home Specification

To the EPA WaterSense Program:

We applaud and support the goal of reducing home water use by 20 percent over the marketplace norm through this important initiative. We recognize water consumption throughout the United States is a serious issue and agree water is vital to the survival of everything on our planet and is limited in supply. The US population is growing and the demand on freshwater resources will continue to increase, placing a tremendous burden on local municipalities.

We agree that managing water use is a growing concern across the United States and we all need to be involved in the judicial use of our vital water resources.

<u>Statement of Interest</u>

RISE is a national not-for-profit trade association representing over 200 producers and suppliers of specialty pesticide and fertilizer products to both the professional and consumer (do-it-yourself) markets. Established in 1991, RISE serves as a resource and provides current and accurate information on issues and research affecting the specialty pesticide and fertilizer industries. RISE member companies manufacture over 90 percent of domestically produced conventional specialty pesticides and fertilizers utilized in the United States, including consumer household, lawn and garden, professional pest control, golf course and other professional turf and lawn care, greenhouse and nursery, mosquito repellents and control products. Pesticide and fertilizer products and used in the home owner market will be affected by the Revised Specification.

We strongly support the scope and objective; a 20 percent reduction of water use from a new single-family home as compared to an existing single-family home.

We support the following language:

The landscape design shall be developed using the water budget tool based upon a regionally developed XX percent evapotranspiration adjustment factor, that takes local environmental conditions into consideration.

It does not make any sense to apply the same landscape design criteria to a single-family home in Las Vegas, Nevada as to a single-family home in Tampa, Florida.

The WaterSense Program does not need to get involved in how many square feet of turfgrass is allowed or how many inches of mulch must be applied.

As an example, a WaterSense Toilet simply uses 20% less water than the current federal standard. The WaterSense program did not tell the toilet manufacturers how to design these toilets.

The WaterSense program "identifies its goal with respect to water efficiency to label products that are about 20 percent more water-efficient than average comparable products on the market." The existing benchmark for showerheads, as specified in the Energy Policy Act of 1992, is a maximum water use of 2.5 gallons per minute (gpm) when measured at a flowing pressure of 80 pounds per square inch (psi), as determined through testing in accordance with the ASME A112.18.1 standard.

To achieve its water efficiency goal, EPA intends to specify a new lower maximum flow rate for high-efficiency showerheads. A showerhead's efficiency cannot be specified, however, **without carefully considering potential impacts on consumer satisfaction or performance, including potential health and safety issues**, once it is installed in the plumbing system." Once again, this goal is stared as a performance standard and is not prescriptive.

We believe the "landscape design" for a single-family home needs the very same consideration with regard to **consumer satisfaction or performance, including potential health and safety issues.** There are many actions one can take to reduce water use for landscapes. For example; one can install rains barrels, underground cisterns, irrigation sensors, or a drought tolerant turfgrass.

The WaterSense program does not need to get bogged down with the details for landscape design. Set a regional standard and let the home builders that chose to participate in this program hire creative and innovative landscape designers to meet the WaterSense standard.

We believe this approach will yield results that will far surpass your 20% goal.

We appreciate the opportunity to share our comments.

Commenter: Scott Murff
Affiliation: Bill Murff Turf Farm, Inc.
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: I want to comment specifically on the 40 percent limit on turfgrass in new home specifications which I believe will do more harm than good to the environment which you are trying to protect.

Rationale: The criteria being set forth in this draft specification will be very harmful to the turfgrass industry and won't even accomplish your goals. I believe more study needs to be done to determine the detrimental effects your specifications will have on the environment. Less grass in landscapes will actually dry out the land more and cause more water to be evaporated and there will also be less carbon dioxide removed from the air because there are fewer plants to do the work.

Sod has many benefits that are being overlooked including but not limited too erosion control, cooling of ground level temperatures, water filtration, and a safe area for children to play on and spend time outdoors. There may be a case that homeowners over-water their yards but that is not the fault of the turf and requires more education on the proper irrigation techniques needed to maintain a healthy lawn. Most people probably do over-water their lawn during the dry season and water could be saved just by educating them on how much or how little water their yard really needs.

Suggested Change (or Language): The best way to lower water usage and protect the environment would be to educate homeowners and landscapers on the proper use of irrigation and the actual pro's and con's of different types of grasses and plants; not limit the use of one of the most beneficial parts of a landscape, the turfgrass. I respectfully request that more study be done before implementing this new criteria or change the language to one of education about proper irrigation techniques and the amount of water needed to maintain a healthy landscape.

Commenter: Lindy Murff
Affiliation: Vice President, Murff Turf Farm, Inc.
Comment Date: July 7, 2009

Topic: Outdoor Water efficiency criteria 4.0

Comment: The EPA, in this case, is creating standards that are based on a single factor and ignoring a myriad of other factors, in order to rule out a certain plant group with relation to its water usage. This is not a logical position by the EPA, many factors affect the amount of water used by a landscape and all factors need to be looked at to determine a more accurate standard of water usage. Also, in our troubled economy, small business will suffer even more and continue to add to the economic downturn with more jobs lost and fewer taxes collected.

Rationale: Turf is greatly maligned and misunderstood by many. A little bit of research into the science of turf grass will easily reveal all of the many benefits to the environment. That is what we would like to see the EPA do. Give some scientific basis for putting this limit on turf. I understand that you can make an argument for any side of any issue. We want the EPA to know that we as turf producers are concerned with water conservation and with being good stewards of the environment.

I am not a scientist, I am a farmer with years of experience in the turf industry and I know that turf is a positive contributor to our environment and its use should not be limited in landscapes. I farm about 2500 acres of sod on the Gulf coast in Texas and about 1000 acres is irrigated leaving around 1500 acres with absolutely no irrigation. I am able to harvest a crop about once every 10 – 12 months on the fields without irrigation. Like I said, I am not a scientist, but farming turf shows me that turf can survive and even thrive without irrigation. Also, when things get extremely dry, the ground begins to crack open. This happens first in areas where there is no turf. Where there is turf it takes much longer for the ground to crack open. Erosion control is amazing with turf. Row crop farmers have a much higher rate of erosion in their fields than that of turf farming. Look at the science and you will know that turf is one of the best things for a landscape that will actually help conserve water. I am just giving you common sense observations.

If you really want to conserve water then educate the homeowners. The public needs education on properly utilizing water in their landscape. This is where the greatest amount of water conservation can be gleaned.

What the EPA is proposing is a direct assault on the freedoms and liberties we hold dear as Americans. The EPA wants to be a good steward of the environment, that is great, but the EPA also has a responsibility to not infringe on the rights we have as Americans to freely choose how we live and landscape and walk and talk, etc. With only one scientific factor in hand and no consideration for environment or cultural practices, the EPA proposes a limit on turf that will have devastating effects on the turf industry nationwide. The turf industry encompasses hundreds of billions of dollars to a nationwide economy already in shambles. These limits will certainly add more unrest to our economy and possibly have the opposite of the EPA's desired outcome. Education is the key.

Suggested Change (or Language): No limit on turf in a water sense home.

Commenter: Ron Soukup
Affiliation: Emerald Lawns, Inc.
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Michael Temple
Affiliation: WaterSense Partner
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Jason Chapman – Irrigation Service Manager
Affiliation: Irrigation by Design, Inc.
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Robert L Reihe, CIC
Affiliation: Irrigation by Design
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Joe Schmitt, President
Affiliation: Plumbing-Heating-Cooling Contractors—National Association
Comment Date: July 7, 2009

Topic: Scope and Objective

Comment: The paragraph dealing with applicable national, state, and local regulations should be expanded to specifically state that all plumbing installers must meet any applicable certification or licensing requirements.

Rationale: A properly certified or licensed plumber has the knowledge, skills, and abilities to ensure an installation is compliant with the most up to date state and local codes.

Suggested Change (or Language): All homes, landscapes and irrigation systems shall meet all applicable national, state and local regulations. Since the health and safety of the public is of primary concern this specification shall not contravene state or local codes and requirements. Unless indicated, criteria for the individual components or products specified in this specification do not constitute criteria to earn the WaterSense label for that component or product category. Individual component criteria are valid only in the context of this specification. EPA will review this specification every three years to revise it as necessary to reflect changes in technology and the marketplace.

Topic: Summary of Criteria

Comment: The criteria of a new home meeting WaterSense certification should recognize that in order for water efficiency to truly be reached, the product must be installed properly, according to the prevailing code, and be installed by a licensed or, where available, certified plumber to ensure proper installation is achieved.

Rationale: Proper installation of plumbing systems is as important to the achievement of water efficiency as is the selection of water-efficient components.

Suggested Change (or Language): New homes must meet criteria in three areas:
Indoor Water Use, including plumbing, plumbing fixtures and fittings, appliances and other water-using equipment must be properly installed by a licensed or, where available, certified plumber to ensure code adherence.

Topic: Definitions WaterSense Product Installation

Comment: Proper installation of plumbing systems is as important to the achievement of water efficiency as is the selection of water-efficient components. It is important to define who is a WaterSense Installation Partner.

Rationale: Americans today use 300 percent more water than they did 50 years ago putting a tremendous strain on the nation's water supply and the environment. According to EPA estimates, if installed correctly by an Installation Partner, WaterSense faucets and toilets in a single family home could save 17,000 gallons of water every year.

Suggested Change (or Language):
7.0 Definitions
Professional Installation Partner: A properly licensed or certified professional who is committed to installing WaterSense labeled products in accordance with the Water-Efficient Single Family New Home Specification. This partner will utilize industry accepted plumbing techniques to insure the efficiency of the plumbing system is achieved. The Professional Installation Partner must signify such commitment by signing a WaterSense partnership agreement with EPA.

Commenter: Eric Ofstedahl, CIC
Affiliation: Horticulture Services, LLC
Comment Date: July 7, 2009

I have carefully read the comments supplied by the Irrigation Association at http://www.irrigation.org/gov/pdf/IA_Comments.pdf re the proposed WaterSense Water-Efficient Single-Family New Home Specifications.

I am in full agreement with the comments set forth by the IA and urge that the EPA Water Sense program accept the changes of wording as proposed by the IA. The suggested specification changes are based on sound scientific methods that have been empirically proven through academic research and "best management practices" applied in real world, real field settings.

As an EPA Water Sense Partner and irrigation industry professional with 19 years of experience and education, I support scientifically sound water conservation principles that are comprehensively based on up-to-date irrigation technologies together with a sensible application of plant and soil science (Cf. pp.4-5 of the above link as an example, regarding "Soil Erosion Control.."). The changes of wording proposed by the Irrigation Association are based on this comprehensive approach.

Commenter: Vernon W. Cooper
Affiliation: Owner, All States Turfgrass Consultants LLC
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0 thru and including 4.1.6

Comment: As a Professional Turfgrass Agronomist I find these draft specifications to be arbitrary, not based on sound science, and detrimental to most of the environmental protective issues I have fought for and implemented over the last 35+ years working with the University of Maryland, The Maryland Department of Agriculture, the Chesapeake Bay Foundation, and the U.S. Department of Agriculture to improve our environment, educate our clients, and protect the many sensitive ecosystems found here in the Mid-Atlantic area including, but not limited to, the Chesapeake Bay and it tributaries.

Rationale: The one-size-fits-all specifications for home lawns, greater than 1000 sq. ft., limits turfgrass to 40% or less and forbids the use of turf on slopes greater than 1 foot of rise in 4 feet of length (approximately 14 degree slopes). With Maryland's diverse topography, soils, climate, and rainfall, this proposal doesn't save water. Instead, it sets up builders who are trying to meet the Water Saver standards to dump excessive soil, sediment and storm water into already over-burdened storm drains and ultimately increase contamination and sediment into our streams, rivers, and the Chesapeake Bay all while compiling with specifications of the EPA.

To comply with these standards, a builder could have Kentucky bluegrass installed on the pure sand soils of Ocean City, requiring watering constantly to keep the grass alive and as long as it only covers 40% or less of the landscape it would qualify as a Water Saver house. Conversely, a builder could also decide to cover the entire "lawn area" with brick, asphalt, concrete or other impervious materials and this also would qualify as a Water Saver home under your specifications. Neither of these choices would be acceptable to most home buyers and certainly does not comply with water and soil sediment regulations of the Maryland Department of the Environment and other U.S. EPA regulations. Not to mention it is just does not make common sense.

It appears by these regulations that turfgrass has now become the EPA's number one environmental enemy which is down right <u>ludicrous.</u> In Maryland, if not almost every section of this country, turfgrass is the most eco-friendly, as well as the most sought after, material that can be applied to lawns and landscapes.

Countless studies have been completed by numerous Universities across the United Starts as well as USDA-ARS that show the environmental benefits of turfgrass. These studies show:

- **The cooling benefits of turfgrass.** In some cases turf reduces ground surface temperatures as much as 30 – 40 degrees over bare soil and as much as 50 – 70 degrees over impermeable surfaces like asphalt or concrete or artificial turf.[1] These regulations would add significantly to global warming. Take a look at any infrared picture of any city or town you want and it is always the artificial impervious materials which are showing the extreme heat, while the coolest areas consistently are areas of turfgrass.
- **The use of turfgrass minimizes the carbon footprint.** Turfgrass plays a positive role in confronting climate change. A well maintained lawn, fed by nutrients from grass clippings, sequesters carbon from the atmosphere. Replacing turfgrass with mulch will actually increase the carbon released back into the atmosphere by

exposing soils and/or using decaying materials as mulch.[2] While mulch may provide some soil runoff protection it is not nearly as effective as turfgrass in reducing greenhouse gas emissions.
- **Healthy, well maintained turf has near zero storm water runoff.** There have been many University studies, some right here at the University or Maryland, showing time after time that the best control of storm water runoff is a good maintained turfgrass cover. According to research by the University of Minnesota[3], storm water runoff due to increase impervious surfaces has reduced the quality of water and ends up burdening our storm water systems causing detrimental pollution to our streams and rivers. In the State of Maryland this pollution ultimately ends up in the Chesapeake Bay.

The ban on utilizing turfgrass on any slopes with a 1 foot rise in 4 feet of length is also extremely perplexing. According to the specification, other plants are to be utilized on slopes over the 1 foot to 4 foot limit. There are many highway slopes and home lawns greater than 14 degrees in the several Western Maryland counties located in the Appalachian Mountains. With the utilization of adapted turf species and cultivars, effective turf on slopes greater than 14 degrees have been established without the use of supplemental irrigation water. The same technology could be utilized on home landscapes as well. No other plants or man made surface materials have the fibrous root system of turfgrasses and nothing has been found to be better in holding soil on steep slopes. Thus prohibiting the use of turf is asking for soil to remain un-stabilized leading at a minimum to sediment runoff and potentially to danger to human life due to land slides.

Another concern is the option of utilizing a single, nationwide ET factor for calculating a water budget. Being realistic, builders desiring to have a Water Sense label will avoid the complexities of calculating a water budget and will instead opt for the 40% limitation. Even if they do decide to have a water budget, having a single rate for the entire country ignores the regional climatic variations and average rainfall levels. How can a single ET factor be the same for Arizona and Maryland? Are sufficient weather stations and data even available to consider such an option?

I am aware that this program is voluntary, however, we have seen time and time again that local, county and state regulators seek some source from a higher “authority” to base their regulations and laws upon, thus voluntary criteria becomes hard and fast regulations and law. This adoption has already occurred in Lexington Massachusetts and these criteria guidelines have not even been finalized.

In closing, please rest assured I am very much aware of the importance of conserving both the quantity and quality of water now and for generations to come. In that respect, I as a Turfgrass Professional am supportive of policies and programs like the Water Sense program. However, the regulations must be based upon sound research and the Outdoor Water Efficiency Criteria (Sections 4.0 to 4.1.6) are not. If the latest irrigation technology, with smart controllers and efficiency systems, are utilized the water savings of 20% or more could easily be achieved without having to restrict the desire or need of efficient turfgrass landscapes.

[1]The Lawn Institute; How the Environment Benefits from a Well Maintained Lawn; http://www.turfgrasssod.org/lawninstitute/environmental_benefits.htm

[2]Dr. Ranajit (Ron) Sahu; Technical Assessment of the Carbon Sequestration Potential of managed Turfgrass in the United States; www.opei.org/carbonreport

[3]University of Minnesota; Sustainable Urban Landscape information Series; Environmental Benefits of a Healthy, Sustainable Lawn; http://www.sustland.umn.edu/maint/benefits.htm

Suggested Change (or Language): I as a Turfgrass Professional request the EPA set aside the sections 4.0 through 4.1.6 of the Outside Water Efficiency Criteria until such time as qualified research can be conducted by non-partisan Universities to answer the concerns these regulations would have on the environment and the many companies involved in supplying the housing industry both here in the Mid-Atlantic area and across the United States. The intentions are admirable but the unintended consequences would be catastrophic as the criteria is currently written.

Commenter: Larissa Mark
Affiliation: National Association of Home Builders (NAHB)
Comment Date: July 7, 2009

Dear Sheila Frace:

On behalf of the National Association of Home Builders (NAHB), we are pleased to submit the following comments on the U.S. Environmental Protection Agency‘s (EPA) **Revised Draft Water-Efficient Single-Family New Home Specification** that was published on EPA‘s Office of Water website on May 8, 2009 (today‘s proposal).

NAHB represents more than 200,000 member firms involved in home building, remodeling, multifamily construction, property management, housing finance, building product manufacturing and other aspects of residential and light commercial construction. For many of NAHB‘s members, water supply is a vital concern. The wise and efficient use of water, including reuse, can contribute to conservation efforts, offer significant financial benefits to both water suppliers and consumers, and help ensure adequate water supplies that will allow for future community growth and development. As representatives of the community of homebuilders who will participate in the program and the growing number of NAHB Certified Green Professionals, the NAHB has an intense interest in the WaterSense Certification and Labeling program for new homes.

General Comments Economic Impact of Increased Costs on Potential Home Buyers
The WaterSense Water Efficiency program for new homes is an innovative attempt to improve the water efficiency of new homes. The program itself and the improvements already made to the specifications since earlier draft versions are commendable. However, NAHB remains concerned with the potential financial implications associated with the costs of the program. NAHB research has shown that, on average, when the price of a home is increased by $1,000, approximately 246,000 U.S. households are priced out of the market for a median-priced new home1. Given EPA‘s current estimates that the cost for an average home to achieve the WaterSense label will be $1000-$3000, it is apparent that this certification program will adversely impact the affordability of a participating home for middle-income households. NAHB urges EPA to proactively seek ways to minimize the administrative costs of the program that have no direct relationship to improving the actual water saving performance of a participating home. In so doing, EPA can both maximize builder participation and maximize the population who can afford access to a WaterSense qualified home.

Potential for Program Alignment
[7]Upon review of the current WaterSense specifications, it is apparent that there is much crossover with the requirements of the *ICC 700 National Green Building Standard* for residential construction. This is not surprising given that both represent the latest accepted guidance for incorporating established best practices for water conservation in residential building.

The *ICC 700 National Green Building Standard* was approved by the American National Standards Institute in January 2009. It is the first and only green building standard to have ANSI approval. The consensus committee of stakeholders, convened according to ANSI

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[7] 1 NAHB (2009). **United States Households Priced Out of the Market by an Increase in House Prices: 2009.** Available at: http://www.nahb.org/fileUpload_details.aspx?contentTypeID=3&contentID=40372&subContentID=112293.

requirements, ensured an open and balanced approach to its creation. As you may know, EPA was represented on this consensus committee.

NAHB's involvement in sponsoring and promoting the standard is indicative of the association's long-standing commitment to proactively address many environmental and land use issues and reduce the overall environmental footprint of home building. This specifically includes Water Efficiency, to which an entire chapter in the Standard is devoted. To date over two thousand projects have been scored to the Standard via the free scoring tool hosted on www.NAHBGreen.org.

NAHB understands that, in introducing a new home building program like WaterSense for new Homes, a primary concern is participation by the builders themselves. Indeed, unfamiliar program processes and added costs can be partially to blame for hindering program participation. While NAHB also understands that WaterSense is a voluntary program, the association is concerned that certain administrative aspects of it may be perceived by potential participants as unnecessarily costly and/or time-consuming. After careful review of the second draft of the specification, NAHB has developed several comments to draw EPAs attention to specific areas that may impede the WaterSense program's growth and, where possible, have included ideas for addressing these areas to make the program attractive to more participants. In addition, NAHB feels that another way to encourage participation in WaterSense would be, to the greatest extent possible, aligning the program with other existing programs that share the same goals.

Certification to the *ICC 700 National Green Building Standard*, as it is offered within the National Green Building Program, could be such a program. The Department of Energy has taken this approach in promoting its **Builders Challenge** program, whereby a builder seeking certification to the National Green Building Standard can, if they incorporate the certain NGBS practices specified by DOE, simultaneously satisfy the requirements of the Builders Challenge. The NAHB Research Center, who provides certification to the National Green Building Standard, is also in discussion with EPA to explore whether the provisions in the NGBS can be similarly aligned with the new **Indoor AirPLUS** program. NAHB encourages EPA to consider this idea for the WaterSense program as well. By streamlining the cost and administrative effort needed to participate in the WaterSense program and aligning it with a program that many home builders have already embraced, EPA can broaden the program's appeal among those who may otherwise be reticent to incorporate an additional voluntary conservation initiative without compromising the stringency or prestige of the WaterSense for Homes label. NAHB invites the EPA to further discuss the merits of this idea with the hopes of establishing such an alignment prior to a full launch of the WaterSense for New Homes program. **Incorporation of Storm Water Management and Use** NAHB reiterates that certain onsite storm water management practices have the ability to provide reduced public potable water consumption over the life of a home. Some of these management techniques may not add significantly to the costs of landscaping a project but will significantly reduce the amount of natural vegetation lost, increase storm water infiltration to groundwater and, with respect to the stated goals of the WaterSense program, reduce and the need for outdoor water and divert demand from the public supply. Home builders are currently required by the National Pollution Discharge Elimination System permit program, both on the federal and state levels, to implement various best management practices (BMPs) to control storm water runoff during construction, but they are quite properly not expected to manage post-construction discharges. However, the WaterSense for New Homes initiative is an ideal venue for encouraging builders to be creative and proactive about incorporate long-term storm water mitigation strategies into projects on a voluntary basis. Further, EPA is currently missing an opportunity to better educate the public about these

strategies by linking them to the WaterSense brand early on. NAHB supports the voluntary incorporation of Low Impact Development (LID) and storm water reclamation techniques through its own green building program as a way to both reduce the amount of storm water leaving the property and to make that water available for other purposes onsite. To facilitate the inclusion of Storm Water management and usage strategies in the WaterSense for new Homes program, EPA could reference the guidance provided for storm water management and usage found in the *ICC 700 National Green Building Standard* that is already approved by ANSI. Examples of techniques encouraged by the Standard for individual lots that are not currently addressed by the WaterSense specifications include:
Rainwater collection and use.

Encouraging the minimization of significant changes in the grade, avoiding excessive compaction of soil, and other activities that can harm existing deep rooted to protect critical root zones (canopy drip line) in ‗tree save' areas. Minimizing concentrated flows and simulating flows found in natural hydrology (e.g., vegetative swales, french drains, wetlands, drywells, and rain gardens). Reducing impervious surfaces with the use of permeable materials to facilitate the percolation of stormwater into the soil. Designing landscapes to preserve and use natural water and drainage features.

Before requiring any of these items, EPA should fully consider the various water rights issues that would be raised as a result of diverting or otherwise using storm water runoff, as well as the many geological, geographical, meteorological, topographical and climatological factors that can affect the options available for directing and managing storm water flow on a given lot. Alternatively, it could take an approach similar to that found in the ICC-700 and make certain practices voluntary or interchangeable. EPA should not, however, wholly neglect an opportunity to address and encourage storm water management and use given that the concept is so naturally in line with the goals of the WaterSense Program. **Resale Opportunities of Previously Certified Homes** Addressing residential water use is an important strategy when attempting to reduce the impacts of water consumption on a national level, thus NAHB assumes that EPA would like the WaterSense label to be considered of real value to both builders and home buyers. However, by allowing only new homes to obtain this certification, EPA effectively removes the long-term value of the certification with respect to resale of the home. As currently written, the WaterSense certification applies only at the point at which the new home meets the standard criteria. Once the home is sold, the certification becomes essentially moot. As an alternative and added incentive, NAHB suggests EPA develop or incorporate a low cost methodology to recertify homes that have earned WaterSense certifications so that the certification can convey upon resale of a home. Otherwise, consumers spending the $1,000 - $3000 (based upon EPA estimates) for a WaterSense qualified home cannot ascribe that cost to the real market value to the home, even if most or all of the qualifying features remain intact. NAHB is concerned that builders will be reticent to participate in a voluntary program that cannot translate to resalable value, as consumers often take that into consideration when selecting options for a new home. NAHB would be happy to work with EPA to develop appropriate criteria to facilitate the ability of a WaterSense label to convey upon resale without compromising the label's meaning. **Specific Areas of Concern Title (specification)** If EPA plans on changing or modifying these specifications in the future, NAHB suggests changing the title to ―Water–Efficient Single-Family New Home Specification **2009** or similar to better distinguish under which specification a home was qualified, should that information be needed in the future.

1.0 Scope (paragraph 2)
While a meaningful reduction in residential water use may reduce wastewater infrastructure requirements, the sizing of water mains (delivery infrastructure) is often a function of fire codes and not regular usage demand from buildings. Accordingly, WaterSense program may not have any meaningful impact on the delivery infrastructure.

Section 3.1 Leaks
NAHB suggests including —drips (as from a faucet) and —constantly running toilets to the criteria since these might not be recognized as —leaks .

Section 3.2 Service Pressure
NAHB seeks clarification on testing protocols. Specifically, should a cold water valve be opened somewhere on the system to relieve pressure from the thermal expansion tank prior to other testing, in order to obtain a —true reading downstream of the PRV?

Section 3.1 Toilets
NAHB seeks clarification as to whether houses that feature bidets and/or urinals can still qualify for the WaterSense label.

Section 3.1 Bathroom and Kitchen Faucets
NAHB seeks clarification as to whether houses that feature Laundry sinks, Utility sinks and/or wet bars can still qualify for the WaterSense label.

Section 3.6 Showerheads (paragraph 2)
For clarity, NAHB suggests adding the phrase —in a single shower compartment after —flowing at any given time to alleviate potential for confusion. As written, it could be understood that the test will be conducted with all the heads in the home flowing simultaneously, which we do not believe is the intent.

Section 4.1 Landscape
Comment 1 The landscaping component of the New Home Specification has improved dramatically since the first iteration was released in May of 2008. However, NAHB remains concerned that the current landscaping requirement still does not adequately recognize or address several commonplace and acceptable water efficiency and reuse practices practiced by the homebuilding industry, namely LID and storm water reuse practices discussed above. While NAHB understands that this program is in its infancy and will continue to mature, we feel that EPA should seek to develop a more holistic program prior to its final release.
Comment 2 The definition for —front yard needs clarification. For instance, how is the front yard defined for a house sitting at a diagonal on a corner lot? For a townhome in a traditional neighborhood where the house may sit very close to the street but maintain a large back yard, does a focus on the front yard miss the intent of the program entirely?

Comment 3 The definition for —landscapeable area needs clarification. The definition, as it stands, is too broad and does not make it clear if areas that are not under roof and do not use water, such as patios and driveways are considered —landscapable area. Private rights of way are left out, as are restrictive covenants for a subdivision both of which may indeed increase—or decrease—the permitted landscapable area. The definition instead appears to encompass every inch of the lot whether it is landscapable or not.

Comment 4 Septic fields need to be defined further to include repair/expansion/reproduction areas. NAHB suggests that portions of a lot with no watering requirements should not be considered as —landscapable area   for the purposes of setting a turf limit.

4.1.1.1: Option 1
NAHB seeks clarification on the term —Turfgrass   which is undefined in the specifications. Further, NAHB feels EPA should recognize that there are some drought tolerant turfgrasses that require little or no watering and should possibly be exempted from turf related criteria in this specification. Currently the specification fails to adequately consider or plan for those areas that must be vegetated but for which trees or shrubs are unsuitable. Also the 40% limit is arbitrary and the agency provides no flexibility for climatic variations or other circumstances.

4.1.2 Turfgrasses
NAHB seeks clarification as to whether EPA seeks to limit the minimum width of a turf area as a landscape feature (in which case turf grass growing between patio stones would disqualify a house), or set a limit on the minimum width of a roll or square of sod upon installation, (in which case the inspection guidance should reflect this and builders and inspectors be advised to verify this criterion prior to sod stabilization).

4.1.3 Slopes
This requirement is problematic because it fails to recognize the variety of methods that can be used to maintain the integrity of sloped areas. NAHB suggests EPA review Section 503.2 (4) of the *ICC 700-2008 National Green Building Standard* to further develop the criteria identified for the treatment of slopes. The Standard recommends reducing long-term erosion effects through the design and implementation of terracing, retaining walls, landscaping, and restabilization techniques.

4.2.1: Irrigation Systems Post Installation Audits
In this revised draft of the New Home Specification, EPA rescinded its requirement that allowed only WaterSense certified professionals to install WaterSense qualifying irrigation systems. NAHB appreciates the compromise on the part of EPA to instead require only a system audit by WaterSense irrigation partner. However, NAHB maintains its concern that, by requiring yet another inspector to be involved in the program, EPA risks increasing the cost and complexity of participation by builders. NAHB suggests that EPA encourage all inspectors for the WaterSense program to obtain WaterSense certification in order to perform any and all audits and inspections required by the program. Doing so simplifies the verification procedures in a way that will make the program more attractive to possible builder participants.

4.2.3 Runoff/overspray
NAHB seeks clarification on the terms runoff and overspray and suggests EPA, as it expands upon this criterion, consider the myriad scenarios when a crown or side slope might be purposefully built into the hardsurface specifically to direct water to a softscape area.

4.2.6 Irrigation Control
NAHB seeks clarification on the PRV requirements of irrigation systems, as they are frequently metered separately to avoid sewer usage fees. In such cases the irrigation system would operate separately of the PRV installed for indoor use.

5.1: Homeowners' Manual
Many homes are sold with homeowners' manuals and NAHB applauds EPA including this requirement in the WaterSense program. The *National Green Building Standard* similarly

requires a home owner's manual to help educate buyers about the features, benefits and proper maintenance of a green home. This includes a home's water saving features. NAHB encourages EPA to develop a template that builders can use to more easily fulfill this program requirement and further suggests that EPA seek to align such a template with the similar requirements of existing protocols like the *ICC 700*. In so doing, EPA not only simplifies the process for builders who would be required to create a homeowner manual by both programs, but also avoids a process that may eventually overwhelm and confuse home owners by causing them to be presented with seemingly disparate manuals.

4.2.6 Irrigation Control
NAHB seeks clarification on the requirements for a builder partner. Must a partner build all homes to WaterSense Specification, a certain proportion of homes, or simply by request from a buyer or as a builder sees fit on a home built on speculative venture?

Budget Approach Areas of Concern
With respect to the Water Budget Approach, NAHB seeks clarification on over what period is the average calculated. Further, we have the following suggestions:

Page 4, Part 1 Budget Approach, item 2.: Private rights of way need to be included along with public rights of way as well as any applicable restrictive covenants of the development that affect the size of the area over which the owner has full design control.

Page 4-5, Part 2 Budget Approach: For simplicity, the spreadsheet should include a tolerance for estimating curvilinear areas. The current inability for the tool to reconcile a landscapable area with a total lot area without recognizing that some area figures will be estimates will hinder effective usage of the tool.

Inspection Guidelines Areas of Concern
Inspection Guidelines - page 4. A Pressure Gauge should be added to the list of required testing equipment.

Inspection Guidelines—page 6, Hot Water Delivery System: NAHB is concerned that it will be difficult for a water sense inspector to determine the fixture furthest from the hot water source without seeing the pipe runs prior to drywall. A fixture that is physically further from the hot water source than another fixture may, in fact, have a shorter pipe run, depending on how the fixtures were plumbed. EPA should instruct inspectors how to determine the fixture with the longest piping run to use for testing. However doing so without requiring an additional pre-drywall inspection is essential to keep programmatic costs down. EPA may have to rely on builders and their plumbers to supply this information. NAHB also suggests that EPA consider the likelihood that the furthest fixture may not be a faucet and give appropriate guidance for testing. For instance, is this test applicable to washing machines and dishwashers that normally do not waste water in the line prior to the delivery of hot water?

Inspection Guidelines—page 6, Hot Water Delivery System: NAHB anticipates a single inspector having difficulty performing an accurate test if he or she is expected to simultaneously hold a flow bag to a faucet, hold a thermometer in the flow stream and fully open and close the valves, all while accurately recording the start and end temperatures.

Inspection Guidelines—page 7, Lavatories: NAHB anticipates a single inspector having difficulty performing an accurate test if he or she is expected to simultaneously hold a flow bag to a faucet, fully open and close operate two valves and operating a stopwatch. EPA is

Inspection Guidelines—page 8—Showerheads, 2nd para. NAHB seeks clarification——all might be interpreted as meaning all showerheads in the house.

Inspection Guidelines—page 9, italicized— —as an upgrade is not needed. Whether a model is or is not standard for a particular builder is immaterial to water efficient performance.

Inspection Guidelines—page 12. Please see the earlier comment on **Specification 4.1.1.1: Option 1** regarding the need for more definition with respect to turfgrasses.

NAHB appreciates of the transparency and openness used during the development of the WaterSense program. We looked forward to commenting on any forthcoming program components and commend EPA for the hard work and the programmatic improvements that were implemented following the first comment period. NAHB encourages EPA to evaluate the economic data submitted and to fully consider the economic impact decisions related to this program have on access to water efficient homes and to be proactive in streamlining the administrative processes as much as possible.

NAHB believes it is possible to simplify the program administration without compromising either the goals of the program itself or the meaning of the WaterSense label, particularly by aligning the program with other credible programs that share similar goals. If you have any further questions, please feel free to contact us at 202-266-8000 or by email at kmorrow@nahb.com or lmark@nahb.com.

Commenter: Emory Thomas
Affiliation: Unknown
Comment Date: July 7, 2009

Dear Madam or Sir:

Please reconsider your restrictions on natural turfgrass in the WaterSense Program that you are proposing in the near future. Please delay this portion of the regulation that your plan to implement.

Please allow time for stakeholder interests to submit their case. True and proven science needs to be a part of the equation. We know that most of the arid portions of the United States are covered with grass. Not very many trees or shrubs, over 90% grass [Refer to Dr. James Beard - turfgrass professor for many years at Michigan State University, and Texas A&M University and then his own business - International Sports Turf]. Why would we want to limit turfgrass if it is the most prevalent grass in Arid Climates?

Yes, I have an "Axe to Grind". I am a turfgrass producer and if you place these restrictions on our product --- you will greatly inhibit our business. Not only will we not be able to grow but we will have to drastically reduce our current operation. This will affect equipment dealers and fertilizer dealers as well as the people who use our products.

Your delaying your decision to limit turfgrass in any manner until this can be fully discussed would be greatly appreciated.

Commenter: Barbara Fair
Affiliation: North Carolina State University, Dept. of Horticultural Science
Comment Date: July 7, 2009

I fully support the comments prepared by: Andrew K. Smith, CIC, CID, CLIA External Affairs Director Irrigation Association,for the irrigation association.

See Appendix A for a copy of the comments submitted.

Commenter: Bill Williams
Affiliation: American Society of Irrigation Consultants
Comment Date: July 7, 2009

See Appendix B for a copy of the comments submitted.

Commenter: Carol M. Ward-Morris, Program Coordinator
Affiliation: Arizona Municipal Water Users Association (AMWUA), Regional Water Conservation Program
Comment Date: July 7, 2009

Dear Ms. Lee,

The Arizona Municipal Water Users Association (AMWUA) is a voluntary association of the municipalities of Avondale, Chandler, Gilbert, Glendale, Goodyear, Mesa, Peoria, Phoenix, Scottsdale, and Tempe. The water conservation staffs of the member municipalities, working together as the AMWUA Regional Water Conservation Committee, have compiled the following comments regarding the WaterSense Revised Draft Water-Efficient Single-Family New Home Specification.

The time and effort the EPA has invested in the development of these specifications, the revisions made in light of stakeholder comments, and this most recent opportunity to offer feedback are very much appreciated.

1.0 Scope and Objective

"EPA's goal is that WaterSense labeled new homes will use approximately 20 percent less water than a standard new home by using a combination of prescriptive and performance-based approaches identified in this specification."

> A fundamental element is absent from the specification: requirement of a water meter, regardless of whether the home is connected to a public water system or supplied by an onsite well. Without a meter, it is not possible to measure consumption and ensure that the water efficiency goals of the program are met and maintained.

3.0 Indoor Water-Efficiency Criteria

3.1 "Leaks – There shall be no visible leaks from any water-using fixtures, appliances, or equipment."

> All leaks are not necessarily visible. There should be a leak check at the water meter included in this section. Again, this argues for the requirement of a water meter.

4.0 Outdoor Water-Efficiency Criteria

4.1.1.1 "Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area."

> Option 1 would be more effective if it weren't written to apply exclusively to turf. High-water-use plants can use as much or more water than turf. We encourage EPA to work to address this.
>
> The principles of Xeriscape require turf areas to be appropriately sized and located. The amount of turfgrass that is appropriate varies by region. Limiting turfgrass to 40 percent of the landscape will very likely initiate a positive change in practices in many areas of the country, but it could negatively impact practices in areas such as ours, where considerably less turf area is acceptable. One of our member municipalities, for example, has in place an

ordinance that restricts model homes to no more than 20 percent water-intensive landscaping.

Similarly, a landscape in the Phoenix area consisting of 39 percent turf and 61 percent citrus trees would still qualify for a WaterSense certified home under option number one of the current guidelines. Taken to the extreme, a landscape could consist entirely of citrus trees and still be certified under this criteria, while requiring significant quantities of water. By our standards, neither can be considered water-efficient.

AMWUA recognizes that other regions will not accept, nor should they, the more stringent limitations on the amount of turf that we would consider appropriate in our region. Due to lower ET_o and higher annual precipitation, turf is much more sustainable in northeastern Ohio than it is in the low desert. Perhaps regional subsets could provide the solution to the issues created by climate and water supply differences across the country.

4.1.1.2 "Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor."

Evapotranspiration adjustment factor is defined in these specifications as "An adjustment factor used in the water budget tool to limit the allotment of water a landscape can be designed to use. For the purposes of this specification, EPA has set this level at 70 percent of reference evapotranspiration (ETo). This means that the landscape must be designed to require a maximum of 70 percent of the amount of water required by an equally sized landscape composed entirely of turfgrass."

Option two would therefore allow a landscape to be planted entirely in a low-water-use turfgrass, such as Bermuda, which has a landscape coefficient of .6.

4.1.2 "Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide."

While there are nozzles available with a 5-foot radius, they are not very efficient; neither are the end, side, and center strip nozzles. Skilled irrigation designers know to cut the normal spacing of these heads in half to account for this. The main reason for turf as a residential landscape plant choice is the fact that it is tolerant to foot traffic for play and recreational uses. How much play will a 4 foot wide strip get? We recommend that the minimum dimension be left at 8 feet, as it was in the previous version of the criteria.

4.2.4 "Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DU_{LQ}) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit."

The intent of this specification is unclear. Is this requirement to be met by each station or zone, or is it achieved by averaging the uniformity for the entire system? Averaging the stations would allow seriously substandard irrigation zones to be installed. For example, a home with three highly efficient drip zones at a 90% EU, coupled with a fixed pattern spray zone at a 20% DU, would calculate to be a 72.5% efficient system. Allowing an irrigation zone to be installed at a 20% DU and meet the requirements for a water-efficient system would erode the credibility of the WaterSense label.

4.2.6 Irrigation controllers

3. “Variable run times – shall be capable of varying run times, for example one minute to a minimum of one hour.”

Because of soil conditions, climate, and plant adaptations, the minimum possible should be increased to a minimum of 2 hours.

4. “Variable scheduling – shall be capable of interval scheduling (minimum of 14 days) to allow for watering on even day scheduling, odd day scheduling, calendar day scheduling, and interval scheduling.”

Because of soil conditions, climate, and plant adaptations, the minimum possible should be increased to a 30-day calendar capability.

4.2.7 Sprinkler irrigation

Pressure management should be addressed in this section. It is very common to encounter residential fixed-pattern spray systems running at excessive pressures. This causes system losses that might not be observed in a catch-can audit, though they will dramatically increase the amount of water that needs to run through the system in order to keep the turfgrass green.

7.0 Definitions

“Lower quarter distribution uniformity (DU_{LQ}) – Distribution uniformity is the measure of uniformity of applied irrigation water over an area. DU_{LQ} is the ratio of the average of the lowest 25 percent of measurements to the overall average measurement, often determined through the use of catch cans or soil moisture probes that evaluate the coverage of one or more sprinklers or drip systems.”

Soil moisture probes are used to determine rooting depth when auditing irrigation systems. They are not used to calculate distribution uniformity and should be removed from this specification.

Revised WaterSense Water Budget Approach

I. Introduction

“Option 1: Turfgrass shall not exceed 40 percent of the landscapable area.”

Please refer to the comments made under the Revised Draft Water-Efficient Single Family New Home Specification 3.0 – 4.1.1.1.

“Option 2: Landscape design shall be developed using the water budget approach and tool based on a 70 percent evapotranspiration adjustment factor.”

Please refer to the comments made under the Revised Draft Water-Efficient Single Family New Home Specification 3.0 – 4.1.1.2.

II. The Water Budget Tool
B. Detailed Instructions
Part 2: Determining the Landscape Water Requirement

1. The NOAA link does not work.

2b. Why is the Kl value altered from reference ET for pools, spas, and water features? Isn't the evaporation rate from a water surface area close to reference ET?

2c. Why are we choosing a sprinkler type for pools, spas, and water features?

ET_o Finder

This is an important tool, as many locations do not have ET values available to them. Arizona has a well-established network of weather stations to calculate ET data through the AZMET system. The reference ET value for the Phoenix, Arizona, area in the Finder, however, is incorrect by a significant margin. Working with a zip code in which an AZMET station is located, we looked up the ETo for the month of June. The ETo Finder provided a reference ET value of 13.41 inches; the AZMET station lists an ETo value of 8.9 inches for June of 2008. That is a difference of 44%. The yearly variations in ET are never that extreme in our area—a four-year average of that same station for the month of June results in a value of 8.6 inches. Other locations with reliable ETo data should be compared to the ETo finder to determine the extent of this anomaly. The methodology of the ETo Finder's calculations should be examined thoroughly to ensure accurate values are being reported.

Revised WaterSense Landscape Water Budget Tool

Utilizing peak month ETo will help eliminate confusion based on the variations in irrigation seasons from region to region. If the system qualifies for the peak month, then it will qualify for the rest of the irrigation season.

The water budgeting option can be viable, but, as it is currently written, it allows for even more water-intensive landscape than option one. The Phoenix area average Reference Evapotranspiration (ETo) rate is 8.6 inches for the peak ET month of June. This was taken from a four year average of the Phoenix Encanto and the Phoenix Greenway AZMET weather stations. (Arizona previously used another method to calculate ETo and currently only has the last four years using the new IA standard Penman-Monteith method. Past data has shown that the ETo variations in the Arizona low deserts are minimal and a four year average can be acceptable.) The average June monthly precipitation of 0.09 inches was obtained from the NOAA climate data. Using this regional data, the budgeting tool would allow a landscape to be 79 percent planted in warm season turfgrass, with the remainder being a non-planted area. This cannot be considered water-efficient or sustainable in our region. The public, and most certainly water conservation professionals, would question the value of a certification that would allow for so much turf in our region.

While using the peak month ET values solves the problem of varying irrigation seasons, it presents another problem in some areas. Bermuda, a warm season turfgrass, is typically used for lawns in the low deserts. If Bermuda lawns are allowed to go into dormancy for the winter months, the crop coefficients drop dramatically; however, it is a very common practice to "overseed" these lawns with a cool season turfgrass for the winter. This in effect raises the crop coefficient from the summer months when the Bermuda is active to a higher one for the cool season winter ryegrass. Because the potential for overseeding exists and is often practiced, it should be calculated as if it will be.

We understand that it is difficult to balance the need for customization in the budgeting tool while maintaining its integrity. It has not been made clear who will be charged with ensuring that the data sets for precipitation and ET_o in the different areas are correct and uniform. Users with a basic knowledge of water management could easily manipulate the tool by simply increasing the ET_o and/or increasing the annual precipitation, allowing a landscape to have an even higher percentage of water-intensive plant material than in the aforementioned example and still qualify for the EPA label. This would further erode the credibility of the program.

Some direction is needed regarding how to enter the square footage of the planted areas to ensure the input is based on the mature canopy size of the plant material; otherwise, the calculation for fifty citrus trees with a three-foot diameter canopy each at the time of planting would result in 353 square feet of plant material; at an average mature diameter of twenty feet, these same trees would cover an area of 15,700 square feet. There is a significant difference in the water requirements between those two different inputs.

The expected distribution uniformities have been lowered to be more achievable, but what are the consequences if the system fails to reach these expected efficiencies during the audit? If a fixed-pattern spray zone fails to reach the expected DU of 65 percent, will the home then be ineligible for certification? Is there a process in place to correct the deficiencies and then re-inspect?

If the entire square footage is not entered on the part 2 tab, it would be valuable to prevent the tool from providing a determination of whether or not the proposed design meets the water budget. It does give an error message in red on the results page, but if it is printed in black and white it may go unnoticed. Contractors are busy people and many will just look for the Yes or No on the bottom of the results page.

Revised Draft Irrigation Audit Guidelines

A: Distribution Uniformity Calculation

As noted previously, the reference to utilizing soil probes should be stricken from this paragraph. Soil probes are used for determining rooting depth and soil type and conditions. They are not used to calculate distribution uniformity.

B: Verification of Specification Criteria by Visual Inspection:

Controller Features

3: As noted previously, this should be changed a minimum 2-hour run time capability.
4: As noted previously, this should be changed to a 30-day calendar capability.

WaterSense Labeled New Home Irrigation Audit Checklist

A: Lower Quarter Distribution Uniformity

There should be sheets for calculating individual stations. DU should not be calculated as an average uniformity of all stations.

B: Verification of Specification Criteria

4.2.2: The system should be inspected prior to backfilling the trenches to verify that there are no leaks.

4.2.4: If this is done station by station, then this should ask if it meets the expected efficiency as listed in the Landscape Water Budget Tool (i.e. 65% for fixed spray, 70% for rotors, etc.).

4.2.6: Adjust capability criteria based on previous comments.

4.2.7: There should be verification that the system pressure is operating within manufacturer specifications to prevent misting problems.

Revised Draft Inspection Guidelines for WaterSense Labeled New Homes

IV: Indoor Water efficiency Criteria

Leaks (section 3.1)
Leak detections should not be just visual in nature; they should include checking the water meter for verification.

Toilets (section 3.4)
Food coloring may be used in place of dye tablets for flapper valve leak detection tests. On checking the water level setting in the tank there should be a ½" distance from the water level to the top of the overflow tube.

Bathroom Faucets (section 3.5.1)
If the faucet is a one-handle type, it should be noted to turn it on for the full mixture of hot and cold (the middle position).

Kitchen Faucets (section 3.5.2)
If the faucet is a one-handle type, it should be noted to turn it on for the full mixture of hot and cold (the middle position).

Evaporative Cooling Systems (section 3.8.1)
Requirements: Blow down three times within a 24-hour period is excessive for residential evaporative coolers. Even with the relatively high TDS levels in the Phoenix area water supply, there is no reason for these systems to blow down so frequently.

End of the last sentence should be changed to "shall not meet these criteria."

V: Outdoor Water-Efficiency Criteria

Please see previous comments regarding outdoor water-efficiency criteria.

VI: Homeowner Education Criteria

Operating Manual (section 5.1) Requirements

Last sentence should be changed to read, “If an irrigation system is installed, the builder shall provide the homebuyer with a **scale-drawn, as-built plan** of the system and copies of the irrigation schedules.

Thank you, again, for the opportunity to provide comments on the Specification.

Commenter: Richard D. Bradley, CIC,CID, CLP, CGIA,CLIA, Water Sense Partner
Affiliation: Superscape Landscape & Irrigation Mgt. Corp**.**
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: George Searles, Controller
Affiliation: Grassroots Irrigation, Inc. & Joyce Landscaping, Inc
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Nicolas M. Khoury
Affiliation: ValleyCrest Landscape Development/ IANE
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Robert Wade, Wade Landscape
Affiliation: EPA WaterSense Partner
Comment Date: July 7, 2009

I am a licensed landscape contractor in California. I represent the Irrigation Association as the Chairman of the Government Affairs Committee. I am also on the Board of Directors of the California Landscape Contractors Association as Director of Legislation. I congratulate the EPA for undertaking such a large and diverse subject as Residential Water Use and Conservation, however, I have some concerns with the direction this process has taken.

As a landscape contractor I have direct knowledge of how irrigation systems work, and do not work, as well as the necessary long term management that irrigation systems require. Irrigation technology has become quite sophisticated in recent years which requires significant background knowledge before informed decisions can be made. We share as a common goal the absolute necessity to conserve water. How we go about achieving these water savings is where we diverge. There are several points in the current document that prohibit plant material in certain circumstances. I think it is incorrect to assume that one standard of plant material selection will satisfy the entire country. Plants, or more specifically turf grass, do not waste water. It is the human manager of the irrigation systems that wastes water. There are many circumstances where turf may be the best solution to a specific problem. This is not to say that I am advocating large areas of non-essential turf. What I am saying is that assumptions have been made about turf grass that are incorrect.

I also disagree with the prohibition of certain emission devices, that is, spray heads. There are many situations where spray heads are the best application. The decision should be left to the experts; Irrigation designers, Irrigation contractors, and Landscape Architects.

I have said that we have the same goal - Conserve Water. I suggest that the most straight forward method to achieve this is to regulate the outcome, not tell experts how to do their work. NO OVER SPRAY AND NO RUNOFF are two regulations that will solve most, if not all, of the situations that waste water. Both are fairly easy to achieve. No over spray can be achieved by good design and good installation. This is where the WaterSense partners become true partners in water conservation. No runoff is a management issue. It is most easily solved by the use of a "Smart Controller". If a system is in good running order, Runoff is caused by watering too long. Depending on the soil in a particular region, there is a finite time frame where the soil can accept water. In my area, this time frame is 3.5 minutes when watering with a spray head. If the landscape requires more than 3.5 minutes, the Smart Controller will recognize this and adjust for multiple start times. The Runoff problem is now solved, without the prohibition of necessary equipment.

I have included as an attachment a more detailed document that explains my thoughts in greater detail. I urge that as these comments are reviewed, the WaterSense committee gives careful consideration to the comments made by those who have direct knowledge and experience and who have committed to water conservation.

Thank you for your time. I am always available to help in this important process.

NOTE: See Appendix A for a copy of the additional comments submitted.

Commenter: Shawn Martin
Affiliation: Plumbing Manufacturers Institute
Comment Date: July 7, 2009

Topic: Section 3.6 Showers

Comment: Current provisions regarding flow restrictions in shower compartments should be modified to make them optional, and incentivize reduced consumption. For consumers choosing to install such products, water consumption requirements in other areas should be reduced to compensate for the use of the device, as described below. This is necessary to ensure that the treatment of these devices is consistent with that of other non-essential uses of water permitted within the specification.

Rationale: The limitation of higher flow showering systems is inconsistent with the treatment of other non-essential uses of water in the specification, and does not account for the very low number of the devices in use. The draft WaterSense specification appropriately allows for several types of non-essential water uses. In all such cases, with the exception of the shower compartment section, the specification seeks to limit the extent of their use and the amount of water they consume. Shower systems that consume more than 2.5 gpm are essentially eliminated, however. No justification is provided to account for this difference in approach. This is in spite of the fact that they serve legitimate functions for consumers who are disabled, and their recreational and therapeutic use is consistent with that of other non-essential devices permitted.

The proposed language seeks to permit the use of higher flow shower systems under certain circumstances, where additional water savings are secured elsewhere in the home to compensate for the additional usage of the device (above and beyond what is required elsewhere in the document). The effect of this proposal is a zero net water use increase resulting from the use of the device.

Suggested Change (or Language):

The total allowable flow rate of potable water from all showerheads flowing at any given time, including rain systems, waterfalls, bodysprays, and jets, shall be limited to 2.5 gpm per shower compartment, where the floor area of the shower compartment is less than 2,600 inches^2 (in.^{2}) (1.7 meters^2 [m^2]). For each increment of 2,600 in.^{2} (1.7 m^2) of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of potable water from all flowing devices is equal to or less than the 2.5 gpm per shower compartment. <u>Showers not complying with the provisions above are permitted, so long as the water consumption elsewhere in the home are reduced by an additional amount (beyond the other requirements of this document) equivalent to the additional flow of the shower (above and beyond the flow from a single 2.0 gpm showerhead). Compensating reductions should be made assuming that the shower is used once per day by one occupant, and that it is used for a period of 9 minutes per use.</u>

Commenter: James Dowd, Executive Director
Affiliation: Dallas Irrigation Association
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Jesse Salinas
Affiliation: Irrigation Design and Consultation primary, Dallas Irrigation Association secondary
Comment Date: July 7, 2009

This is simply a request on my behalf that EPA Postpone the new guidelines.
The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria. As stated in California Assembly Bill 1881(enacted 2006): "…landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development.…" The green industry believes the statement within AB1881 can apply across the country and as such, is hopeful the EPA will make constructive improvements that embrace the value of the outdoor living environment prior to publication of its WaterSense model new home specification.

The green industry is also united in recommending to the EPA that decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. We also recommend to the EPA that the comments submitted by the green industry in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, we urge the EPA to take into consideration the comments below, as they are based on market data, best management practices and best available science

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment: Any arbitrary limit on landscape plant material is not supported and should be removed from the specification. This national criterion, voluntary or otherwise, is inappropriate and not based on best available science. For this reason, we do not support the inclusion of Option 1.

Rationale: The green industry believes in the practice of "the right plant in the right place," and promotes local and adapted plant materials appropriate for each climate and geographical location. The 40% turfgrass limitation is an arbitrary limit placed on landscapes; local geographies, climates and markets should guide the make-up of landscape materials, including types of turfgrass, trees and shrubs.

Suggested Change (or Language): The EPA should use best available science to produce a performance-based approach to landscape design criteria, rather than an arbitrary prescriptive approach. The EPA should continue the dialogue with all segments of the green industry on best practices and stewardship to determine the best performance-based criteria to implement as part of the new homes specification.

Commenter: Stephen W. Smith, President, Deborah M. Hamlin, Executive Director
Affiliation: Irrigation Association
Comment Date: July 7, 2009

See Appendix A for a copy of some of the comments submitted.

Comparison of 10 diverse locations for Landscape Water Allowance

The study using the Water Budget Tool from EPA to look at landscapable area and ETAF to describe the amount of water available for irrigate the landscape.

The current definition of landscapable area is very generous for determining the amount of water available for the landscape; however, the Irrigation Association recognizes that the definition is confusing to the general public because it is used to describe the area in an unconventional way. Our study using the water budget tool to determine the water allowance can be redefined without increasing the total amount of water determined by the tool.

New, more traditional definition of landscapable area:
Landscapable Area is all area that could be landscaped and irrigated that is not covered by roof line and permanent hardscapes such as driveways, sidewalks, decks etc.

The ETAF be changed from the proposed .70 to .80.

The attached spreadsheets analyze how to use both methods to determine the amount of water available for the landscape. Each method calculates a nearly identical water allowance, using the EPA Water Budget Tool and calculating with a smaller landscapable area with an ETAF of 0.80. An analysis of landscape water requirement indicates that with only minor to changes to some landscapes in some areas will the allowance be adequate. In general a change of less than 2% is needed.

See attached documents using the EPA Water Budget Tool and a comparison of ten different cities and locations around the United States.

Commenter: David Lundell, Division Chairperson
Affiliation: New Seed, Inc. American Seed Trade Association, Lawn Seed
Comment Date: July 7, 2009

See Appendix C for a copy of the comments submitted.

Commenter: Betsy McGill
Affiliation: Executive Director, Florida Sod Growers Cooperative
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: We feel that the current language limiting turfgrass to no more than 40% of the landscape is arbitrary, is not based on sound scientific criteria and ignores the critical role of consumer behavior in the use of outdoor irrigation water. We are also deeply concerned about the ban on turfgrass for steep slopes, as well as the single, nationwide .7 evapotranspiration factor for calculating water budgets.

Rationale: As an industry, we are deeply committed to water conservation and the wise use of our natural resources. Our *Lawns Make Our World Greener* (www.floridalawn.com) public outreach program was launched this year to educate and encourage homeowners and businesses on how to use less water and still maintain healthy turf areas that contribute a host of scientifically-documented benefits to our Florida environment.

Turfgrass produces oxygen, cools the atmosphere, and is the most effective material for preventing erosion, which makes the ban of turfgrass on slopes puzzling.

Turf is also unequaled for capturing rainwater, purifying it through its dense root system, and returning it to our aquifers. In a state where it's not unheard of to have 18 to 20 inches of rain in a single week, these benefits are especially crucial.

New studies are finding that turfgrass plays a valuable role in sequestering carbon and reducing dust and pollutants. And continuing work through the University of Florida, Texas A&M University and other institutions are demonstrating that turfgrasses in many areas of the nation can be maintained in a healthy condition with minimal - and in some cases no - supplemental irrigation.

The blanket 40% cap on the percentage of turfgrass being proposed, in addition to not allowing for obvious regional differences, is not based on science and sends a resoundingly negative - and undeserved - message about turf that will be devastating to an industry already suffering under the current economy. The water budget alternative as it now stands is not only flawed in not allowing for regional variations, but is extremely complex, making it almost certain that it won't be utilized.

The Florida Sod industry led the nation in production in 2007, contributing over $703 million in output and $416 in value added contributions to the state and supporting over 5,500 jobs at the farm level. The industry also serves as a cornerstone for other local businesses, from suppliers to landscapers to lawn maintenance companies, most of which are locally owned, smaller businesses.

The current economy has already resulted in a tremendous decline in sales – as much as 50 – 70% in most cases. Farms have closed, and long-time employees are being laid off.

Although the WaterSense program is voluntary, local governments who are struggling to create water management plans will almost certainly view the recommendation to reduce turf as a near-mandate to do the same, resulting in severe economic repercussions for our farmers and our communities.

It's easy to lose sight of the true goal of these plans: *to address water use, not plant mix*. There are tremendous water savings opportunities available through enforcing current watering restrictions and working with developers, property owner associations, and homeowners to education and promote balanced, sustainable landscapes and responsible care. These measures would result in immediate, quantifiable water savings without the loss of jobs and the economic contributions made by these local businesses.

The Florida Sod industry is actively involved in several aspects of research, from exploring new irrigation technologies to developing new turf varieties with reduced care requirements. We're also actively reaching out to homeowners and businesses with our water conservation message, as we feel that education and understanding are keys to long-term positive change.

Suggested Change (or Language): We respectfully request that the EPA set aside the Outdoor Water Efficiency Criteria at this time and continue to work with stakeholders and researchers to develop a program that is scientifically sound, includes reasonable allowances for regional variances, and will achieve the goal of quantifiable water savings without the unintended consequences that seem likely under the current proposal.

Commenter: Mary Kay Woodworth
Affiliation: Executive Director, METRO Atlanta Landscape & Turf Association, Inc., President, Urban Ag Council, Georgia
Date of Comment: July 7, 2009

The attached comments represent our agreement with the comments submitted by the National Turfgrass Foundation and the Irrigation Association regarding the second draft of the WaterSense® *Water Efficient Single Family New Home Specification*. These comments reflect the best options as we see fit given the draft presented to the public for comment. These comments should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

We recommend to the EPA that decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome based performance criteria are developed in partnership with qualified stakeholders. We also recommend to EPA that the comments submitted by the Irrigation Association in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, we urge the EPA to take into consideration the comments below from the landscape and irrigation industries, as they are based on market data, best management practices and best available science.
Sincerely,

See Appendices A and C for a copy of the comments submitted.

Commenter: Arthur J. Milberger
Affiliation: King Ranch Turfgrass
Comment Date: July 7, 2009

Topic: The limitation of turfgrass to 40% of the landscape, slope restrictions, and ET factor

Comment: Totally arbitrary and without merit

Rationale: The USA is made up of multiple climates and thus no one rule fits all climates. The landscapes of the USA provide both aesthic as well as economical solution for covering the barren earth, and as such turfgrass must be used where appropriate without limitation.

Suggested Change (or Language): Turfgrass should be used in situations where there is a need for asthetic benefits , social /psychological benefits, erosion protection, climate reduction of greenhouse gases, filtration of runoff, protection of our water purity,utility benefits, and countless other benefit, too numerous to name.

See Appendix B for a copy of the other comments submitted.

Commenter: Rob Zimmerman
Affiliation: Kohler Co.
Comment Date: July 7, 2009

Topic:

WaterSense New Home Draft Specification; Section 3.6: Showerheads

Comment:

The 2,600 in^2 floor area minimum for additional showerheads is overly restrictive and arbitrary.

Rationale:

Multiple-outlet shower systems represent a small portion of the new home market. Market research by manufacturers of these systems suggests such systems are almost exclusively installed in master bathrooms, and are very infrequently used to their full capacity. In addition, many of these systems are installed for therapeutic reasons, or to provide accessibility to physically impaired users. To disqualify new homes with these systems from the WaterSense program, even though those homes may incorporate many other water-saving technologies is restrictive and will limit participation in the program.

The predominant model codes used in the United States set minimum areas for shower enclosures. The Uniform Plumbing Code (UPC)* requires 1,040 in^2, while the International Plumbing Code (IPC)** requires 900 in^2. Area restrictions such as that found in the WaterSense New Homes Draft specification are also being proposed in other green building codes. At this time, there is no consensus on what area constitutes an appropriate delineation for “single person” and “two person” showers. The lack of consensus illustrates that 2,600 in^2 is arbitrary.

However, if EPA feels that it is necessary to retain the link between shower enclosure floor area and total water flow, we feel that an area of 1,500 in^2, or 1.5 times that of the model codes, would be a reasonable compromise.

*UPC, Section 411.7
**IPC, Section 417.4

Suggested Change (or Language):

We request that the second paragraph of Section 3.6, which sets a minimum floor area of 2,600 in^2 before additional showerheads may be added, be deleted entirely from the WaterSense New Homes specification.

If the area restriction is to remain, we request that “2,600” be changed to “1,500”.

Commenter: Gary Klein
Affiliation: Affiliated International Management, LLC
Comment Date: July 7, 2009

Topic: 3.3 Hot Water Delivery System – To minimize water loss from delivering hot water, the hot water distribution system shall store no more than 0.6 gallons (2.3 liters) of water in any piping/manifold between the hot water source and any hot water fixture. Timer- and temperature-based recirculating systems shall not be used to meet the criteria.
Comment: There are six types of recirculating systems:

1. gravity or thermosyphon (no pump, but large heat loss in the circulation loop)
2. continuously pumped
3. timer based controls
4. temperature based controls (aquastat controls temperature)
5. time and temperature based controls (aquastat controls temperature)
6. demand controlled

Of these, the only demand controlled has been demonstrated to be energy efficient.
Rationale: See Comment above
Suggested Change (or Language): Either include all of the types that are prohibited, which are items 1-5 above, or say that only demand controlled is acceptable.

Topic: 3.3 Hot Water Delivery System – To minimize water loss from delivering hot water, the hot water distribution system shall store no more than 0.6 gallons (2.3 liters) of water in any piping/manifold between the hot water source and any hot water fixture. Timer- and temperature-based recirculating systems shall not be used to meet the criteria.
Comment: Why is the specification set to allow a structural waste of 0.6 gallons from the source of hot water to the fixture? The original proposal and subsequent drafts had a much smaller amount. The amount of structural waste needs to be much smaller to provide acceptable hot water delivery over the life of the plumbing that will be built into a WaterSense qualified new home.
Rationale: According to research conducted by the California Energy Commission, the amount of water that is wasted per hot water event is larger than the amount of not-hot-water that is stored in the pipe. At flow rates between 1 and 3 gallons per minute, the extra waste of water is approximately 1.25 times the actual volume in the pipe. The waste of water gets larger as the flow rate decreases, growing to roughly 2 times the actual volume when the flow rate is around 0.5 gallons per minute. Even with the flow rates for faucets currently defined by WaterSense, there are many occasions in which people do not use the full flow rate. In addition, we can anticipate that flow rates for lavatory faucets will decline over time to 0.5 gallons per minute, since that is already the law for public restrooms; the technology is available and it works well. People care more about time-to-tap than they do about water or energy savings. I have surveyed more than 20,000 people from all over the United States, in all walks of life in the past decade. Universally, they want the time-to-tap to be between 2 and 3 seconds at any faucet or shower, and they would like this to be reasonably consistent throughout the house. They consider 10-15 seconds to be acceptable. (A maximum of 10 seconds is also what the American Society of Plumbing Engineers considers acceptable for buildings designed by plumbing engineers.) When hot water arrival takes longer than 15 seconds, most everyone leaves the tap they turned on and does something else, returning to use the hot water when they are ready. Their departure introduces the second type of waste related to hot water delivery, behavioral waste. While difficult to measure, it can be significantly larger than the structural waste.

With these additional elements in mind, let's analyze the performance of the proposed hot water delivery criteria.

Structural Waste = 0.6 gallons in the pipe * 1.25 (factor for additional waste) = 0.75 gallons

Time –to-Tap, based on existing flow rate criteria

Lavatory Faucets @ 1.5 gpm = 0.75 gallons ÷ 1.5 gpm = 0.5 minutes = 30 seconds

Kitchen Faucets @ 2.2 gpm = 0.75 gallons ÷ 2.2 gpm = 0.34 minutes = 20 seconds

Showers @ 2.5 gpm = 0.75 gallons ÷ 2.5 gpm = 0.3 minutes = 18 seconds

Performance will be considered unacceptable by consumers for all faucets and showers when the maximum allowed structural waste is built. We note that there is currently a discussion underway to reduce showerhead flow rates to 1.75 gallons per minute. Assuming the same length of pipe, the performance will be very similar to that of the lavatory faucets. In addition, although there will be not water waste, energy will be wasted when the piping serves dishwashers and washing machines.

In order to get the waste at current flow rates down to acceptable time-to-tap delays, it is necessary to reduce the volume of structural waste. The lowest flow rate is the critical variable, in this case 1.5 gpm. To get the time-to-tap down to the maximum acceptable delay, the volume needs to be cut in half down to 0.3 gallons. To get down to the preferred maximum delay of 3 seconds, it is necessary to cut the volume down to 0.06 gallons. This buildable under current codes using demand controlled circulation with short twigs serving the hot water outlets, and with multiple water heaters or hot water plumbing cores such that the volume from the one or more water heaters is no more than 0.06 gallons.

I would note that a proposal has been submitted to the International Code Council for consideration this fall that effectively has a maximum structural waste of 0.25 gallons, less than half of the current WaterSense for New Homes proposal. The proposal is being supported by several groups including DOE.

One last point, the structural waste of water is directly related to the structural waste of energy. After hot water has been used a given location, if the time between events is long enough, the temperature of the water in the pipes will no longer be acceptable for hot water use. The greater the allowable structural waste, the greater the eventual energy waste.

Suggested Change (or Language): If EPA wants to have long-lived plumbing systems that will be considered acceptable for many years of changes to federal standards and to the Water Sense flow rate criteria, then please reduce the maximum allowable volume to 0.06 gallons.

I also want to encourage EPA to consider and adopt the changes to the Draft Inspection method proposed by the Alliance for Water Efficiency.

Topic: 3.3 Hot Water Delivery System – To minimize water loss from delivering hot water, the hot water distribution system shall store no more than 0.6 gallons (2.3 liters) of water in any piping/manifold between the hot water source and any hot water fixture. Timer- and temperature-based recirculating systems shall not be used to meet the criteria.

Comment: The hot water source needs to be better defined.

Rationale: As I understand the Draft Inspection Guidelines, there are really two separate ways to qualify. One is for the volume from the water heater to the hot water outlet to be no more than 0.6 gallons, including the additional waste factor of 1.25 described above. The other is for the volume from the demand controlled recirculation loop to be no more than 0.6 gallons, including the additional waste factor of 1.25 described above.

The current inspection method and the language in 3.3 are currently in conflict because the Draft Inspection Guidelines assume that the maximum waste, including the additional waste factor shall not exceed 0.6 gallons. This means that the structural waste can be no more than 0.48 gallons, which I think is headed in the right direction, even though I do not think it is small enough.

Suggested Change (or Language): Create a definition. Hot Water Source – Acceptable hot water sources include a water heater or a demand-controlled recirculation loop.

Topic: Type of Water Heater
Comment: The current Draft Specifications are silent on acceptable water heaters. Current tankless water heaters, both fossil-fired and electric, waste water as they ramp up to temperature. The waste is on the order of 0.25 to 1.0 gallons, which is very similar to the maximum acceptable structural waste of water in Section 3.3.

Rationale: This topic was raised in comments on earlier drafts. By setting the maximum acceptable structural waste for all hot water distribution systems, all water heaters are treated equally, which is as it should be.

Suggested Change (or Language): No change is needed. EPA has done a great job on this issue.

Topic: Pipe Insulation
Comment: Hot water piping needs to be insulated. This reduces both water and energy waste and it improves the time-to-tap.
Rationale: Insulation on hot water piping makes a difference to water waste when the environment in which the piping runs is relatively cold (basement, attic, crawl space or within a concrete slab in winter) or damp (buried in the ground, often under a concrete slab). In these cases, insulation makes a difference during the delivery phase of a hot water event, thereby directly impacting the water waste covered in Section 3.3. It also makes a difference to the energy waste during the use and cool down phases of a hot water event.

Insulation also reduces water waste when the time between hot water events is between 10 and 20 minutes for ½ inch nominal piping and between 15 and 45 minutes for ¾ inch nominal piping, for pipes located in room temperature air (65-70F). These pipe diameters are the most common in sizes found in single family housing. The time frame is a bit less for 3/8 inch nominal piping and a bit longer for 1 inch nominal. When pipes are located in the adverse environments described above, insulation is even more critical, since the time to cool down is much shorter for uninsulated pipe.

In these situations, insulation keeps the water temperature usefully hot (105F) so that the next hot water event sees hot water much more quickly that it would on the cold starts envisioned in Section 3.3. In some cases, the hot water will come out practically instantaneously.

Please note that effective July 2009, California's Title 24 building code will require that all hot water piping from the water heater to the kitchen be insulated, regardless of pipe diameter or the environment in which it is installed. The reasoning for this is that the kitchen sink is the most used hot water outlet and the time between events is often within the window in which insulation makes a big difference. R-4 will be the minimum acceptable insulation level.

There is nothing in the current proposal that addresses the time between events energy waste, unless the maximum allowable waste was applied to the cool-down period as well as to the initial cold start.
If the hot water piping is installed in adverse environments, it will be necessary to insulate the pipe to meet the maximum allowable waste, and for these conditions no change to the Specifications is needed.

However, over the lifetime of the piping, say 50 or more years, it is likely that there will be many occasions in which the time between events will be within the insulation effectiveness range, regardless of where the piping has been installed. Think master bathroom and one shower after the other during the morning rush hour; think one shower after the other followed by consecutive lavatory sink use in the kid's bathroom; think sink use in the powder room when there is a large party; think the time between hot water draws during the washing machine and dishwasher cleaning cycles.

If EPA accepts that the piping should be insulated in order to save water, then the question becomes to what level. The International Code Council has received a proposal that recommends R-3 minimum for all piping unless the volume from the source of hot water to the outlet is less than 0.25 gallons. This proposal has the support of DOE, among others.

The Green Technical Committee of International Association of Plumbing and Mechanical Officials is recommending that the wall thickness of the insulation be equal to the nominal pipe diameter up to 2 inch diameter for typical pipe insulation materials. This will be very close to R-3 for ½ inch nominal piping, and more for the larger diameters. This concept results in practically equal heat loss per foot.

Since pipe insulation will often be inaccessible for the life of the piping, we want to install materials that do not shrink over time. Some types of foam pipe insulation shrinks approximately 10 percent in length in just a few years. These should be avoided.

Suggested Change (or Language): Please add the following to Section 3.3:
All hot water piping shall be insulated to at least R-3.

There also needs to be a way to test for this during the inspection. Example language:
After completing the initial water waste test, get hot water to all hot water outlets. Wait 15 minutes, then turn on the hot water at each outlet. Water at a temperature of at least 105F shall arrive within 2 seconds.

Commenter: Scott Grams, Executive Director
Affiliation: Illinois Landscape Contractors Association (ILCA)
Comment Date: July 7, 2009

The Illinois Landscape Contractors Association (ILCA) and the Illinois Professional Lawn Care Association (IPLCA) have banded together to comment on the WaterSense guidelines that are not based on science or best practices. Both our professional associations are extremely concerned about this initiative.

The WaterSense landscape specification proposes to limit turfgrass coverage on new homesites in two primary ways. The first way provides builders with two options for changing plant composition: cap the amount of allowable turf coverage to 40% of the landscape area of a homesite or use a complex water budget that lacks scientific basis. These options would apply whether the home is built in Illinois, Arizona, Oregon, Kansas, or Maine, and the vastly different climatic zones of these states alone illustrate the challenge of a national one-size-fits-all standard.

For example, this spring in Illinois there has been very little need to water turfgrass. The wet weather has saturated the ground and made consistent watering unnecessary. Turfgrass has helped soak up this rainwater which reduced runoff and kept moisture out of overtaxed storm drains, sewers, and basements.

The state of Illinois has different weather conditions from the top of the state to the bottom. Equally, there are many different soil conditions. Some soils can hold more moisture while sandier soils can hold very little. It would be difficult to establish turf guidelines within Illinois. To try and box the entire country into the same turfgrass specifications is ludicrous and ignores our nation’s diverse climates and soils.

Furthermore, it is not clear what turfgrass will be replaced with under the 40% guideline. Non-permeable areas such as pavement, brick, concrete, and blacktop do not need to be watered but increase the heat stress put on the environment. Bare soil lacks the aesthetic value of plants and will attract weeds. Other plants could be substituted but plants need to be consistently watered. If plants wither, they die. If turfgrass withers, it goes dormant.

Weather is a dynamic, not a static, variable. Conditions within Illinois may be wet one year and dry the next, again illustrating the challenge of a national, static standard. Trees and turfgrass are not engineered like a low-flow toilet or showerhead but are natural, living things that require maintenance based on need at a given time and place.

The EPA standard bans turfgrass on so-called "steep slopes," which are defined as exceeding one foot of drop per four feet of landmass. Given the well-recognized role that turfgrass plays in controlling soil erosion on inclines, this criterion undermines sound environmental practices.

The EPA claims that the specification is voluntary; however, already local governments have begun efforts to codify the measure, and there is legislation pending in both houses of Congress to authorize WaterSense. Our fear is that local governments and municipalities will require turfgrass reductions for new home construction, based on these EPA WaterSense guidelines that lack scientific basis.

Turf restrictions should be relative to geographic area and allow for a greater turf percentage on larger properties. This is not a case of one-size-fits-all. It's a case of one-size-hurts-all. Turf is a natural aquifer. Rainwater that permeates turf is cycled back into the environment. Eliminating turf only replaces the area with non-permeable materials. At that point, we are literally washing water down the drain.

Commenter: Allen George
Affiliation: American Society of Irrigation Consultants Inc.
Comment Date: July 7, 2009

See Appendices A and B for a copy of the comments submitted.

Commenter: David A.Dymond
Affiliation: Director for Turfgrass Producers International, Director For the Florida Sod Producers Co-operative.
Comment Date: July 7, 2009

I am opposed to setting a limit of "40%" of a landscape can be turfgrass. Turf is an environmentally beneficial part of the landscape. It filters, produces oxygen, sequesters carbon, cools the landscape area, to name just a few. NO OTHER LANDACAPE PRODUCT IS A EFFECIENT IN THE ABOVE BENEFITS AS TURF. Certainly not gravel, mulch, bare ground, or asphalt.

Our area receives large amounts of rainfall in short periods during the summer months. Without large turf areas, washing or erosion of topsoil, debris, and contaminents would be a persistant problem.

One size does not fit all area of the country.

Suggestion for consideration:
The assumption the limiting turf saves water is incorrect. Education of the home owners about how to irrigate correctly and when. Utilization of the new technology in the engineering of irrigation and enforcment of water misuse are PROVEN ways to reduce water use in the landscape.

Commenter: Martti Silvola
Affiliation: Finnamex Landscape
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Joseph Coia
Affiliation: Member of Irrigation Association of New England
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Brian Langdon
Affiliation: MAGIC
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Paul J. Roche, CID
Affiliation: Irrigation Industry Professional
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Jon P. Devine and Jenny Hoffner
Affiliation: Natural Resources Defense Council (NRDC) and American Rivers
Comment Date: July 7, 2009

To Whom It May Concern:

On behalf of the Natural Resources Defense Council (NRDC) and American Rivers, we are writing to comment on the revised draft specification for water-efficient single-family new homes under EPA's WaterSense program. Thank you for the opportunity to provide input on this valuable program.

These comments are in addition to those provided by the Alliance for Water Efficiency, of which both NRDC and American Rivers are members. Notwithstanding that membership, on the subjects discussed below, these comments represent only our organizations' position.

EPA deserves credit for addressing both indoor and outdoor water criteria in the draft specification. As the agency knows, water use inside a building commonly does not represent all of the consumption that occurs in a single-family home. In fact, outdoor water use may range from 30 to 60% of total use, depending on the utility service area. Moreover, peak outdoor water use can drive the need for additional water supplies, and choices made during the construction of a home can greatly influence the amount of water used outdoors. For instance, installing large areas of turf grass on a lot will generally cause significant amounts of water to be used for lawn-watering. Similarly, fixtures such as pools and ornamental features can consume large quantities of water for non-essential uses. Landscape irrigation system design and equipment also contribute to the amount of water used to maintain landscape vegetation.

We are aware that a number of organizations are urging EPA to weaken elements of the outdoor criteria. We strongly urge EPA to resist this suggestion. To the contrary, as noted below, we believe the criteria should be strengthened significantly.

EPA's wisdom in developing criteria for both indoor and outdoor use is undermined by its decision to exclude outdoor water use efficiency provisions that our organizations and others have repeatedly urged the agency to incorporate because they are so essential for conserving water. We, again, call on EPA to include the following provisions:

- Require that new home sites maintain natural hydrology, namely that the builder ensure that the volume of stormwater associated with the 90th percentile rain storm event be retained onsite, via infiltration, evapotranspiration, or re-use. Natural hydrology helps diminish the pollutants that the stormwater carries directly and also reduces the need for irrigation with potable water. Onsite infiltration helps maintain the existing balance of water in the region; water supplies are more sustainable when development ensures that the water continues to infiltrate where it did before the development occurred. Infiltrating water on site promotes groundwater recharge, base flows in streams, and therefore the long-term vitality of the area's water resources. Developing homes in such a way that the water is infiltrated on site can help to relieve the water infrastructure of maintenance and capital costs. A highly impermeable site, which the draft specification allows, undermines these goals.

- Prevent builders from constructing new homes in sensitive locations. In our view, it would significantly damage the integrity of the WaterSense label if a building could earn certification even where a builder filled in onsite wetlands or streams to construct the home. Similarly, one wonders how water-sensitive a home situated in a flood-prone area really is. For that reason, we recommended (and continue to recommend) that the final specification provide that the WaterSense label is not available for homes built within 100-year flood plains as mapped by the Federal Emergency Management Agency or for homes that fill and/or destroy water bodies, including wetlands (as identified using the 1987 Corps of Engineers Wetlands Delineation Manual).

Please feel free to contact either of us should you have questions about these comments. Thank you in advance for considering our views.

Commenter: Brian E. Vinchesi – WaterSense Irrigation Partner
Affiliation: Irrigation Consulting, Inc.
Comment Date: July 7, 2009

The following are my comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. My comments are based on 25 years in the irrigation industry, a degree in irrigation engineering and a great deal of teaching speaking and volunteer work within the industry. The specification as drafted is weak on science and poorly thought out. Most disconcerting is its lack of promotion of other WaterSense initiatives as part of the specification. Additional public comment is needed to get this specification to the point where anyone will be inclined to use it.

I recommend that the EPA base their specification not on dictating how areas shall be irrigated but on requiring areas be irrigated properly. There are many more ways to save water and properly irrigate than outlined in this specification which reflects only a few opinions and is not only not science based but its requirements are not practical. The lack of WaterSense labeled products being required and the removal of WaterSense Partner requirements is an insult to those of us who have invested our time, money and brain power in becoming a WaterSense Partner and work toward having irrigation products labeled. Certainly if EPA will not promote its own programs, why should I or anyone else. It is unacceptable.

The President and Director of the EPA have both stared that EPA requirements will be science based and transparent. This specification is not science based nor are the calculations used or conclusions drawn transparent.

Topic: 4.1 – At a minimum, the front yard shall be landscaped to meet the criteria in either option. The entire yard shall be landscaped to meet the criteria in either option where landscaping of the entire yard is financed, installed, or sold as an upgrade through the homebuilder. The entire yard shall also be landscaped to meet the criteria in either option when irrigation systems, pools, spas, or water features have been financed, installed, or sold by the homebuilder.

Comment:
The requirements should apply to the whole landscaped area regardless.

Rationale:
The entire landscape should be treated equally.

Suggested Change (or Language):
Any option associated with the outdoor criteria shall apply to the entire landscapable area.

Topic: 4.1.1.1 <u>Option 1</u> – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment:
This requirement cannot be applied unilaterally across the country. For example, if 40% turf is allowed in Las Vegas or Phoenix water use will increase not decrease. The homeowner should decide how much turf they want based on an allowed water budget, not by arbitrary percentages.

Rationale:
Local geographies, climates and markets along with an appropriate water budget should guide the make-up of landscape materials, including types of turfgrass, trees and shrubs.

Suggested Change (or Language):
The EPA should use a performance-based approach to landscape design criteria, rather than an arbitrary prescriptive approach that may not save water.

Topic: 4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.

Comment:
Science dictates that evapotranspiration adjustment factors be determined based on geography and climate. 80% has proven science behind it, 70% does not and therefore has not basis for being included in the specification.

Additionally, the water budget tool is flawed. To start with it uses and ETAF of 70% which has no basis. WaterSense wishes to seek an overall 20% reduction in water use. The 70% ETAF goes way beyond this measurement, more like 60%, and therefore unjustly penalizes outdoor water use and irrigation systems in particular. Any evapotranspiration adjustment factor that is implemented as a "one-size-fits-all" ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or educational programs available.

Rationale:
Very high irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. The EPA itself estimates the average irrigation system is using approximately 50% more water than what is needed by the landscape.

I used the calculator for four actual landscapes in four states that have actually been installed: North Carolina, South Carolina, Ohio and Massachusetts. In Ohio the tool allowed 14% and Massachusetts 37% more water than required for the landscape. That is not saving water. In North Carolina the calculator met 96% and South Carolina 93% of the water requirements with a 100% ETAF. It is evident that the calculator is not saving the required 20% and is over allocating in wetter areas.

The calculator also does not properly deal with rainfall. It penalizes high rainfall areas and rewards low rainfall areas. If anything, it should be the opposite as the dryer areas is where there is the most potential and need for saving water.

Suggested Change (or Language):
4.1.1.2 Option 2 – The calculator needs to be fixed so that it reflects proper results.

Landscape design shall be developed using the water budget tool only and be based on an 80 % evapotranspiration adjustment factor.

Topic: Alternative water supplies for landscape irrigation

Comment:
The current draft does not consider the use of alternative water supplies.

Rationale:
The future of potable water for irrigation is short and justified. The specification should at least suggest the use of alternative water sources for irrigation including rainwater (where legal), stormwater and effluent water.

Suggested Change (or Language):
The specification should include incentives or at least suggestions for using non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Leaching requirements would have to be included in the water budget calculator for effluent systems.

Topic: 4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.

Comment:
There is no rational for this requirement and in some areas the treatment of these areas is dictated by local authorities. This is an example of dictating how an area should be treated as opposed to irrigating an area with proper equipment and techniques.

Rationale:
The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. In some areas of the United States four feet wide strips of turf may be inappropriate, in others it is a valuable part of the landscape that is much needed and regulated.

In many instances throughout the United States, areas of turfgrass of four feet wide are efficiently irrigated using methods such as drip, spray strip nozzles, and rotator-style nozzles, among others.

Suggested Change (or Language):
4.1.2 Turfgrass – Irrigation installed in strips less than 4 feet wide shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create runoff.

Topic: 4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment:
Again, the treatment of these types of areas is many times dictated by local regulations and must be irrigated for stabilization. This is also an example of dictating how an area should be treated as opposed to irrigating with proper equipment and techniques.

I recommend the elimination of prescriptive choices of irrigation methods and that the choice of plant materials in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:
Based on years of research, science and best management practice development, the best applicable science indicates that all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with no run-off.

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):
4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Topic: 4.2 Irrigation Systems

Comment:
I believe that removing the WaterSense irrigation partner requirement from the specification is an insult to all of the WaterSense Partners, and the WaterSense program itself. I have four WaterSense Partner certifications and own a company with 7 WaterSense Partners representing some 17 certifications. I have a substantial investment in the program between classes, tests and reprinting of business cards and other material with the WaterSense Partner logo. In turn, the EPA is not proud or supportive enough of the program to even require it in this specification. Bottom line is if you, the EPA, is not going to promote your own program why should anyone else including myself or any of my employees, EPA has removed the WaterSense Partner designer and installer requirement from the original draft citing issues related to "cost" and "availability". Those that have become partners have paid the cost and should be rewarded. Others should be required to become partners to be able to install irrigation systems in a WaterSense labeled home. There are no barriers to entering the irrigation contracting business and therefore the majority of contractors are uneducated. Developers take the lowest bidder. Without the Partner requirement there will be no water saved, just more wasted.

The EPA should implement a requirement that all irrigation systems installed upon a WaterSense® labeled new home be designed, installed and audited by a WaterSense® labeled irrigation partner period, no excuses.

Rationale:
It's your program, support it.

Suggested Change (or Language):
4.2.10 Irrigation Partner Requirement – The WaterSense® program believes in the quality of work associated with the WaterSense® label. All irrigation systems shall be designed, installed and audited by a WaterSense® labeled irrigation partner.

Topic: 4.2.1 Post-installation audit – All irrigation systems shall be audited by a WaterSense irrigation partner. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Comment:
Irrigation system audits are an important component of any water-use savings program but should not be audited by the installing partner.

Rationale:
Contractors do not criticize their own work and therefore should not be allowed to audit systems they installed.

Suggested Change (or Language):
4.2.1 Post-installation audit – All audits conducted on an installed irrigation system shall be conducted by a WaterSense® partner who is not the installer of the irrigation system to avoid conflicts of interest.

Topic: 4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment:
EPA can meet the goal of more than 20% water savings through a specification for the largest turf area to be a DULQ of 0.63 or greater. An overall 70% DU is not practicable.

Rationale:
The chart below, referenced from (http://www.ncwcd.org/ims/ims_info/SummaryEvaluationSprinklerSystems.pdf), represents the lower quarter distribution uniformity results from audits performed on residential sprinkler systems as well as large commercial type projects. Over 6800 audits are represented in this table with the average results shown.

Sprinkler System Performance

Residences		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	4500	**52**		1.4	.70-3.70	**58**		.70	.10-2.30
Utah USU	164	**52**	18-80	1.57	.50-3.20	**49**	15-86	.76	.20-1.70
Colorado	973	**53**	20-89	1.34	.22-4.06	**54**	19-92	.62	.12-1.60
Oregon	398	**55***				**54***			
Florida MIL	576	**54**	11-89						
U of FL Case Study	19	**40**				**48**			
California Case study	19	**41**	16-54	1.61	.66-2.97				
Commercial		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ}%	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	166	**55**	7-82	1.49	.26-3.10	**55**	8-84	.74	.13-2.46
Colorado	20	**52**	6-77	1.36	.60-2.12	**50**	3-88	.60	.10-1.12
Arizona	7					**41**	20-56	.76	.57-.92
Texas	6					**58**	27-79		

* reflects the lower-third distribution uniformity information of 61 and 60 reduced by 6 points (weighted average)

According to the data used in the table above, the weighted average DU_{LQ} for residential sprinkler systems is 0.524 and this is for the visually best performing sprinkler zones when the auditor selected a zone to do a catch can test. Case studies from Florida and California shows even lower DU_{LQ} but these audits were for the entire turf area, not the visually best sprinkler zones.

Using the EPA WaterSense® goal to decrease water use by 20%, the DU_{LQ} of .524 x.20 = 0.105. The proposed value for sprinkler uniformity would be .629 rounded to .63. This will represent a significant improvement because of the challenges of achieving high uniformity on small, curvilinear turf areas that will be typical in the proposed specification. The audit of the sprinkler system should be on the largest turf area and the DU_{LQ} calculated for that area.

Suggested Change (or Language):
4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 0.63 or greater. When an audit is performed, distribution uniformity will be measured on the largest turf area during the post-installation audit.

Topic: 4.2.5 Rainfall shutoff device – Irrigation systems shall be equipped with technology that inhibits or interrupts operation of the irrigation system during periods of rainfall (e.g., rain sensors).

Comment:
I support the inclusion of rainfall shutoff technologies.

Topic: 4.2.6 Irrigation controllers
Comment:
I support the inclusion of "smart controllers" in installed irrigation systems.

Rationale:
Smart controllers are an integral part of any efficient irrigation system. If the WaterSense program is not going to support their labeled products who will? What kind of message does that send to water purveyors, builders and the consumer?

Suggested Change (or Language):
4.2.6 Irrigation controllers –Irrigation systems shall be equipped with irrigation smart control technology. The language should follow that as outlined for shower heads which is also awaiting a labeling specification.

Topic: 4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment:
There are many variables that are taken into consideration when determining the best and most efficient way to irrigate plant material in a landscape. Climate, geography, location in the landscape, etc., all play major roles and the responsibility should be placed the irrigation designer to determine the best type of irrigation for each portion of the landscape.

Rationale:
WaterSense irrigation partners should have the flexibility to make the correct determination for each individual site and location. Why tie the hands of the WaterSense Partner who has proven they know how to properly design and install irrigation systems. Most contractors do not even know what matched precipitation is.

Suggested Change (or Language):
Sprinkler and microirrigation installed in turfgrass and other plant material shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off. All sprinklers shall be matched precipitated.

Topic: Water Meters

Comment:
I support the inclusion of water meters. All water should be measured

Rationale:
Water management is simply not possible without water measurement.

Suggested Change (or Language):
Water Meters for Irrigation Systems – The WaterSense® labeled new home shall include the installation of a separate, dedicated water meter, sub-meter or flow sensor that meets applicable local standards or otherwise measures water use in billing units used by the local utility. In the event such use is not monitored by the local utility, measurement units in either gallons or cubic feet are acceptable.

Topic: The Use of the Words “If Installed”

Comment:
Throughout the draft specifications, the words “if installed” are associated to the installation of irrigation systems. The words “if installed” should be removed from the specification.

Rationale:
Irrigation systems are the only equipment referenced in the specification that is singled out by stating “if installed.”

Suggested Change (or Language):
Remove “if installed” and replace with language referencing “installed irrigation systems.”

Topic: Water Budget Calculator – Peak Watering Month

Comment:
When performing steps 1B and 2A, it should be more clearly stated to use the same peak month data in each area. Also, it should state that the peak watering month in each section should be the same month to avoid any confusion that may occur.

Rationale:
The data entered into the calculator may be misapplied, thus providing incorrect data at the outset.

Suggested Change (or Language):
Explicitly state, in detail, that the peak watering month data should be used in each step and that the same month's data needs to be used to determine the LWA and LWR.

Topic: Water Budget Calculator – Run Time Multiplier (RTM)

Comment:
Run Time Multiplier should be defined as 1/[0.4 + (0.6 x DULQ)].

Rationale:
The method for determining Run Time Multiplier (RTM) is stated incorrectly in the Water Budget Tool as $1/DU_{LQ.}$ The correct method would be to use the equation as defined in the document Landscape Irrigation Scheduling and Water Management (IA 2005), which is 1 / 0.4 + (0.6 x DU_{LQ}).

Suggested Change (or Language):
Run time multiplier (RTM) – 1/[0.4 + (0.6 x DULQ)] (Landscape Irrigation Scheduling and Water Management IA 2005).

Topic: Water Budget Calculator – Distribution Uniformity (DU)

Comment:
The distribution uniformity for the new home specification should be 0.63 and should likewise be used in the water budget calculator so that the water budget tool reflects the performance standard for the irrigation system.

Rationale:
Distribution uniformity for the water budget calculator should match the specification for acceptable DU. Currently the calculator uses 0.65 but the specification calls for 0.70.

Suggested Change (or Language):
Change DU_{LQ} from 0.65 to 0.63, as recommended by the Irrigation Association.

Topic: Irrigation Audit Guidelines – Data

Comment:
The WaterSense® irrigation audit guidelines should reflect the changes recommended as part of the WaterSense® Specifications for New Homes.

Rationale:
There are many suggestions that have been put forth that have a bearing on the specifics of the irrigation audit guidelines. In order for there to be uniformity throughout the specifications, the EPA should reflect the changes in the guidelines as well as the specifications.

Suggested Change (or Language):
Incorporate the recommended changes in the audit guidelines as well as the Specifications for New Homes utilizing the IA Audit Guidelines.

Topic: Irrigation Audit Guidelines

Comment:
The Irrigation Association has developed a set of minimum guidelines to create a standardized procedure to perform an audit of a landscape irrigation system. These guidelines were published in May 2009 and ASABE standards have been reviewed and incorporated wherever possible. Consultation and review of the guidelines has been conducted with many irrigation auditors, contractors, statisticians, educators, irrigation consultants and the Irrigation Association Certification Board. I urge the EPA to take the following changes into consideration for those irrigation systems that will be audited as part of the labeling process.

Rationale:
The guidelines were developed by the Irrigation Association and are intended to function as recommendations in the auditing of landscape irrigation systems. They have been designed to aid irrigation professionals in fieldwork procedures, techniques and performance calculations.

Suggested Change (or Language):
Implement the Irrigation Association recommended guidelines for an irrigation system audit, which can be found at http://www.irrigation.org/certification/pdf/AuditGuidelines_FINAL.pdf.

Commenter: Edwin G. Farmer
Affiliation: King Engineering Associates, Inc.
Comment Date: July 7, 2009

We have reviewed the referenced specifications, audit guidelines and water budget tool and offer the following comments:

Page 2, B. Verification of Specification Criteria by Visual Inspection: Irrigation controllers contain the following features (Criterion 4.2.6):

Variable Scheduling – Shall be capable of interval scheduling (minimum of 14 days) to allow for watering on even day scheduling, odd day scheduling, calendar day scheduling and interval scheduling.

Suggest that wording be revised to require "minimum of 14 days or remote monitoring and adjustment". The 14 day requirement appears to be arbitrary and would only have application in complying with watering restrictions which would limit water application to specific days. This would not be necessary if remote monitoring and adjustment of the controller were provided.

Percent adjust ("water budget" feature) – shall include a "Percent Up/Down Adjust" feature (or water budget) feature such as a button or dial that permits the user to increase or decrease the run times or application rates for each zone by a prescribed percentage, by means of one adjustment without modifying the settings for that individual zone.

This requirement appears to be arbitrary and may represent a specific manufacturer's product. A smart controller would not benefit from this required feature.

Page 5, Criterion 4.2.6 Irrigation Controllers

"Variable Scheduling – Shall be capable of interval scheduling (minimum of 14 days) to allow for watering on even day scheduling, odd day scheduling, calendar day scheduling and interval scheduling"

Suggest that wording be revised to require "minimum of 14 days or remote monitoring and adjustment". The 14 day requirement appears to be arbitrary and would only have application in complying with watering restrictions which would limit water application to specific days. This would not be necessary if remote monitoring and adjustment of the controller were provided.

Page 5, Criterion 4.2.6. Irrigation Controllers

"Percent adjust ("water budget" feature) – shall include a "Percent Up/Down Adjust" feature (or water budget) feature such as a button or dial that permits the user to increase or decrease the run times or application rates for each zone by a prescribed percentage, by means of one adjustment without modifying the settings for that individual zone.

This requirement appears to be arbitrary and may represent a specific manufacturer's product. A smart controller would not benefit from this required feature.

We appreciate this opportunity to participate in development of this important criteria.

Commenter: Robert J. Dolezal, Executive Vice President
Affiliation: California Association of Nurseries and Garden Centers.
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Katie Swickard
Affiliation: Covington Water District, Water Resources Specialist
Comment Date: July 7, 2009

Topic: Chapter 4 OUTDOOR WATER-EFFICIENCY CRITERIA – add soil depth requirement

Comment: Builders often scrape off all top soil during construction. When it's time for the landscaping to go in, they often apply very scant amounts of soil then top with sod. Unfortunately, the unsuspecting new home buyer is left trying to keep turf green when the roots have insufficient rooting depth.

Rationale: Turf roots that are enabled to grow deeply (they can grow 10 – 12 deep) are the most drought tolerant. Water conservation is greatly enhanced as irrigation can be much less frequent.

Suggested Change (or Language): Require soil depth for lawns to be a minimum of 8 inches deep.

Commenter: Philip V. Robisch
Affiliation: Water Conservation Manager, Hunter Industries Incorporated
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Louree Walker, Executive Director
Affiliation: Tennessee Nursery & Landscape Association
Comment Date: July 7, 2009

The Tennessee Nursery & Landscape Association supports the position of the Irrigation Association related to the WaterSense® outdoor watering specifications.

See Appendix A for a copy of the comments submitted.

Commenter: Angela Cenzalli
Affiliation: President of the Cape Cod Landscape Association
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Andrew Chalmers
Affiliation: Irrigation Association & Irrigation Association of New England
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Leslie Cahill, Vice President, Government Affairs
Affiliation: American Seed Trade Association
Comment Date: July 7, 2009

See Appendix C for a copy of the comments submitted.

Commenter: K. Marc Teffeau, Director of Research and Regulatory Affairs
Affiliation: American Nursery and Landscape Association
Comment Date: July 7, 2009

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification.* The American Nursery and Landscape Association, the national trade association representing nursery crop producers, independent garden centers, landscape design and build firms and landscape distribution companies is committed to the concept of efficient water use and management in commercial and residential landscapes. Our members are concerned about and are dedicated to the need to increase water use efficiencies and eliminate waste in the landscape in appropriate and prudent ways. We currently are a partner with US EPA in the GreenScapes program and have adopted the concept of sustainability as one of our major focus areas with our membership. Given our ongoing positive working relationship with EPA, we value and appreciate the opportunity to provide comments and input regarding the WaterSense® program drafts. We encourage and support EPA's effort in the area of promoting efficient water use on a nationalleve!. This effort needs to be based, however, upon research results that have been scientifically validated and peer reviewed. We continue to express our concern, as we submitted in response to the first draft, that there has been limited scientific review of the proposed landscape irrigation guidelines. We encourage the WaterSense program to pursue a more diligent and focused effort in this area to insure that any formula, calculation or water conservation practice recommended by the program can be scientifically justified to the end user.

The comments below reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" Of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria. In our opinion, as the WasteSense® guidelines are currently presented, it is premature on the part of EPA to release a final version of the landscape irrigation specifications component of the WaterSense® certification without vetting them through a more through independent scientific review process. We are concerned that the Revised WaterSense Budget Approach and Tool represents a simplistic, reductionist engineering approach to landscape irrigation management that does not take into consideration both the biotic and abiotic elements that impact plant growth in the landscape.

Topic:
4.1.1.2 Option 2 - Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.
Comment:
Best available science dictates that evapotranspiration adjustment factors should be determined based on geography and climate. If a national water budget continues to be a part of the specification, we recommend that the ETAF be implemented at 80%. In addition to the recommendation that the EPA use a 80% ETAF for the water budget calculator, we are also including, as part of these comments, significant comments focusing on the data and assumptions used within the proposed water budget tool. We urge the EPA to consider all recommendations associated with the water budget tool, in addition to the recommended change to 80% ETAF. We feel that an 80% ETAF would be a significant increase in efficiency (as much as 50%) from the current market norm. Any evapotranspiration adjustment factor that

is implemented as a "one-size-fits-all" ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or applicable educational resources.

Rationale:

We believe that high irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. According to the EPA, many irrigation systems are using approximately 50% more water than what is needed by the landscape. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% wateruse savings.

Suggested Change (or Language):

4.1.1.2 Option 2 - Landscape design shall be developed using the water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic: Determining Landscape Water Allowance in Tool Calculations

Comment: EPA references that "The data are based on information obtained from the International Water Management Institute's (IWMI) World Water and Climate Atlas which calculates Penman-Monteith reference evapotranspiration rates from 1961-1990 historical data. While local, real-time evapotranspiration data are more suitable for scheduling an irrigation system, EPA believes that the IWMI data are suitable for use when designing the landscape"

Rationale: This EPA publication refers to a database that lacks 19 years of more current climate data. Preliminary review of the draft of the new USDA ARS Plant Hardiness Zone Map to be released this fall indicated warming trends in a number of the climatic zones in the United States. This warming will impact ET rates.

Suggested Change (or Language): Remove use of IWMI database and replace with a more current, robust database that represents U.S. climatic conditions.

Topic:

Alternative water supplies for landscape irrigation

Comment:

It is disappointing that current draft is silent about incorporating the use of alternative water supplies. A number of municipalities and states - for example Tampa, FL and the state of Florida Department of Environmental Protection (http://www.dep.state.fl.us/water/reuse/) are promoting the use of recycled water. "A national leader, Florida currently reuses 242 billion gallons of reclaimed water each year statewide, which has become a critical component of water management. Florida's permitted reuse capacity exceeds 1.3 billion gallons per day, more than 52 percent of Florida's total permitted capacity for all domestic wastewater treatment facilities. Florida currently uses reclaimed water to irrigate 246,841 residential lawns, 477 golf courses, 794 parks and 272 schools. The addition of this section would provide an excellent opportunity to promote the use of such resources for landscape irrigation.

Rationale:

In addition to lessening the demand on domestic potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.

Suggested Change (or Language):

The specification should include an option, or incentives, to use alternate, non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes. Because of potential poor water quality, consideration should be made to accommodate the need for additional leaching fractions deemed appropriate to make the water useable in the landscape.

Topic:
Soil Type and Soil Preparation
Comment:
A key component to landscape design and water-use efficiency is determining the correct soil type and appropriate soil preparation. Neglecting to include soil type in water use calculations is a major deficiency in the Tool calculations. In addition, its exclusion in the final specification is equivalent to neglecting the key component to ensuring the landscape can thrive in a water efficient manner.
Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Different soils have different water holding capacities and respond to irrigation events in variable ways. Many of the reactionary proposals set forth in these specifications (including but not limited to 40% turfgrass restriction, 4:1 turfgrass slope restriction, etc.) would not be needed if soil type were considered, performance criteria were put forward and the proper soil preparation were included in the specification.
Suggested Change (or Language):
Soils - Soil type should be taken into consideration in the development of the KL Landscape Coefficient. In addition during the construction process, the WaterSense ® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant material, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist.

Topic:
KL or landscape coefficient and Kmc microclimate factors
Comment:
As defined, the KL of landscape coefficient and the Kmc microclimate factors are inadequate.
Rationale:
The landscape coefficient does reference a Kmc. It is assumed that this value would take into consideration variable site conditions and microclimates within a specific landscape. There is no definition of this term in Section C. or validation of this factor indicated in the tool development. In addition on page 5 of Version 1.0 it states "If you are not familiar with the Ks values for the proposed plant types, contact your local cooperative extension for guidance". These coefficients are not available from local Extension offices within the U.S. and in reality, do not exist at this time nor will they be developed or made available in the foreseeable future. Custom plant factors can be used in the formula but very little, if any, research based data are available in local areas of the country to provide a specific landscape coefficient.

On page 5 of Version 1.0 section B Plant Type is referenced to the United States Green Building Council (USGBC). LEED for Homes Rating System 2008 (SS 2.5 Table 6). The table refers to Ks of low, medium and high for trees, shrubs, ground covers and turf but these terms are not defined. For the plant materials palette available for the landscape designer what constitutes plants in these three categories? There does not exist in neither the nursery/landscape industry nor in the horticultural scientific literature definitions of what constitutes "high", "medium", or "low" water use plants. In addition, there are currently no scientifically researched and validated criteria to determine plant material water use in the landscape. These definitions would have to be determined on a very localized level and account for all the environmental variables in the specific landscape. We do not feel that it is correct to base these calculations on definitions found in the University of California Cooperative Extension and California Department of Water Resources publication - (2000)A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California: The Landscape Coefficient Method and Water Use Classifications of Landscape Species (WUCOLS) III (2000) as these estimations may not be appropriate for other areas of the U.S.

Suggested Change (or Language):

Base landscape coefficients on scientifically valid data and research that is specific to the site location in question.

Commenter: James E. McNew, Vice President, Technical Services
Affiliation: Outdoor Power Equipment Institute (OPEI)
Comment Date: July 7, 2009

The Outdoor Power Equipment Institute (OPEI) appreciates the opportunity to submit comments in response to EPA's current draft Water-Efficient Single-Family New Home Specification. OPEI is the international trade association that represents all the major manufacturers of lawn and garden, utility and forestry equipment, including manufacturers of handheld products (like chainsaws) and ground-supported products (such as lawnmowers). These products maintain and nurture green lawns, landscapes and healthy forests, which in turn provide enormous quality of life, health, and environmental benefits, including the sequestration of carbon dioxide and other green house gas emissions, reductions in storm water runoff, and mitigation of the heat island effect plaguing many of our cities and communities. OPEI members produce not only the cleanest engines and equipment, but also new materials, technologies and emission controls that are part of the environmental solutions for today and tomorrow.

OPEI stands by our previous comments on the earlier draft dated July 21, 2008 (attached). There have been no improvements on the critical issues with the landscape criteria that we addressed in our previous comments.

The solutions for landscape within EPA's draft specification go far beyond the scope established in June of 2006, by EPA Administrator Stephen L. Johnson when he announced in San Antonio, Texas, a new EPA program targeted at reducing the use of fresh water resources called WaterSense. In the press conference, Administrator Johnson stated *"EPA's WaterSense program promotes efficient use of the nation's water supply by identifying products and practices that reduce water bills and maintain high environmental standards – all without compromising performance."* It is this high standard that the program must continue to reflect; 1) reduce water consumption (reduce water bills); 2) maintain high environmental standards that considers the full and balanced impact of the program to the environment; and 3) without compromising performance.

EPA's WaterSense Single Family New Home Specification has clearly ignored the balanced impacts upon the environment and the compromising of performance principles. OPEI has provided valid, scientific literature documentation that clearly identifies the environmental degradation that will be caused by the implementation of this program. It is not the turfgrass and greenscape that is the problem. It is the wasteful management of our precious water resources that EPA, through WaterSense, finds easier to ignore than to address when it comes to the landscape criteria. Turfgrass and greenscapes help to manage the rainwater runoff and capture that is essential for reducing the need for supplemental water for landscapes. It is turfgrass and greenscapes that will help reduce the heat island effects from the vast areas of paved or barren land. It is turfgrass and greenscapes that help clean the air by capturing dust and particulate matter. The list of benefits goes on and on. Every landscape criteria within WaterSense would increase the very problematic issues we are facing with climate change and water quality; runoff, increased heat island, dust and particulates (ozone), polluted waterways and reservoirs, etc.

The landscape criteria in the WaterSense program has not be properly vetted and does not reflect best management practices for the environment as a whole. The landscape criteria should be limited to the performance criteria for irrigation equipment performance and irrigation systems design only and not for landscape design. The 40% turf criteria and turfgrass use restrictions within the landscape (re. turfgrass restriction on areas less than 4 foot wide) should be eliminated completely. Promotion of gray water recycling and storm water capture and storage should be promoted for outdoor landscape watering without any restriction on turfgrass and greenscaping.

Commenter: Gregg E. Robertson, President
Affiliation: Pennsylvania Landscape and Nursery Association
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Kathy F. Scott, Conservation Projects Section Manager
Affiliation: Southwest Florida Water Management District
Comment Date: July 7, 2009

The Southwest Florida Water Management District (District) is pleased that the EPA WaterSense program continues to seek input from parties interested in promoting water efficiency standards for new homes.

Topic: 4.1 Landscape

Comment: While this may not be the intent, an irrigated landscape (front, back, or entire yard) should not be required.

Rationale: A 1,000 square foot landscape, if irrigated, can still waste water.

Suggested Change (or Language): Clarify that irrigation is not required.

Topic: 4.1.1.1 Option 1

Comment: As provided in our comments on the first draft, "Limiting turf to 40% of the landscapable area may not necessarily reduce water use."

Rationale: "Limiting turf to 40% of the landscapable area may not necessarily reduce water use."

Suggested Change (or Language): The limit should be on the high water use zones of the irrigation system.

Topic: 4.1.3 Slopes

Comment: According to the University of Florida/Institute of Food and Agricultural Sciences, turf should not be installed on slopes greater than 6:1 and other groundcover should not be installed on slopes greater than 2:1 or 3:1.

Rationale: Maintenance and safety issues.

Suggested Change (or Language): Regional/local conditions should be considered.

Topic: 4.1.4 Mulching

Comment: Consider switching "non-vegetated" back to "non-turf", as it was in the previous draft.

Rationale: "Non-vegetated" may cause confusion.

Suggested Change (or Language): See comment above.

Topic: 4.1.5 Pools/spas

Comment: The surface area should not be considered part of the turfgrass allowance or landscapable area.

Rationale: If pools/spas are required to be covered, evaporative loss is not a concern.

Suggested Change (or Language): Remove this requirement.

Topic: 4.1.6 Ornamental water features

Comment: The allowance for certain ornamental water features and addition of a recirculating requirement is an improvement. Cooling properties of an ornamental water feature requires further clarification.

Rationale: As written, this is open to interpretation.

Suggested Change (or Language): Provide examples, similar to examples provided for “beneficial use.”

Topic: 4.2.5 Rainfall shutoff devices

Comment: Instead of, "during periods of rainfall" consider changing to "during periods of sufficient moisture.” This would also require a change to the heading from "Rainfall shutoff device" to something more like "rain/moisture sensing devices."

Rationale: It should be clear that rain sensors or soil moisture sensors could be used.

Suggested Change (or Language): See comments above.

Topic: 5.2 Irrigation System

Comment: Our comments on the first draft included the following statement, which is still relevant, "Instead of builders developing manuals, they should provide buyers with the manufacturers' manuals. In addition, landscape and irrigation contractors should provide buyers with post-construction documentation. According to the *Landscape Irrigation and Florida-Friendly Design Standards*, this would include 'as-constructed drawings, recommended maintenance activities and schedules, operational schedule, design precipitation rates, instructions on adjusting the system to apply less water after the landscape is established, maintenance schedule, water source, water shut-off method, and the manufacturer's operational guide for their irrigation controller'."

Rationale: It is not necessary to recreate something that already exists.

Suggested Change (or Language): See comment above.

Topic: 7.0 Definitions

Comment: By definition "landscapable area" seems to include the driveway, and it should not. In the definition in the previous draft, driveways were specifically excluded.

Rationale: A driveway cannot be landscaped.

Suggested Change (or Language): Reconsider previous definition or specifically state that driveways are excluded.

Topic: 7.0 Definitions

Comment: Define hot water delivery system, water softener and drinking water treatment system in this section.

Rationale: The only definition currently provided for equipment in Section 3.8 "Other Equipment" is evaporative cooling system.

Suggested Change (or Language): Seek definitions from appropriate sources.

We appreciate the opportunity to comment, and hope the comments are useful as the Specification is further refined. If you should have any questions, please feel free to contact me at 352-796-7211, extension 4247.

Commenter: Timothy Malooly, CIC, CID, CLIA EPA WaterSense Partner
Affiliation: Irrigation professional, Irrigation Association, Minnesota Nursery & Landscape Association
Comment Date: July 7, 2009

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments herein reflect the best workable options I see fit given the draft presented to the public for comment. These comments should by no means be accepted as an —endorsement of the full specification, as there is much science that, in my estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

As stated in California Assembly Bill 1881(enacted 2006): —…landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development… we believe the statement within AB1881 can apply across the country and as such, is hopeful the EPA will make constructive improvements that embrace the value of the outdoor living environment prior to publication of its WaterSense Model New Home Specification.

I recommend to the EPA it not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. I also recommend to EPA that the comments submitted by the Irrigation Association in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as a workable starting point and because they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, I urge the EPA to take into consideration the comments below from the irrigation industry and me, as they are based on market data, best management practices and best available science.

Topic:
4.1 – At a minimum, the front yard shall be landscaped to meet the criteria in either option. The entire yard shall be landscaped to meet the criteria in either option where landscaping of the entire yard is financed, installed, or sold as an upgrade through the homebuilder. The entire yard shall also be landscaped to meet the criteria in either option when irrigation systems, pools, spas, or water features have been financed, installed, or sold by the homebuilder.
Comment:
If the EPA is going to support having any prescriptive requirements associated with the outdoor criteria, then the requirements should apply to the entire landscapable area, not just the front yard, regardless of whether an irrigation system, pool, spa or other water feature is installed.
Rationale:
We not support any language that does not treat the entire landscape equally.
Suggested Change (or Language):
Any option associated with the outdoor criteria shall apply to the entire landscapable area.
Topic:
4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment:
I do not support any arbitrary limits on landscape plant material. This national criterion, voluntary or otherwise, is inappropriate and not based on best available science. For this reason, and as previously commented, I do not support the inclusion of Option 1.
Rationale:
I believe in the practice of —right plant in the right place, and work closely with the green industry in promoting local and adapted plant materials appropriate for each climate and geographical location. The 40% turfgrass limitation, in my estimation, is an arbitrary limit placed on landscapes. Local geographies, climates and markets should guide the make-up of landscape materials, including types of turfgrass, trees and shrubs. Plant materials can be very effective at making useable, non-potable water, especially in salt-using winter climates. Turf is especially good at filtration of water due to its root and shoot density. Turf also acts as a convenient, low cost erosion blanket.
Suggested Change (or Language):
The EPA should use best available science to produce a performance-based approach to landscape design criteria, rather than an arbitrary prescriptive approach. I urge the EPA to focus on and support reward for use of best practices and stewardship to determine the best performance-based criteria to implement as part of the New Homes specification.

Topic:
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.
Comment:
Best available science dictates that evapotranspiration adjustment factors should be determined based on geography and climate. If a national water budget continues to be a part of the specification, I recommend that the ETAF be implemented at 80%.
In addition to the recommendation that the EPA use a 80% ETAF for the water budget calculator, please also consider, as part of these comments, comments furnished by the Irrigation Association, focusing on the data and assumptions used within the proposed water budget tool. I urge the EPA to consider all recommendations associated with the water budget tool, in addition to the recommended change to 80% ETAF. I feel that an 80% ETAF would be a significant increase in efficiency (as much as 50%) from the current market norm. Any evapotranspiration adjustment factor that is implemented as a —one-size-fits-all ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or applicable educational resources.
Rationale:
I believe that high irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. According to the EPA, many irrigation systems are using approximately 50% more water than what is needed by the landscape. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% water-use savings.
Suggested Change (or Language):
4.1.1.2 Option 2 – Landscape design shall be developed using a water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic:
Alternative water supplies for landscape irrigation
Comment:
The current draft is silent about incorporating the use of alternative water supplies and the addition of this section would provide an excellent opportunity to promote the use of such resources for landscape irrigation.

Rationale:
In addition to lessening the demand on domestic potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.
Suggested Change (or Language):
The specification should include an option or incentives to use alternate, non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes. Because of potential poor water quality, consideration should be made to accommodate the need for additional leaching fractions deemed appropriate to make the water useable in the landscape.

Topic:
4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.
Comment:
I believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) in strips less than four feet wide can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. I recommend the removal of this restriction and urge the EPA to employ performance-based criteria, rather than the prescriptive approach currently taken in the draft, to determine irrigation efficiency in these areas.
Rationale:
The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. In some areas of the United States four feet wide strips of turf may be inappropriate, in others it is a valuable part of the landscape that is much needed.
In many instances throughout the United States, areas of turfgrass of four feet wide are efficiently irrigated using methods such as drip, spray strip nozzles, and rotator-style nozzles, among others.
Furthermore, there are many instances where strips of sod occur within the design of a landscape and can be easily and properly irrigated. I understand the spirit of intent of the EPA call-out but believe negative unintended consequences will result from this call-out.
Suggested Change (or Language):
4.1.2 Turfgrass – Irrigation installed in strips less than 4 feet wide shall not result in overspray onto hardscapes including but not limited to sidewalks, curbs, walks and roadways and shall be programmed to not create runoff.

Topic:
4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).
Comment:
I believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States turfgrass is used as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes with this reactionary, prescriptive approach would significantly adversely change the market, without any assurance of less water-use or

elimination of run-off. We believe that plant material for 4:1 slopes should be selected based on local climate, geography and markets.

Furthermore, I recommend the elimination of prescriptive choices of irrigation methods and that the choice of plant materials in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:

Based on years of research, science and best management practice development, the best applicable science indicates that all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with little to no increase in run-off.

Soil Erosion Control and Dust Stabilization Turf protects nonrenewable soil resources from water and wind erosion. Turf's high shoot density and root mass stabilize surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turf's high biomass matrix provides resistance to lateral surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turf can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked nonpoint surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.)

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):

4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Topic:

4.2 Irrigation Systems

Comment:

I believe in the value of a labeled WaterSense irrigation partner. I also feel that properly administered and with a realistic timeline and pre-determined measurements for/of success, these New Home specifications can be among many tools to expand the label's value, promote and reward water efficiency, dissuade careless behavior and help empower the green industry to police or better police over a reasonable timeline.

EPA has removed the WaterSense Partner as designer and installer from the original draft citing issues related to —cost and —availability . If an irrigation system, properly designed and installed is deemed too expensive by a builder when planning a new home, then I believe instead of installing a poor-quality system intended to meet a budget target, the builder should not install an irrigation system.

The Irrigation Association and others have worked and continue to work toward expanding the number of WaterSense partners available to install and audit irrigation systems.

I recommend EPA implement a requirement that all irrigation systems installed upon a WaterSense® labeled new home be designed, installed and audited by a WaterSense® labeled irrigation partner.

Rationale:

As a public-private partnership, the WaterSense® program's irrigation partner label continues to grow throughout the irrigation industry, thus increasing the amount of efficient irrigation education and best management practice implementation throughout the United States. I agree with the EPA in standing behind excellence in efficient irrigation and feel that an essential tool to ensure that the irrigation partner label enjoys a high brand value is through the promotion of the label through the WaterSense® specifications for New Homes. I support concept of the WaterSense® irrigation partner label. According to the EPA, —…all too often, landscape irrigation wastes water—up to 1.5 billion gallons every day across the country. WaterSense irrigation partners can help you reduce your water consumption, save money, and maintain a healthy and beautiful landscape... The EPA continues by stating —…when every drop counts, we count on our partners.... An efficient irrigation system is multi-faceted; it needs high-level competence, best available technology and regular maintenance to ensure efficiency. I urge the EPA to stand behind the labeled partners, as they have done the labeled products, through the specifications for New Homes and pledge to continue to help EPA promote the value of the WaterSense Partner.

Suggested Change (or Language):

4.2.10 Irrigation Partner Requirement – The WaterSense® program believes in the quality of work associated with the WaterSense® label. All irrigation systems shall be designed, installed inspected and audited by a WaterSense® labeled irrigation partner.

Topic:

4.2.1 Post-installation audit – All irrigation systems shall be audited by a WaterSense irrigation partner. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Comment:

Irrigation system audits are an important component of any water-use savings program. Though calculating distribution uniformity (DU) does measure how well water is applied to a landscape; it does not calculate efficiency. I maintain that the WaterSense® program can be successful in significant water-use savings in new homes if a visual inspection is conducted on all installed irrigation systems and full audits conducted at random, with the irrigation system designer, installer and builder partner not knowing whether or not a full audit will be performed at the time of installation.

Rationale:

Variable conditions, including weather, play an important role when calculating DU. Weather in many areas often delays the test for days, sometimes weeks, until conditions allow a test to be performed. When there is a re-inspection/co-inspection required, this process may be delayed even further. If efficient products and services already included within the criteria, an assumption for high distribution uniformity exists. The goals of the *Water-Efficient Single-Family New Home Specification* will be achieved without having to calculate each irrigation system's DU. DU measures how evenly water is applied to an area, not the rate of application. Water savings will be achieved through proper irrigation scheduling.

I do believe in the use of proper audits and believe that —spot-checking irrigation systems through a traditional audit protocol will allow the program to keep the high integrity it is striving to achieve without increasing costs and the likelihood of significant delays in the labeling process.

Suggested Change (or Language):

4.2.1 Post-installation audit – All irrigation systems shall be visually inspected by a WaterSense irrigation partner enrolled in the New Homes program as a knowing, willing participant and who was not the installer of the system being inspected. All audits conducted on an installed irrigation system shall be conducted on a random basis and should be conducted by a WaterSense® partner who is (also) not the installer of the irrigation system. The irrigation system designer, installer and the WaterSense® builder partner shall not be aware of whether or not a full audit protocol or a visual audit will be conducted on the system. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Topic:
4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment:
EPA can meet the goal of more than 20% water savings through a specification for the largest turf area to be a DULQ of .63 or greater.

Rationale:
The chart below, referenced from (http://www.ncwcd.org/ims/ims_info/SummaryEvaluationSprinklerSystems.pdf), represents the lower quarter distribution uniformity results from audits performed on residential sprinkler systems as well as large commercial type projects. Over 6800 audits are represented in this table with the average results shown.

Sprinkler System Performance

Residences		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	4500	**52**		1.4	.70-3.70	**58**		.70	.10-2.30
Utah USU	164	**52**	18-80	1.57	.50-3.20	**49**	15-86	.76	.20-1.70
Colorado	973	**53**	20-89	1.34	.22-4.06	**54**	19-92	.62	.12-1.60
Oregon	398	**55***				**54***			
Florida MIL	576	**54**	11-89						
U of FL Case Study	19	**40**				**48**			
California Case study	19	**41**	16-54	1.61	.66-2.97				
Commercial		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ}%	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	166	**55**	7-82	1.49	.26-3.10	**55**	8-84	.74	.13-2.46
Colorado	20	**52**	6-77	1.36	.60-2.12	**50**	3-88	.60	.10-1.12
Arizona	7					**41**	20-56	.76	.57-.92
Texas	6					**58**	27-79		

* reflects the lower-third distribution uniformity information of 61 and 60 reduced by 6 points (weighted average)

According to the data used in the table above, the weighted average DULQ for residential sprinkler systems is .524 and this is for the visually best performing sprinkler zones when the auditor selected a zone to do a catch can test. Case studies from Florida and California shows even lower DU but these audits were for the entire turf area, not the visually best sprinkler zones. Using the EPA WaterSense® goal to decrease water use by 20%, the DULQ of .524 x.20 = .105. The proposed value for sprinkler uniformity would be .629 rounded to .63. This will represent a significant improvement because of the challenges of achieving high uniformity on small, curvilinear turf areas that will be typical in the proposed specification. The audit of the sprinkler system should be on the largest turf area and the DULQ calculated for that area.

Suggested Change (or Language):

4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of .63 or greater. When an audit is performed, distribution uniformity will be measured on the largest turf area during the post-installation audit.

Topic:

4.2.5 Rainfall shutoff device – Irrigation systems shall be equipped with technology that inhibits or interrupts operation of the irrigation system during periods of rainfall (e.g., rain sensors).

Comment:

I support the inclusion of rainfall shutoff technologies. I personally authored the language of the first statewide mandate of the use of rain sensing technology; a bill that is currently used as a model for similar efforts in other states.

Rationale:

N/A

Suggested Change (or Language):

N/A

Topic:

4.2.6 Irrigation controllers

Comment:

I support the inclusion of —smart controller technologies upon all installed irrigation systems.

Rationale:

Smart controllers are an integral part of modern, efficient irrigation systems and effectively address the all-important topic of proper and responsible scheduling of irrigation.

Overall water usage in a landscape can be significantly and at low financial cost, reduced with proper installation and programming of a smart controller.

Suggested Change (or Language):

4.2.6 Irrigation controllers –Irrigation systems shall be equipped with irrigation smart control technology.

Topic:

4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment:

There are many variables that are taken into consideration when determining the best and most efficient way to irrigate plant material in a landscape. Climate, geography, location in the landscape, etc., all play major roles and the responsibility should be placed the irrigation designer to determine the best type of irrigation for each portion of the landscape.

Rationale:

Certified irrigation professionals should have the flexibility to make the correct determination for each individual site and location.

Suggested Change (or Language):
Sprinkler and microirrigation installed in turfgrass and other plant material shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic:
Water Meters
Comment:
Any voluntary water-use savings program should include the use of water meters.
Rationale:
Water meters are not required in all areas throughout the United States. The program should also promote using water wisely, which includes accurately knowing how much water has been used.
Water management is simply not possible without water measurement.
Suggested Change (or Language):
Water Meters for Irrigation Systems – The WaterSense® labeled new home shall include the installation of water measurement and totaling technology including but not limited to a separate, dedicated water meter, sub-meter or flow sensor that meets applicable local codes or standards or otherwise measures water use in billing units used by the local utility. In the event such use is not monitored by the local utility, measurement units in either gallons or cubic feet are acceptable.

Topic:
Soils
Comment:
A key component to landscape design and water-use efficiency in a landscape is appropriate soil preparation. Neglecting its inclusion in the final specification is equitable equivalent to neglecting the key a vital determinant of success of any landscape including but not limited to efficient and effective water use upon the landscape component to ensuring the landscape can thrive in a water efficient manner.
Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Many of the reactionary proposals set forth in these specifications (including but not limited to 40% turfgrass restriction, 4:1 turfgrass slope restriction, etc.) would not be needed if performance criteria were put forward and the proper soil preparation were included in the specification.
Suggested Change (or Language):
Soils – During the construction process, the WaterSense ® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant material, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist. (If invited, I will happily assist EPA in creating workable evaluation/inspection criteria for use by WaterSense program inspectors.)

Topic:
The Use of the Words —If Installed
Comment:
Throughout the draft specifications, the words —if installed are associated to the installation of irrigation systems. The words —if installed should be removed from the specification.

Rationale:
Irrigation systems are the only equipment referenced in the specification that is singled out by stating —if installed.
Suggested Change (or Language):
Remove —if installed and replace with language referencing —installed irrigation systems.

Topic:
Definition of Landscapable Area
Comment:
The definition in the revised draft, though favorable to the landscape community, is confusing as it is not a widely-used definition. The specification should revert to the original definition as stated in the original draft specification. Due to the changes this will cause within the outdoor criteria, I urge the EPA to accept the recommended changes throughout this document, in addition to the recommended definition change.
Rationale:
The definition of —landscapable area as the building lot area not under the roof is not based on science nor is it the market accepted definition of —landscapable area.
Suggested Change (or Language):
Landscapable Area: The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Topic:
Water Budget Calculator – Peak Watering Month
Comment:
When performing steps 1B and 2A, it should be more clearly stated to use the same peak month data in each area. Also, it should state that the peak watering month in each section should be the same month to avoid any confusion that may occur.
Rationale:
The data entered into the calculator may be misapplied, thus providing incorrect data at the outset.
Suggested Change (or Language):
Explicitly state, in detail, that the peak watering month data should be used in each step and that the same month's data needs to be used to determine the LWA and LWR.

Topic:
Water Budget Calculator – Run Time Multiplier (RTM)
Comment:
Run Time Multiplier should be defined as 1/[.4 + (0.6 x DULQ)].
Rationale:
The method for determining Run Time Multiplier (RTM) is stated incorrectly in the Water Budget Tool as 1/DULQ. The correct method would be to use the equation as defined in the document Landscape Irrigation Scheduling and Water Management (IA 2005), which is 1 / .4 + (.6 x DULQ).
Suggested Change (or Language):
Run time multiplier (RTM) – 1/[.4 + (0.6 x DULQ)] (Landscape Irrigation Scheduling and Water Management IA 2005).

Topic:
Water Budget Calculator – Distribution Uniformity (DU)
Comment:
The distribution uniformity for the new home specification should be .63 and should likewise be used in the water budget calculator so that the water budget tool reflects the performance standard for the irrigation system.

Rationale:
Distribution uniformity for the water budget calculator should match the specification for acceptable DU. Currently the calculator uses .65 but the specification calls for .70.
Suggested Change (or Language): Change DULQ from .65 to .63, as recommended by the Irrigation Association.

Topic:
Irrigation Audit Guidelines – Data
Comment:
The WaterSense® irrigation audit guidelines should reflect the changes recommended as part of the WaterSense® Specifications for New Homes.
Rationale:
There are many suggestions the Irrigation Association and WaterSense Partners have put forth that have bearing on the specifics of the irrigation audit guidelines. In order for there to be uniformity throughout the specifications, the EPA should reflect the changes in the guidelines as well as the specifications.
Suggested Change (or Language):
Incorporate the recommended changes in the audit guidelines as well as the Specifications for New Homes.

Topic:
Irrigation Audit Guidelines
Comment:
The Irrigation Association has developed a set of minimum guidelines to create a standardized procedure to perform an audit of a landscape irrigation system. These guidelines were published in May 2009 and ASABE standards have been reviewed and incorporated wherever possible. Consultation and review of the guidelines has been conducted with many irrigation auditors, contractors, statisticians, educators, irrigation consultants and the Irrigation Association Certification Board. I urge the EPA to take the following changes into consideration for those irrigation systems that will be audited as part of the labeling process.
Rationale:
The guidelines were developed by the Irrigation Association and are intended to function as recommendations in the auditing of landscape irrigation systems. They have been designed to aid irrigation professionals in fieldwork procedures, techniques and performance calculations. Recommendations and projections from the guidelines and their accuracy depend upon the quality of measurements and data provided by the individual user. It should be pointed out, the Irrigation Association makes no warranty, implied or expressed, as to the results obtained from these proposed procedures.
Suggested Change (or Language):
Implement the Irrigation Association recommended guidelines for an irrigation system audit, which can be found at http://www.irrigation.org/certification/pdf/AuditGuidelines_FINAL.pdf

Commenter: Kathryn Aro
Affiliation: Executive Director, Minnesota Turf & Grounds Foundation (MTGF)
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: On behalf of the Minnesota Turf and Grounds Foundation (MTGF), I am writing to express opposition to the proposed 40 percent turfgrass limitation, the ban on turfgrass for steep slopes and the single, nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale: The MTGF's mission is to support Minnesota's green industries through the support of research and education. Based on the information provided to the MTGF from the National Turfgrass Federation and scientists from the University of Minnesota and the University of Wisconsin Madison, it is clear that the proposed regulations are not scientifically supported and that they dismiss without thought the value of turfgrass to both the environment and our culture.

The WaterSense program is intent on imposing identical restrictions on the entire country which does not align with the clear and simple fact that horticulture, and consequently, its maintenance, varies based on geographical location. It is no more complicated than that.

It isn't a complete stretch to compare this line of thinking to the lessons learned by major department stores many years ago. Stores used to sell the same products in each store regardless of location. When winter coats didn't sell in Florida, they wised up and put purchasing power for certain items in regional hands. The decision to impose the same bans and restrictions on turfgrass regardless of location is no different. WaterSense can avoid the learning curve Target and Walmart experienced by changing its strategy now so that it aligns with the product.

I am also concerned that WaterSense has so readily dismissed the value of turfgrass on our culture and on our environment. The cultural benefits are obvious. Simply look around your own communities. Turfgrass provides aesthetic appeal to homes, parks, corporate campuses, cemeteries, city parks and more, and it provides a safe surface for school playgrounds and athletic fields.

In addition, turfgrass plays an important role in minimizing pollution. In fact, as researchers and communities look to science for ways of improving the quality of our air and water, turfgrass is recognized as one of the most effective solutions available. Turfgrass absorbs water, which helps reduce storm runoff which improves water quality. Lawns cool the air, provide oxygen, trap dust and dirt, promote healthful micro-organisms, prevent erosion, and filter rainwater contaminants.

Finally, the MTGF supports the official comments put forth by Brian Horgan, University of Minnesota and Doug Soldat, University of Wisconsin Madison which you have already received. I hope WaterSense takes the time to read and understand the scientific and cultural arguments against its proposed changes.

Suggested Change (or Language): MTFG defers to the suggestions made by Brian Horgan and Doug Soldat.

Commenter: Mark Smith, CIC, CLIA, MCLP
Affiliation: Owner Majestic Landscapes, LLC, Board of Directors, IANE
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Allen George
Affiliation: American Society of Irrigation Consultants
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Craig Otto, CWCM-L, CID, CLIA, CIC, EPA, WaterSense Partner
Affiliation: Water in Motion
Comment Date: July 7, 2009

See Appendix A for a copy of the comments sumitted.

Commenter: Edward J. Klaas, II, CLIA, CGIA, EPA WaterSense® Partner
Affiliation: Owner/Vice President – Business & Legal Affairs Chair – Irrigation Association Contractor Common Interest Group Irrigation Association Ambassador - Region 3 & Georgia Leader Past President – Georgia Green Industry Association – Irrigation & Water Division
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Michael Williams
Affiliation: Vice President of Government Relations, North American Equipment Dealers Association
Comment Date: July 7, 2009

NAEDA represents 5,000 retail agricultural, industrial and outdoor power equipment dealerships in the U.S. and Canada. Collectively, these dealerships employ approximately 100,000 people. NAEDA is a federation that works with 15 affiliated associations in the U.S. and three in Canada. It is on their behalf – and the dealerships we serve – that we are commenting on these proposals.

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's raises two concerns for our industry. One concern is the 40 percent turfgrass limitation and the second concern is the ban on turfgrass for steep slopes.

Rationale: The specifications are a "one-size-fits-all homes." To impose a 40 percent turfgrass limitation for all new home sites does not consider the regional differences in the U.S in climate and in available plant materials. Different areas of the U.S. should be allowed to utilize plants that match the local area and weather conditions and not be based on an arbitrary percentage set by EPA.

In addition, to restrict the use of turfgrass on steep slopes denies the benefits of what turfgrass can do to reduce soil erosion and storm water runoff. These two benefits alone make the steep slope ban unreasonable. We believe more research is needed by EPA before adopting this provision.

Suggested Change (or Language): We believe EPA should set aside the Outdoor Water Efficiency Criteria at this time until more stakeholder input can be received and data collected to verify that the proposed criteria will provide the outdoor water efficiency being sought while not resulting in unintended consequences to homebuilders, the turfgrass industry and our outdoor power equipment dealers.

Commenter: Tom Shannon
Affiliation: ASIC, IA, CID, CIC, Water Sense Partner
Comment Date: July 7, 2009

See Appendix A for a copy of the comments submitted.

Commenter: Clark Throssell, Ph.D.
Affiliation: Golf Course Superintendents Association of America (GCSAA)
Comment Date: July 7, 2009

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.
Comment: The proposed 40% turfgrass limitation is arbitrary and is not supported by science. We do not support any arbitrary limits on landscape plant material. This national criterion, voluntary or otherwise, is inappropriate and not based on best available science.
Rationale: The one-size-fits-all specification imposes a 40% turfgrass limitation on landscapable areas of new home sites regardless of location in the country. During the EPA WaterSense webinar on June 22, it was stated the 40% turfgrass limitation was taken from legislation that various communities have enacted and is an average, or consensus, based on the various figures that communities across the country have used. There was no discussion of the science or logic used by these communities to reach a specific turfgrass limitation figure nor was any assessment of the community programs that specify turfgrass limitation offered.
We believe in the practice of "the right plant in the right place," and working closely with the green industry in promoting local and adapted plant materials appropriate for each climate and geographical location. Local geographies, climates and markets should guide the makeup of landscape materials, including species of turfgrass, trees and shrubs.
EPA staff has not provided data comparing the water use of turfgrass, trees, shrubs, and other landscape plant material within climatic zones. Without valid scientific comparisons of water use by plant species, any attempt to limit the use of a specific plant species is ill-fated and raises questions about the effectiveness of the WaterSense program.
Suggested Change (or Language):
The EPA should use best available science to produce a performance-based approach to landscape design criteria and plant selection, rather than an arbitrary prescriptive approach. We urge the EPA to continue the dialogue with all segments of the green industry on best practices and stewardship to determine the best performance-based criteria to implement as part of the new homes specification.

Topic: 4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.
Comment: The best available science dictates that the evapotranspiration (ET) adjustment factor should be based on climate and geography and that a single, nationwide 0.7 evapotranspiration adjustment factor for calculating the water budget is inappropriate for the entire United States.
Rationale: The single, nationwide ET adjustment factor for calculating a water budget is not supported by scientific research. Builders seeking the WaterSense label will avoid the complexities of a water budget and related calculations and simply use the option to limit turfgrass. Furthermore, designating a single ET rate ignores the regional climatic variations and average rainfall levels in different regions of the country.
The ET adjustment factor must take into consideration the need for a leaching fraction when irrigating with a water source with undesirable salinity content. The leaching fraction calls for irrigation above the ET adjustment factor to leach salts from the soil profile and is an established practice in many plant production systems, including turfgrass and landscape maintenance.

Suggested Change (or Language): 4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on percent evapotranspiration adjustment factor determined by the state land grant university cooperative extension program on turfgrass management. Accommodations for a leaching fraction must be included in the water budget tool.

Topic:

4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment:

Turfgrass stands provide considerable benefits to society by controlling erosion and enhancing water infiltration when grown on slopes. We believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States, turfgrass is used successfully as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes would significantly adversely change the market, without any assurance of less water-use or elimination of run-off. We believe that plant material for 4:1 slopes should be selected based on local climate, geography and markets.

Rationale:

Based on years of research, science and best management practice development, the best applicable science indicates that all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with little to no increase in run-off.

Soil Erosion Control and Dust Stabilization

Turf protects nonrenewable soil resources from water and wind erosion. Turf's high shoot density and root mass stabilize surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turfgrass' high biomass matrix provides resistance to surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turfgrass can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked nonpoint surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.)

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):

4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Commenter: Mary Ann Dickinson, Executive Director
Affiliation: Alliance for Water Efficiency
Comment Date: July 7, 2009

The Alliance for Water Efficiency welcomes the publication of the revised draft specification for WaterSense New Homes. Across our diverse membership of water utilities, environmental organizations, manufacturers, and installers, Alliance members maintain a strong level of support for the WaterSense Program and a desire to see it expand in a timely and orderly way. The May 8, 2009 revised draft of the WaterSense New Homes specification marks a solid beginning for WaterSense participation in the labeling of whole buildings based upon published criteria of sustainability.

This letter addresses the competing criteria proposed by Energy Star, and transmits an attachment of detailed comments relating specifically to the revised draft specification for WaterSense New Homes. These comments have been prepared by our WaterSense and Water Efficient Products Committee and affirmed by our Board of Directors.

Competing Criteria Proposed by Energy Star. The Alliance for Water Efficiency notes that the EPA Energy Star office has proposed revised eligibility criteria for the Energy Star New Homes program. For the first time, criteria intended to improve the efficiency of domestic hot water use are being proposed as mandatory requirements for all Energy Star-qualified new homes. We welcome this development, but note with some consternation that the Energy Star comment period runs concurrently with the comment period for the revised WaterSense New Homes Specification, and that the two proposals differ in key respects.

Regarding the substance of the Energy Star proposals, there are two key elements to address. First, we believe that it is premature to specify a maximum flow rate for showerheads of 2.0 gpm until additional performance metrics are developed to ensure customer satisfaction is maintained while water efficiency is improved. Since WaterSense has issued a notice of intent to prepare a specification for showerheads, and work on such a specification is well underway, the more appropriate course for Energy Star would be to specify installation of a WaterSense labeled showerhead upon adoption of the WaterSense showerhead specification. Since the proposed Energy Star specification will not take effect until January 1, 2011 in most states, there should be ample time for a fully vetted WaterSense showerhead specification to be adopted and available to meet the needs of the Energy Star program.

A second issue relates to the design of domestic hot water distribution systems. The WaterSense draft specification seeks to achieve energy and water efficiency by limiting the volume of water that may be contained in piping between the hot water source and the furthest fixture using hot water. Any hot water piping configuration may be installed provided the volume limit is met. The Energy Star draft specification, in contrast, specifies three particular hot water piping configurations, although key terms are not defined and volumetric limits are not established. We believe the WaterSense approach to be far preferable. Indeed, without any limit on water volume, pipe length, or maximum wait time for hot water (any of which might be acceptable approaches), we fail to see how the Energy Star specification as proposed can be expected to achieve the very specific hot water energy savings claimed for this provision in the Energy Star Homes savings methodology document. A 24% reduction in consumption for gas-fired water heaters and a 31% reduction for electric water heaters are claimed.
“Overview of Evolving ENERGY STAR Qualified Homes Program & Methodology for Estimating Savings,” Exhibit 4, p. 9.

Regarding the awkward process of concurrent, but inconsistent, draft proposals from the same agency addressing the same subject matter and same stakeholders, we believe that EPA should provide the public with an explanation as to how this happened and what steps will be taken to ensure that it does not happen again. In this immediate instance, in order to maintain fairness to all stakeholders and to avoid the delay of either specification, we recommend that the comments received on these overlapping provisions be consolidated, and that WaterSense and Energy Star jointly prepare responses to all comments received on these issues. Each program should then issue a reconciled set of hot water criteria that are at least consistent, if not identical.

Thank you for the opportunity to submit these comments. If we can be of further assistance and/or provide further information, please contact us at 773-360-5100.
Sincerely,
Carole Baker
Chair, Board of Directors
Mary Ann Dickinson
Executive Director

COMPETING CRITERIA PROPOSED BY ENERGY STAR
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COMMENTS ON THE WATERSENSE NEW HOMES REVISED DRAFT SPECIFICATION DATED MAY 8, 2009
Note: Where no comments are made, the Alliance for Water Efficiency supports the provision as proposed.

Topic: 1.0 Scope and Objective

Comment: In light of the WaterSense program's intent to encourage community water and wastewater infrastructure savings, storm water management criteria which preserve local groundwater resources, displace the use of potable water, protect source water quality, and reduce wastewater infrastructure costs should also be developed for this and future versions of the New Homes specification.

Comment: EPA should be mindful of the need to maintain the integrity of the WaterSense label, not only with regard to conformity with individual criteria, but also with regard to the relationship of new homes to natural water features and riparian environments.

Rationale: WaterSense labeled new homes built in flood plains and wetlands have great potential to tarnish the brand. EPA should consider this aspect of brand integrity in both the development of new homes performance criteria and in the evolving relationship with WaterSense partner homebuilders. Maintaining respect for the natural hydrology of home sites is completely consistent with the purpose of WaterSense.

Topic: 1.0 Scope Objective, re: Licensing of Installers

Comment: The paragraph dealing with applicable national, state, and local regulations should be expanded to specifically state that all plumbing and irrigation installers must meet any applicable state or local licensing requirements.

Rationale: Proper installation of plumbing and irrigation systems is as important to the achievement of water efficiency as is the selection of water-efficient components.

Topic: Service Connection Issues. A new Section 3.0 dealing with service connection issues should be inserted before the existing Section 3.0.

Comment: A fundamental requirement for achieving and maintaining any water efficiency improvements is missing from the New Homes specification. A water meter should be required, whether the new home is connected to a public water system (including reclaimed or untreated source water conveyed through a distribution system) or is supplied by onsite well water.

Rationale: For efficiency programs to be effective, water consumption must be measurable and consumption measurement information must be available to the consumer.

Comment: Care must be taken during new home construction that the pipe material selected and the installation practices used for any builder-installed service pipe are appropriate to the soil conditions at the site. Documentation of compliance with relevant guidelines or requirements issued by the water utility regarding service line materials and placement should be maintained by the builder and made available at the time of inspection. Service lines should be pressurized and the connections of all fittings at the meter box and the house foundation should be checked for leakage while such fittings remain exposed.

Rationale: Service lines – the pipe and fittings running between the utility's water main and the foundation of the new home – are common sources of leakage in established utility service areas.

Topic: 3.0 Indoor Water Efficiency Criteria, 3.2 Service Pressure

Comment: Language should be clarified to state that a PRV is not required if (a) service pressure at the home is 60 psi or less at the time of inspection, and (b) if 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.

Topic: 3.0 Indoor Water Efficiency Criteria, 3.3 Hot Water Delivery System

Comment: We disagree with the lack of any requirement for the insulation of hot water service piping and recommend that all hot water pipes be insulated to at least R-3.

Rationale: It is common practice for residents to draw water from hot water fittings without use until the hot water reaches the desired temperature. Such wait times have the effect of wasting energy and water while reducing consumer satisfaction. Insulation of hot water piping reduces the waste of energy, water, and time during the delivery, use, and cool-down phases of a hot water event. During the delivery phase, when the piping runs in unconditioned spaces, in a slab, when it is buried, or when the flow rate is very low (less than 1 gpm), pipe insulation significantly reduces the heat loss.22 Hiller, Carl, "Hot Water Distribution System Piping Heat Loss Factors, Both In Air and Buried – Phase II Test Results," paper presented to ASHRAE Annual Meeting, Salt Lake City, June 22, 2008.

Comment: At the very minimum, we recommend that all buried hot water pipe be insulated to R-3 with closed cell insulation material. Insulation should be warranted to maintain its R value in underground applications in damp soil, or alternatively, underground pipe and insulation must be installed together in a waterproof conduit or channel. While physical inspection of the installation of pipe insulation in a finished home can be problematic, builder-supplied photos should be required to document proper installation, as well as inspection of any exposed hot water pipe segments.

Rationale: Hot water service pipe insulation is particularly important when piping is installed in a mass floor or mass wall or is buried. Uninsulated pipe buried in damp conditions has been found to lose heat at 4 to nearly 9 times the rate of uninsulated pipes in room temperature air. Adding insulation to buried pipe in damp conditions reduces heat loss by about 90%.

Comment: We agree with the establishment of a hot water *in situ* volume limitation in lieu of specific hot water piping system designs. However, we recommend a maximum volume of 0.5 gallon, which will still allow design flexibility, while reducing waiting time and water waste.

Rationale: It is important that hot water pipe storage volume be minimized at the time of construction. In coming years, flow rates for fixture fittings (especially showerheads) are likely to decrease further from today's levels, and unnecessary pipe storage volume will extend waiting times as fixture flow rates are reduced.

Comment: The performance test for this criterion in the "Revised Draft Inspection Guidelines for WaterSense Labeled New Homes" is flawed. By requiring a 10-degree rise to be achieved with a flow of no more than 0.6 gallon, a system with the maximum pipe storage volume of 0.6 gallon permitted under the specification will seldom, if ever, pass the inspector's test.

Suggested Change (or Language): We recommend several changes to the inspector instructions (in addition to the 0.5 gallon volume limit noted above) to ensure that the test is fairer and more realistic:

- The inspector should verify that the water heater is on and that the thermostat is set at the midpoint of the "hot" setting, i.e., not "vacation", "warm", or similar low heat settings, nor the hottest possible setting. For hot water heaters with thermostat settings in degrees, the setting should not be higher than 135 degrees F.
- The fixture to be tested should be a shower or faucet, rather than a tub spout, to allow the inspector more control and precision in measuring the volume required to achieve the target water temperature.
- The target temperature should be restated as an actual temperature more representative of that desired for hot water, i.e., 105 degrees, rather than simply a 10-degree rise.
- The pre-marked volume limit on the measurement container should be increased to accommodate mixing and unavoidable heat loss as hot water from the source travels through unheated pipes in the test. This allowance will vary somewhat by the flow rate of the fixture fitting being tested. For a showerhead, the maximum volume of the draw should be 1.2 times the maximum pipe volume stated in the specification. Thus, if the maximum pipe storage volume in the specification is 0.5 gallon, the maximum volume drawn in the test to achieve the 105 degree temperature target should be 0.6 gallon. This relationship is based on findings of hot water pipe flow dynamics published by Carl Hiller.33 Hiller, Carl, "Hot Water Distribution System Piping Time, Water, and Energy Waste – Phase II Test Results," paper presented to ASHRAE Annual Meeting, Salt Lake City, June 22, 2008.

Comment: The term "hot water source" should be defined to include appropriately insulated demand-activated hot water recirculating systems.

Topic: 3.0 Indoor Water Efficiency Criteria, 3.6 Showerheads

Comment: We support the establishment of a reasonable delineation between an individual shower and a multi-person shower based on floor area. However, all of the showerheads directed to the additional increment of floor area must be operated by controls that are separate from the showerheads directed to the initial increment of floor area.

Comment: Expressing the showerhead water flow limitations in terms of potable water enables the installation of recirculating showers. The operation of a recirculating shower requires the initial filling of a reservoir for the recirculation pump in addition to the potable water drawn as make-up water during shower operation. To ensure water-efficient design, we recommend that the capacity of any recirculating shower reservoir be limited to not more than 20 gallons.

Topic: 3.0 Indoor Water Efficiency Criteria, 3.7 Appliances, 3.7.1 Dishwashers

Comment: Support, with the addition of a water factor of less than or equal to 5.0 gallons per cycle, which is included in the Energy Star specification for dishwashers effective July 1, 2011.

Topic: 3.0 Indoor Water Efficiency Criteria, 3.8 Other Equipment

Comment: Humidifiers are missing from the list of other equipment. Any whole-house humidifier should not be of the high-consumption flow-through variety. Other commercially available technologies, including low-consumption flow-through units (≤ 5 liters/day) make the use of a highconsumption flow-through humidifier unnecessary.

Comment: Bathtubs are also missing from the specification, and should be inserted after paragraph 3.6. Bathtubs and shower/spa tubs should not exceed 75 gallons capacity, measured at the level of the overflow drain. This interior volume will accommodate a generously proportioned (for example, a tub with exterior dimensions of 6' x 3.5') conventional or jetted bath tub. Larger tubs will require significantly more water even if not filled to capacity.

Topic: 3.0 Indoor Water Efficiency Criteria, 3.8 Other Equipment, 3.8.3 Drinking Water Treatment Systems

Comment: Support. However, the efficiency rate is ambiguous, and should be clarified that it relates to the relative recovery and reject streams rather than some other operating characteristic, such as the level of removal of impurities.

Suggested Change (or Language): Such systems shall yield at least 85 gallons of treated water for each 100 gallons of water processed.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.1 Landscape, Front Yard vs. Entire Yard

Comment: We support requiring that a front yard be landscaped to meet the outdoor waterefficiency criteria. However, the definition of “front yard” should be clarified (See comment in Definitions section below), and the criteria for requiring entire yard landscaping should be clarified. Builder-installed irrigation in the front yard should not trigger a requirement for builder-installed landscaping that meets the requirements of the criteria in the remaining portions of the yard. This has the potential to limit builder participation in some markets. References to “entire yard” should be replaced with “remaining portions of the yard”, and landscaping conforming to the criteria should be required on lots where the builder is offering the enumerated list of amenities *in any of the remaining portions of the yard*.

Comment: For lots where the entire yard is not landscaped, the “landscapable area” of the lot must be limited to the front yard.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.1 Landscape, Landscapable Area

Comment: "Landscapable area" is a term that is critical to the effectiveness of the WaterSense outdoor efficiency criteria. Unfortunately, the definition as proposed is deeply flawed. See the discussion below under "Definitions".

Comment: All builder-installed landscape should conform to the outdoor water-efficiency criteria. We question the need or desirability to exclude lots with landscapable areas of less than 1000 square feet from all landscape criteria.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.1 Landscape, 4.1.1 Landscape Design, 4.1.1.1 Option 1

Comment: The value of Option 1 is to provide a computationally simple method for ensuring that newly installed landscapes are more water efficient than typical offerings. Since the water budget concept is still new and unfamiliar in many parts of the country, we support a simplified compliance track for builders and landscapers in these areas. Option 1 would be stronger and more effective, however, if the percentage limitation were not stated to apply exclusively to turf *per se*, but rather was supplemented over time to include all plant material with high or medium water use requirements. We recommend that EPA work with states, universities, and trade allies to establish and maintain easily accessible lists of the most commonly used landscape vegetation grouped into high, medium, and low water use plants for each of the USDA climate zones.

Comment: It is critically important that Option 1 include an absolute cap, as well as a proportionate cap, on the area devoted to high and medium water use plants. We recommend a cap of 40% or 2,000 sq. feet, whichever is less (or 1,000 square feet if only a portion of the landscapable area, i.e., the front yard, is installed by the builder).

Rationale: An absolute cap at this level will still allow functional turf areas for active play, entertainment, and similar activities for which turf is desirable, while ensuring that waterdemanding plants will not be used on larger lots simply to fill space. Without a cap, however, substantial expanses of high water use plants could be installed without constraint, save for the size of the lot itself. At lot sizes of one-quarter acre and above, Option 1 will allow water consumption in such yards that would nearly negate the water savings achieved elsewhere in a WaterSense new home. Thus, limiting installation of high and medium water use plants by builders is both reasonable and necessary to ensure that WaterSense new homes are substantially more water efficient than the average residence.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.1 Landscape, 4.1.1 Landscape Design, 4.1.1.2 Option 2

Comment: We recommend that the specification contain a step-wise strengthening of the ET adjustment factor, beginning at 70% in 2009 and shifting to 60% in January 2011.

Rationale: We note that the ET adjustment factor has been revised upward from the previous draft specification. We note further that California will soon be requiring new landscapes to be installed with a water budget using a 70% ETAF. Although wide participation in the WaterSense program is to be welcomed, specifications should be set to ensure that WaterSense new homes will offer significantly above-average water efficiency.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.1 Landscape, 4.1.3 Slopes

Comment: The challenge for effective water management on slopes is the avoidance of excessive runoff, particularly runoff of applied irrigation water. This provision should be revised from a prohibition of turf on slopes to a requirement to prevent excessive runoff on slopes through any of the following –

- Terracing;
- Unirrigated (but stabilizing) treatment, such as landscape stone or native grasses and shrubs;
- Subsurface irrigation, or surface irrigation fitted with low precipitation nozzles, with either approach zoned to the slope; or
- If previously undisturbed, retention of established plant communities and soil structure.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.1 Landscape, 4.1.6 Ornamental Water Features

Comment: The ornamental water features subject to this provision should specifically be those that are supplied with potable water. A feature making exclusive use of graywater or rainwater, for example, should not be subject to a recirculation requirement.

Comment: The requirement that ornamental water features "serve a beneficial use" is so vague as to be meaningless. "Cooling properties," for instance (an example listed in the definition section), is an attribute of virtually any water body by virtue of the thermodynamics of evaporation. Similarly, a wildlife habitat function could be provided by almost any water feature if such language were broadly construed. We support the inclusion of water features supported by non-potable sources and water features supplied with recirculating potable water that are part of a registered wildlife habitat program, of which there are several available to builders and homeowners. Ornamental fountains and waterfalls sustained by potable water should not be installed in a WaterSense labeled new home. The Definitions section should be revised accordingly.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.1 Landscape, 4.1.X Soil Preparation

Comment: Soil preparation requirements should be included, since water demand can be exacerbated by landscape installation on compacted subsoil, as is typically found at graded and backfilled building sites. A minimum of four inches of substrate, appropriate to the needs of each major element of the plant palette of the installed landscape, should be required. For compliance, small samples of substrate should be retained on-site and the installed landscape spot-checked by the inspector with a probe.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.2 Irrigation System
We note that the requirement that irrigation systems be installed by a WaterSense certified irrigation partner has been dropped from the revised draft specification. We recommend a tiered approach, where WaterSense certified designers and installers are not initially required, but become a requirement in January 2011.

Rationale: While current levels of partner participation may mean that a WaterSense Irrigation Installer is hard to find in some markets, it is important that the New Homes program help draw more participants into WaterSense certified training programs to upgrade their skills, even as it seeks to strengthen its own brand reputation for quality and efficiency in irrigation design and installation.

Comment: A master irrigation shut-off valve in an accessible location should be a required for any installed irrigation system.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.2 Irrigation System, 4.2.3 Runoff/Overspray

Comment: This paragraph should state that irrigation systems "shall be designed **and installed** to sustain the landscape without creating runoff . . ."

Comment: The duration of system operation to measure and verify the absence of runoff in the postinstallation audit should not be left solely to the auditor's judgment, but rather be based upon a minimum operating time for each zone or station (i.e. 5 minutes), and in no case less than a full rotation or arc for all sprinkler equipment. The Draft Irrigation Audit Guidelines should also be revised accordingly.

Topic: 4.0 Outdoor Water-Efficiency Criteria, 4.2 Irrigation System, 4.2.4 Distribution Uniformity

Comment: Field experience indicates that a DULQ of 70 percent is far higher than well-installed spray irrigation systems typically achieve. Survey data on DU has been compiled by the Southern Nevada Water Authority, Eugene Water & Electric Board, the Irrigation Association, and the University of Florida. It appears that a DU in the range of 60 to 63 % would achieve performance significantly above average, but not so high as to discourage participation in the program. High DU is an important goal, because it will discourage consumers from overwatering an entire landscape to prevent brown spots in underwatered locations. Nevertheless, we recommend that the requirement be realistically attainable in typical new home installations.

Comment: The specification also needs clarification on two additional points. The draft Irrigation Audit Guidelines direct that DU only be tested for turfgrass areas. This should be mentioned in the specification itself if that is the intent. Also unclear is whether the DU requirement is to be met by each station or zone individually, or attained by averaging the entire tested area.

Topic: 7.0 Definitions, Front Yard

Comment: The definition of front yard should be clarified for homes on corner lots and homes oriented perpendicularly to the street. In such cases, the front yard should encompass: (a) all of the lot between the house and the street; and (b) any additional area between the front of the house and the adjoining property line not included in (a).

Topic: 7.0 Definitions, Landscapable Area

Comment: We recommend returning to a common sense definition of "landscapable area," such as lot area minus the building footprint, permanent hardscape (driveways, sidewalks, paved walks, ground-level decks4), and natural areas protected by easement or covenant. A conceptually similar definition is proposed for California's statewide model water efficient landscape ordinance.5 In contrast with the California definition, we recommend the inclusion of unprotected, undisturbed natural portions of the lot within the definition of landscapable area as a useful tradeoff, allowing landscape designers an incrementally larger water budget in return for the unprotected natural areas of the lot left undisturbed. Additionally, for lots where the entire yard is not landscaped, "landscapable area" must be limited to the front yard.

Rationale: "Landscapable area" is a key term for the workings of the WaterSense outdoor efficiency criteria. Unfortunately, the definition as proposed is deeply flawed. EPA has stated that the definition was drawn from the US Green Building Council's *LEED for Homes*. However, a careful review of *LEED for Homes* shows that the term landscapable area is not used, nor was the definition of the term "designed landscape" used, contrary to EPA's May 8 explanatory letter. Instead, the WaterSense draft text has appropriated the definition of the LEED term "buildable land." This term is not used in LEED in the context of irrigation efficiency (note the January 2009 errata listings), but rather is used to establish a credit system for building density. Two of the principal shortcomings of attempting to bend this definition to WaterSense's purpose are the inclusion of driveways within the landscapable area and the exclusion of land "excluded from residential development by law," which commonly includes land within zoning-required building set-backs, which are often part of the landscaped portion of the lot.

Topic: 7.0 Definitions, Lower Quarter Distribution Uniformity (DULQ)

Comment: Reference is made to the use of soil moisture probes as a basis for determining distribution uniformity. However, we are unaware of any published protocol for making such calculations. In the absence of an acceptable protocol, reference to soil moisture probes for determining DU should be removed from the specification. The Draft Irrigation Audit Guidelines should also be revised accordingly.

4 We distinguish decks from patios, since the former are more likely to be builder-installed and affixed to the house, while the latter may be located throughout the landscaped area, provide utility and decorative value without irrigation. We also distinguish between elevated decks, which may receive light and irrigation beneath, and ground-level decks.

5 (dd) "landscape area" means all the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or non-pervious hardscapes, and other nonirrigated areas designated for non-development (e.g., open spaces and existing native vegetation).

Topic: Draft Inspection Guidelines, Auditing/Sampling

Comment: We note that the Revised Draft Inspection Guidelines for WaterSense Labeled New Homes requires inspection of 100% of all irrigation systems installed, even while allowing a reasonable sampling regime for home inspection generally. The importance of this distinction is not immediately clear, particularly if, as we recommend above, that the specification includes a phased requirement for irrigation system design and installation by a WaterSense irrigation partner beginning in January 2011.

Topic: Draft Inspection Guidelines, Pre-Inspection and Section 3.1 Leaks

Comment: At the very beginning of the inspection, the water meter should be read, and then reread after inspection set-up is complete and prior to any water being drawn by the inspector (a minimum of 15 minutes). An incremental reading of zero should be required. If a zero read is not obtained, the procedure should be repeated following a walk-through of the property to ensure that all faucets are closed and all water-using appliances turned off. Note: It is not the responsibility of the inspector to locate leaks that may be indicated by a meter reading but are not visible during inspection.

Commenter: Batya Metalitz, LEED AP
Affiliation: LEED Technical Development
Comment Date: July 7, 2009

The following comments on the updated WaterSense Water Budget Tool are provided by the staff of the U.S. Green Building Council's LEED for Homes Program.
USGBC is pleased to have the opportunity to work with EPA to improve the alignment between the WaterSense Budget Tool and the LEED for Homes Outdoor Water Use Calculator. Ultimately, the goal would be to allow projects to use the same equations and budgeting tool for both programs.
This memo includes:

- An update on the alignment process, and
- Identification of discrepancies that exist between the two programs' approaches, and recommendations on how these should be addressed.

Overview and update of alignment process

WaterSense and LEED for Homes have discussed the possibility of long-term alignment of the outdoor water use approach. Based on a meeting held March 25, 2009, it seems feasible that the WaterSense tool, with some additional tables to accommodate differences between the programs, could be used for LEED for Homes projects as well. This alignment will be discussed as a possible change in the next version of the LEED for Homes Rating System.

To further alignment, a WaterSense team member has joined the Technical Advisory Subcommittee (TASC) that oversees the Locations and Linkages, Sustainable Sites and Water Efficiency categories – the LL/SS/WE TASC. We sincerely appreciate the participation of this WaterSense member in the TASC meetings. Many of the approaches described below were developed by the TASC prior to WaterSense involvement. We hope that the inclusion of a WaterSense representative in these meetings will help to align approaches for other challenging scenarios as they arise.

LEED for Homes recently included the WaterSense link to reference evapotranspiration rate (ETo) values in its Outdoor Water Use calculator. LEED for Homes thanks WaterSense for the use of this link.

The USGBC notes the inclusion of some aspects of the LEED for Homes approach in the updated version of the WaterSense Water Budget tool (e.g., species factor values, calculation based on peak month rather than year). The LEED for Homes program is grateful for these steps towards alignment.

In the following sections, we present an overview of remaining discrepancies in approaches, and recommendations for how these discrepancies can be resolved. LEED for Homes looks forward to working with WaterSense to align these differences.

Discrepancies in the Underlying Algorithm

The two programs use a different equation for calculating the water budget. However, these equations are similar, and both are based on scientific research and include input from the public. As part of the long-term alignment process, LEED for Homes will consider adopting the WaterSense equation for the next version of the Rating System. (Because of its approval process, LEED for Homes cannot make short-term changes.) Any alignment will need to be approved by several key players in LEED for Homes, and undergo public comment. Consequently, we cannot guarantee that LEED for Homes will adopt these changes.

To summarize the differences in the equations, and the proposed approaches to alignment:

1. WaterSense includes the effective rainfall, and LEED for Homes does not. By including this factor, the water budget is more regionalized.

   USGBC recommends: that WaterSense keeps this aspect intact. The USGBC will consider adopting this aspect of the WaterSense approach with the next version of the LEED for Homes Rating System.
2. WaterSense does not include the microclimate factor, and LEED for Homes does. In the preliminary experience of LEED for Homes with its recently released calculator, the microclimate factor is often a source of confusion and misinterpretation in residential landscaping.

   USGBC recommends: that WaterSense keeps this aspect intact. The USGBC will consider adopting this aspect of the WaterSense approach with the next version of the LEED for Homes Rating System.
3. The programs differ in their terminology for some terms of the equation.

   USGBC recommends: that the two programs communicate to resolve these minor differences.
4. The irrigation efficiency values ("distribution uniformity" in WaterSense) are higher for the WaterSense budget than in LEED for Homes. In part, this is because WaterSense requires certain irrigation efficiency measures in its program; these measures are optional in the LEED for Homes program, and awarded in a different credit.

   USGBC recommends: that WaterSense keeps this aspect intact. If LEED for Homes adopts the WaterSense approach, these differences can be resolved through an adjustment of the LEED for Homes point values assigned to a particular percentage water savings, or through the addition of a table for LEED for Homes projects in the WaterSense tool.
5. LEED for Homes requires verification. For example, if drought tolerant species are claimed, the green rater must verify the installed plant lists using a list of regionally specific drought tolerant plants provided by a 3rd party (e.g., agricultural extension).

   USGBC recommends: that WaterSense keeps this aspect intact. If LEED for Homes adopts the WaterSense approach, verification will continue to be required by LEED for Homes, but guidance on verification will be provided in a separate document (i.e., not the water budget tool).

Discrepancies in treatment of landscaped areas
The two programs treat certain types of landscaping differently. These differences may be due to different goals of the programs. Based on the "WaterSense Philosophy" section of the WaterSense website, it appears that the primary goal of the program is to reduce water use. While LEED for Homes shares this goal, it also promotes surface water management (e.g.,

minimizing erosion and runoff) and reducing the local heat island effect. These additional goals have led to decisions on how to treat certain areas, such as non-vegetated areas. Because plants provide value, such as stormwater run-off prevention and heat island reduction, the LEED for Homes program provides fewer credits to areas that are not planted.

6. WaterSense includes hardscapes in the calculation, and automatically assigns these areas as "No Irrigation". Consequently, WaterSense is treating these as 100% efficient irrigation areas. This provides an incentive to include more hardscapes. In the current version of WaterSense, a project that is entirely hardscaped, or a project that is half hardscape and half turf irrigated with fixed spray, meets the WaterSense budget criteria.

   LEED for Homes excludes hardscapes from the landscaping calculations in both the prescriptive and performance pathways. Thus, projects cannot earn any of the landscaping credits (SS 2.2-2.5) for installing hardscapes.[8]

   USGBC recommends: that WaterSense exclude hardscapes from the landscaping calculation.
7. WaterSense includes non-vegetated softscape areas in the calculation and automatically assigns these areas as "No Irrigation". Consequently, WaterSense is treating these as 100% efficient irrigation areas. This provides an incentive to include more non-vegetated softscapes. In the current version of WaterSense, a project that is entirely non-vegetated softscape meets the WaterSense budget criteria.

   In the LEED for Homes program, these areas earn limited credit in the landscaping credits. Projects with > 50% of landscaping that is non-vegetated softscapes must use the prescriptive pathway (SS 2.2-2.4). In the prescriptive pathway, projects can use non-vegetated softscapes to earn credit for basic landscape design (SS 2.2) and limiting conventional turf (SS 2.3), but they cannot be counted towards drought tolerant plants (SS 2.4). Projects with non-vegetated softscapes for < 50% of landscaping can use the performance approach; these areas are excluded from the calculation.

   USGBC recommends: that WaterSense allow projects to install non-vegetated softscapes for no more than half of the landscaped area, and that these areas of non-vegetated softscapes be excluded from the equation.
8. WaterSense allows users to choose "No Irrigation" for areas that are planted with no irrigation. This area is then treated as having 100% efficient irrigation. This approach encourages projects to install no irrigation. This approach also describes these areas as either a) never requiring irrigation, or b) being irrigated with a perfectly efficient method.

   The LEED for Homes LL/SS/WE TASC developed the following approach for these areas:

   a) For zones with low water needs (i.e., zones with $K_L < 0.33$), a higher irrigation efficiency is assumed[9]. A high irrigation efficiency value was

[8] Projects can earn permeability credit (SS 4.1) for installing hardscapes that are permeable with a porous sub-base, and credit for mitigating the local heat island effect (SS 3) for installing hardscapes with a high albedo.

chosen in these scenarios to encourage projects not to install irrigation if it was not needed. But the value is < 100%, because there will be some inefficiencies when plants are watered.

b) For zones with medium to high water needs (i.e., zones with $K_L \geq 0.33$), a low irrigation efficiency is assumed[10]. This was chosen to encourage projects to install irrigation if it is needed.

USGBC recommends: that WaterSense change its approach to areas that have no irrigation: For areas planted with trees, shrubs, or groundcover that are described as "Low water requirement", a high distribution uniformity (the WaterSense equivalent of irrigation efficiency) value should be assigned. WaterSense should consult with experts to determine a value, but a uniformity < 100% should be used. For areas planted with turf, or planted with trees, shrubs, and groundcover with medium or high water requirements, the distribution uniformity that is assigned should be the lowest distribution uniformity value given by WaterSense (i.e., currently 65%).

9. WaterSense treats pool/spa areas as turf. LEED for Homes currently ignores these areas.

USGBC recommends: that WaterSense keeps this aspect intact. The USGBC will consider adopting this aspect of the WaterSense approach with the next version of the LEED for Homes Rating System. The LL/SS/WE TASC has also recommended that LEED for Homes adopt this approach towards pool/spa areas.

[9] The assumed irrigation value is 65%, which is a medium/high value in the range of irrigation efficiency values given in LEED for Homes.

[10] The assumed irrigation value is 40%, which is the lowest irrigation efficiency value given in LEED for Homes.

Commenter: Irene Gavranovic
Affiliation: President, All Seasons Turf Grass, Inc. President, Turfgrass Producers of Texas
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's limitation on turfgrass is not based on science and the Water Sense program may have unintended consequences if it is accepted in its current state. Our concerns are specific to the 40% turfgrass limitation, the ban on turfgrass for steep slopes, and the single, nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale: The 40% turfgrass limitation is not based on any scientific facts. Within Texas, S.A.W.S. (San Antonio Water System) conducted a rebate program that paid homeowners to remove turfgrass from current landscapes or limit turfgrass to 50% for new landscapes. The results of the program were that most participants either showed no savings or actually used more water after the rebate than before the rebate. Another interesting finding from the program was that those with irrigation systems used more water than those who watered with a handheld hose. Overall, it appears people need to be educated on the proper water requirements for plants, trees and turfgrasses.

The ban of turfgrass for steep slopes is not justified. Turfgrass has a fibrous root system and it has been shown to be very effective in controlling erosion, which is a key factor in choosing a ground cover for slopes. If irrigation is a concern, many turfgrass varieties perform well without supplemental irrigation. Texas A&M University conducted a drought tolerance study on 25 commonly sold turfgrass varieties in Texas. They all survived a 60-day drought.

The idea of calculating a water budget based on a single, nationwide .7 evapotranspiration factor is complicated. We believe, this alone, will cause many homebuilders to opt for the 40% turfgrass limitation.

In summary, more research needs to be conducted before the EPA finalizes the outdoor component of the Water Sense program. The ideology behind Water Sense is a good start for conserving one of our most precious resources, but more consideration must be given before the positive aspects of the program can outweigh the negatives.

There are many benefits of turfgrass that are being neglected and they need to be realized before banning or reducing turfgrass from landscapable areas. Some of the environmental benefits are the generating of oxygen by absorbing gaseous pollutants such as carbon dioxide and sulfur dioxide, stabilizing dust, reducing storm water runoff, controlling erosion, reducing noise and reducing the urban "heat island" effect. Additionally, turfgrass provides positive mental health benefits and provides an area for children and pets to play. We believe people will want to plant, cultivate and enjoy turfgrass at their homes for these benefits as well as others.

Suggested Change (or Language): We respectfully request that the EPA reconsider and set aside the current specification guidelines on the outdoor criteria of the Water Sense program. Many have expressed concerns about the negative impacts these criteria will have on the environment and suppliers that serve the homebuilding industry. Setting aside the Outdoor component will allow time for a stakeholder process to create outdoor water efficiency solutions that actually reduce water consumption.

Commenter: T. Kirk Hunter
Affiliation: Executive Director, Turfgrass Producers International & The Lawn Institute
Comment Date: July 7, 2009

Topic: Outdoor Water Efficiency Criteria 4.0

Comment:
On behalf of the members of Turfgrass Producers International (TPI), thank you for allowing us an opportunity to comment on the WaterSense - Water-Efficient Single-Family New Home Specification. We support efforts to address water conservation for the well-being of our society and environment. We feel that if properly designed and implemented, the WaterSense program could be of vital importance as we strive to conserve and reduce water use in our homes. Water conservation is an objective that everyone can and should support; however, it appears that this approach to efficient water use has been developed without regard to regional climate, average precipitation levels, soil types, and native or adaptive grass types and plant species. As the executive director of TPI, I must express our collective concerns with the WaterSense draft specifications as they relate to turfgrass and the landscape. There are numerous consequences to implementation of the draft specifications as they are currently written.

Our goal is to ensure that there is enough water for future generations and there is no doubt that the WaterSense program ultimately saves water through efficient and smart irrigation practices. We believe that in many instances, however, the 40% turf limitation does not achieve this goal. There are inherent values of turfgrass, if responsibly installed and maintained properly. Turfgrass should not be undervalued as part of the WaterSense program and we urge the EPA WaterSense Program to reevaluate the 40% and the requirement that turfgrass shall not be installed on slopes greater than 4:1"

I hope you will agree that the elimination or reduction of turfgrass species as choices for home lawns may not be immediately practical. Initially, WaterSense was based on the premise that no one should have to make lifestyle changes to implement the program. The way the current draft is written, a homeowner who wants to have turfgrass in their lawn must reduce significantly the amount or eliminate turfgrass entirely which would cause a significant lifestyle change. What will homeowners in Michigan (or choose a state) propagate as lawns if they cannot comply with WaterSense labeling with one of the species of cool-season grasses?

Also very worthy of note is consideration of the potential non-intended consequences of the WaterSense restrictions. Scientific literature contains many references to the environmental benefits of turfgrasses cultured as lawns. Some of these benefits include evaporative cooling of the ambient air, extremely efficient filtering of surface water, and reducing dust and noise pollution. This does not even consider what is perhaps the most important, non-intended consequence; where will our children play? Will they play in and on graveled areas? Bare soil? Again, it just does not seem very practical to effectively eliminate our only current choices for turfgrass lawns by virtue of the current specifications. These are only a few of many social and environmental consequences of the specifications as proposed.

There are between 50 and 100 million home lawns in the USA. A large percentage of these lawns are located in areas where cool-season grasses are well adapted. Clearly, many people love their lawns, they enjoy the activity on the lawn, the beauty, the cooling effect, the water absorbing/ cleansing aspect, etc. Lawns are a perfect place for the dogs to play, the kids and family to recreate, barbeque, etc. However, the current WaterSense draft may virtually eliminate or significantly reduce lawns around new homes. The lawns that many people desire will not be an option, or will be severely limited. In addition, there are many environmental benefits of turfgrass that have been seemingly disregarded, namely heat reduction, erosion control, dust abatement, and water filtering.

Many local governments and municipalities rely on turfgrass to serve as a natural filter for water runoff, thus resulting in less pollution of the groundwater. In fact, many municipalities are taking the opposite approach of the proposed EPA WaterSense program by utilizing turfgrass as a BMP for erosion control, filtering storm water etc based on research funded by the EPA non-point source pollution program. These communities are requiring a certain percentage of land property be covered by turfgrass and landscape limiting any impervious surface coverage (roofs, decks, pavements, driveways, etc.) to less than 25% of the total property.

We are committed to conserving water and feel that a water budget will be the best environmental and economic option to ensure the success of the EPA's WaterSense program. Reference Evapotranspiration rates need to be determined on a local or regional basis where plant materials and climate factors are very similar and local experts know and understand plant water requirements.

There is a great deal of turfgrass research conducted in this country. We have good estimates on water use, conservation and efficiency and we are working to implement these practices and strategies. Many of the strategies involve choosing the proper turfgrass species, using the appropriate management, setting the irrigation controller properly, etc. We can already document significant water savings just by using proven strategies. We are working very hard to define appropriate turfgrass species to address the issues of water conservation and management while allowing for acceptable and functional home lawns. Turfgrasses still require additional study regarding cultural practices to reduce inputs while producing a sustainable lawn. In the interim, it seems most practical not to act in haste.

Plants don't waste water, people do! Turfgrass sod producers feel that conservation and sustainability are of vital importance to our nation and to the world. With proper specifications, we can achieve these goals and the goals of the WaterSense program. We should and will endeavor to increase awareness of these issues to all those involved ranging from lawn and landscape professionals to private home owners. At the same time, the EPA could take a leadership role in instituting more practical specifications that do not impose such drastic and unacceptable consequences.

The proposed WaterSense Program's goals may be achieved at the expense of an environmentally-beneficial landscape. We encourage the EPA to utilize specifications based on scientific data with consideration for the overall environmental impact and consideration for the many benefits that landscapes and green spaces provide. Over simplification or a "one-size-fits-all" approach would be detrimental to the adoption and success of the WaterSense program. If designed and implemented properly, WaterSense could be a successful program that the green industry can endorse and support.

What scientific information was used to derive the 40% turfgrass limitation and the limitation on 4:1 slopes? By virtue of these comments, I am asking for copies of all reference materials, consultants reports, meeting minutes and any other relevant information used to develop this criteria. Additionally, I would ask for a list of stakeholders and subject matter experts who have participated and contributed to the development of the Outdoor Water Use criteria.

The draft specification's limitation on turfgrass is arbitrary, not supported by science and may undermine the goals of the WaterSense program. Such deviations from best available science should be corrected prior to the formal release of the outdoor criteria. We recommend to the EPA that decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. The attached specific comments represent our agreement with the comments submitted by the National Turfgrass Federation and the Irrigation Association regarding the second draft of the WaterSense® Water Efficient Single Family New Home Specification.

Rationale:
The one-size-fits-all home specification imposes a 40 percent turfgrass limitation on landscapable areas of new home sites whether that home site is located in the arid, desert southwest or in cooler, damp climates such as Seattle, Washington or Portland, Maine. Under the proposed criteria, a homebuilder constructing a house in Phoenix could plant cool season Kentucky Bluegrass on 40 percent of the property-a scenario that would require non-stop irrigation--and qualify that house for the WaterSense label. Conversely, a homebuilder in Northeast Michigan could mulch and hardscape the entire landscapable area and also qualify for the label. We believe that these are outcomes that should be avoided. There are many other scenarios that we could provide that would fit the WaterSense criteria, yet be environmentally unsound as well as undesirable to the consumer. Plants interact with their environment and respond to how they are maintained; therefore, what is applicable to one geographical area may not be at all applicable to another area. Since the ultimate goal of Water Sense is to reduce water use, this fact cannot be emphasized enough.

The proposed restrictions assign a negative environmental value to turfgrass and suggest that a yard covered in turfgrass is somehow less preferable or less eco-friendly than other landscape choices. On the contrary, countless studies have been completed by numerous Universities across the United Starts as well as USDA-ARS that show the myriad of environmental benefits of turfgrass. The cooling benefits of turfgrass: In some cases turf reduces ground surface temperatures as much as 30 – 40 degrees over bare soil They are also 50 to 70 degrees cooler than hardscaped (asphalt or concrete) areas[1]. Reducing turfgrass only contributes to the "heat island" effect that plagues urban areas across our nation. These regulations would add significantly to global warming. In addition to its cooling properties, managed turfgrass plays a positive role in our efforts to confront climate change. The use of turfgrass minimizes the carbon footprint: A well maintained lawn, fed by nutrients from grass clippings, sequesters carbon from the atmosphere and helps to minimize the property's carbon footprint[2]. Reducing the turf area and replacing it with mulch or hardscape makes an active carbon "sink" inactive, and it may actually increase the carbon released back into the atmosphere by exposing soils or using non-growing, decaying materials such as mulch. Healthy, well maintained turfgrass has near zero storm water runoff: There have been many University studies, showing that the <u>best</u> control of storm water runoff is a good maintained turfgrass cover. According to research by the University of Minnesota[3], storm water runoff due to increase impervious surfaces has reduced the quality of water and ends up burdening our storm water systems and ultimately pollutes our lakes, streams, and rivers.

These erosion and stormwater control benefits that turfgrass delivers makes the steep slope ban on turfgrass in the specification perplexing. Under the draft specification, plants other than turfgrass can be planted on steep slopes. Turfgrass, because of its fibrous root system, is better than other plant in controlling erosion, a key factor in choosing a ground cover for slopes. Turfgrasses are used on most roadside slopes because turfgrasses are the best species at controlling erosion. And in the case of roadsides, turfgrass is effective on slopes, when using an adapted species and cultivar, without requiring supplemental irrigation. The same came be said for turfgrass on slopes within a landscape.

Another concern is the single, nationwide ET factor for calculating a water budget. We believe strongly that builders seeking the WaterSense label will avoid the complexities of a water budget and related calculations and simply opt to limit turfgrass. Furthermore, designating a single ET rate ignores the regional climatic variations and average rainfall levels in different regions of the country.

The new draft specs require that the user of the water budget tool, to determine monthly ETo, access the International Water Management Institute World Water and Climate Atlas. To utilize the tool, the user is required to input exact latitude and longitude, after which an estimate of monthly ETo is provided. This is interesting as the scientists that met with EPA on Feb. 10th discussed the lack of ETo data available nationwide. Therefore, it is highly questionable how useful this tool really is in providing accurate ETo, as well as if most people will go through the trouble of identifying their longitude and latitude. Most builders will opt for the 40% turfgrass limit because it is easiest.

In summary, there is no research supporting any of the tenets of Section 4.0. Turfgrass can be maintained with limited or no supplemental irrigation in many regions of the U.S, but this fact seems to get ignored when the only concern is water savings on the outside portion of the home. As the scientists told you back on Feb. 10th, using the latest in irrigation technology, with smart controllers and efficient systems, will easily result in 20% (or more) water savings, without having to limit builders and consumers in their desire to plant turfgrass. The scientists also recommended that the outdoor requirements be instituted in phases, as more regional information on ETo is available. This turfgrass limitation will have serious consequences on the success of WaterSense and its adoption. We want to see WaterSense succeed, but we also know that many people want to plant, cultivate and enjoy turfgrass at their homes. The current draft of the outdoor portion of the new homes specs will not satisfy this desire and will ultimately lead to the demise of the WaterSense new homes program.

While this program is being proposed as voluntary, we have seen time and time again that local, county and state regulators seek source information from a higher "authority" to base their regulations and laws upon, thus voluntary criteria become regulations and laws. This adoption has already occurred in Lexington Massachusetts and these criteria guidelines have not even been finalized.

[1] The Lawn Institute; How The Environment Benefits From a Well-Maintained Lawn; http://www.turfgrasssod.org/lawninstitute/environmental_benefits.htm

[2] Dr. Ranajit (Ron) Sahu; *Technical Assessment of the Carbon Sequestration Potential of Managed Turfgrass in the United States; www.opei.org/carbonreport/*

[3] University of Minnesota; Sustainable Urban Landscape Information Series; Environmental Benefits of a Healthy, Sustainable Lawn. http://www.sustland.umn.edu/maint/benefits.htm.

Suggested Change (or Language):
We respectfully request that EPA set aside the Outdoor Water Efficiency Criteria. Based on reaction at the public hearings and the webinar the Agency hosted, the outdoor criteria has raised many concerns about the negative impacts these criteria will have on the environment and suppliers that serve the homebuilding and turfgrass industry. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water efficiency solutions that actually reduce water consumption and do not result in unintended consequences. If the

Outdoor Water Efficiency Criteria section cannot be set aside, we recommend that the first draft comments submitted by the Irrigation Association (September 2008) on behalf of more than 90 individuals and organizations are revisited. We urge the EPA to take into consideration the comments (below) from the landscape and turfgrass industry which are based on best management practices and best available science.

Topic:
4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.
Comment:
We do not support any arbitrary limits on landscape plant material. This national criterion, (voluntary or otherwise), is inappropriate and not based on best available science. For this reason, and as previously commented, we do not support the inclusion of Option 1.
Rationale:
The 40% turfgrass limitation is an arbitrary limit placed on landscapes. Local geographies, climates and markets should guide the make-up of landscape materials, including types of turfgrass, trees and shrubs. Builders should work closely with green industry suppliers to promote adapted plant materials appropriate for each climate and geographic location.
Suggested Change (or Language):
The EPA should use best available science to produce a performance-based approach to landscape design criteria, rather than an arbitrary prescriptive approach. We urge the EPA to continue the dialogue with all segments of the green industry on best practices and stewardship to determine the best performance-based criteria to implement as part of the new homes specification.

Topic:
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.
Comment:
Best available science dictates that evapotranspiration adjustment factors should be determined based on geography and climate. If a national water budget continues to be a part of the specification, we recommend that the ETAF be implemented at 80%. Any Evapotranspiration adjustment factor that is implemented as a “one-size-fits-all” ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or applicable educational resources.
Rationale:
We believe that high irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. According to the EPA, many irrigation systems are using approximately 50% more water than what is needed by the landscape. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% water-use savings.
Suggested Change (or Language):
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic:
Alternative water supplies for landscape irrigation
Comment:
The current draft is does not address incorporating the use of alternative water supplies and the addition of this section would provide an excellent opportunity to promote the use of such resources for landscape irrigation where available.

Rationale:
In addition to lessening the demand for potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.
Suggested Change (or Language):
The specification should include an option, or incentives, to use alternate, non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes.

Topic:
4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.
Comment:
We believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) in strips less than four feet wide can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems.
Rationale:
The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. In some areas of the United States four feet wide strips of turf may be inappropriate, in others it is a valuable part of the landscape that is much needed. In many instances throughout the United States, areas of turfgrass of four feet wide are efficiently irrigated using methods such as drip, spray strip nozzles, and rotator-style nozzles, among others.
Suggested Change (or Language):
We recommend the removal of this restriction and urge the EPA to employ performance-based criteria. Irrigation installed in strips less than 4 feet wide shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to eliminate runoff.

Topic:
4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).
Comment:
We believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States turfgrass is used as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes with this prescriptive approach would significantly adversely change the market, without any assurance of less water-use or elimination of run-off. Plant material recommendations in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:
Based on years of research, science and best management practice development, the best applicable science indicates that all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with little to no increase in run-off.
Soil Erosion Control and Dust Stabilization
Turfgrass protects nonrenewable soil resources from water and wind erosion. Turfgrass has high shoot density and root mass that stabilizes surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turfgrasses high biomass matrix provides resistance to lateral surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turfgrass can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked non-point surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.) Irrigation systems have been and continue to be successfully installed and properly maintained
throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.
Suggested Change (or Language):
4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate which will eliminate run-off concerns.

Topic:
Soils
Comment:
A key component to landscape design and water-use efficiency in a landscape is appropriate soil preparation. Neglecting its inclusion in the final specification is equitable to neglecting the key component to ensuring the landscape can thrive in a water efficient manner.
Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Many of the unrealistic proposals set forth in these specifications would not be needed if performance criteria were put forward and the proper soil preparation were included in the specification.
Suggested Change (or Language):
During the construction process, the WaterSense ® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant materials, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist.

Commenter: Karen L. Guz, Director
Affiliation: Conservation Department San Antonio Water System
Comment Date: July 7, 2009

I would like to make the following comments on the EPA WaterSense Home Certification.

1) It is very important that landscapes be as efficient as possible on any home that obtains an efficiency certification. This is because all indoor gains in efficiency can be completely wiped out by excess outdoor water usage. We have seen this in pilot neighborhoods in San Antonio where all other factors should have led to lower water usage, but instead the neighborhood had higher usage than others because of excess irrigation. Therefore, it is critical that this be addressed and that standards be very strict.

2) If irrigation is going to be present in a home with homes with a WaterSense label then it must have no less than 70% efficiency on spray irrigation. This can be obtained with specialty products or very highly designed systems. There are many who will complain that this is difficult. They are correct. This is difficult and this makes it hard to do with pop up spray irrigation which is known to waste a lot of water in application. Since we know that it is not efficient, why would it be allowed in a home that is intended to be the standard bearer for efficiency?

3) All beds should be on drip irrigation with plant material that is known to be xeric for the region.

4) We support having less turf in the landscape. Although it is possible to have turf be dormancy capable and therefore not be watered, it usually is irrigated by homeowners. In nearly every analysis of home landscapes, we find that when there is more turfgrass, there is more water used. This is regardless of grass type. People seem to have an urge to water their grass to keep it green despite that it can go dormant and survive. Therefore, if there is a lot of grass more water will be used. Limiting it and zoning the irrigation to water it selectively is the best way to combat this. It is not necessary to eliminate grass completely. But grass can be an appropriate and limited portion of the landscape.

5) If a water budget is used, then appropriate growth factors or stress factors should be applied in addition to the PET or ETo and the crop coefficient. This is because research shows that 100% of ET (after crop coefficient) is not necessary to maintain an attractive home landscape. The full ET replacement is intended to maximize growth of plant material and was developed from crop science from agriculture for high yield crops. We do not want to harvest grass and other home plants. We simply want an acceptable appearance. Therefore, applying a .7 or 70% growth factor would be appropriate in addition to a regional crop coefficient for the area. If the water budget is simply PET or ETo times 70% that is a very generous water budget and very high. In areas with limited water supply there is likely not enough water to provide that across all landscapes.

Commenter: Mark A. Peterson
Affiliation: San Antonio Water System
Comment Date: July 7, 2009

Topic: WaterSense Standards - Landscape

Comment: Did we at SAWS miss something? We imagined that the WaterSense label would stand for the pinnacle of water conservation, yet we still see middling requirements for landscape. The WaterSense label should be a reachable goal but only with effort. In that way, it becomes a true unique brand label.

Rationale: The WaterSense label is to be one of water conservation excellence not one of slight improvement.

Suggested Change (or Language): Specifically, (1) the DU for all irrigation systems must be 70% or better – if irrigation systems are even encouraged, (2) EPA should require beds to have drip or no irrigation, provided the plants are considered xeric to the region, (3) we defy anyone to defend the use of a K for trees, shrubs, and groundcovers of over .5 – of course, riparian species and restricted soil volume sites may require a larger coefficient but then it would not be a WaterSense home, (3) although we are encouraged by Option 1 (40% turf), we believe that a limit be placed on all WaterSense homes, or at the very least, require turf that can go dormant during summer drought, and (4) most importantly, the ETAF of 70% is just not acceptable for a WaterSense home – in none of our research or case studies in San Antonio have we ever found a 50% of PET/ETo to fail in producing healthy landscapes – reduce the ETAF to 50%, if we can do it in the SW, other parts of the country can do it as well.

Commenter: Roger Beyer
Affiliation: Executive Director, Oregon Seed Council
Comment Date: July 7, 2009

Topic: 4.1.1 Landscape design

Comment: The 40% limit for turfgrass seems to be an arbitrary number without scientific justification. When setting standards for a national building certification only scientifically proven data should be used. The 40% limit may affect the Clean Water Act, the Clean Air Act and Global warming in a positive or a negative manner, has that been studied and the results used in these proposed standards?

Rationale: The available research data of the effect turfgrass has on water quality should be used to justify any standard that is proposed. Turfgrasses help purify water entering underground aquifers by its root mass and soil microbes acting as a filter to capture and breakdown many types of pollutants. With up to 90% of the weight of a grass plant in its roots, a good lawn provides a very efficient erosion prevention device. It also removes soil particles from silty water. Healthy, dense lawns absorb rainfall more effectively than most other surfaces in a landscape thus preventing runoff and also allow rainfall to soak into the ground and help recharge underground watersources.

Turfgrasses absorb carbon dioxide and other green house gasses from the atmosphere while sequestering the carbon and releasing pure oxygen. Actively growing turfgrass may sequester 800 pounds of carbon per acre each year and a turf area of just 2,500 square feet releases enough oxygen to meet the breathing needs of a family of four annually. Turfgrasses trap much of an estimated 12 million tons of dust and dirt released annually into the atmosphere of the United States.

Many species of turfgrass have been developed that thrive with little or no additional irrigation in many parts of the country. Using an arbitrary percentage for amount of turfgrass in a national model may have unintended effects that are detrimental to the goal of conserving water.

Topic: .1.5 Pools/spas

Comment: Including pools and spas as turf areas is not consistent with the use patterns. These should be considered hardscapes as they are impervious to rainfall.

Rationale: Scientific data should be the only criteria considered when creating water use standards. I am not aware of data that shows pools to have the same water requirements as turfgrass. Pools are closer in similarities to hardscapes and if they are to be grouped with another category should be included with those features. When setting national building standards for water use only features that are uniform across the entire country should be considered.

Topic: 4.1.6 Ornamental water features

Comment: Including ornamental water features as turf area is not consistent with the use patterns. These should be considered hardscpaes as they are impervious to rainfall.

Rationale: Scientific data should be the only criteria considered when creating water use standards. I am not aware of data that shows ornamental water features to have the same water requirements as turfgrass. Ornamental water features are closest to pools which are similar to hardscapes and if they are to be grouped with another category should be included with those features. When setting national building standards for water use only features that are uniform across the entire country should be considered.

Topic: 7.0 Definitions

Comment: The definition of Landscapable area excludes the area of the septic drainage. Appropriate plants should be identified for the septic drainage area, and turfgrass should be listed as an approved plant for that area.

Rationale: Many trees and other shrubs should not be planted in a septic drainage area as the roots can grow into the drain field and cause blockages. Grasses are recommended for growing in those areas and help absorb the moisture, recycling the water and nutrients and prevent any potential leaching into streams or underground waterways.

Suggested Change (or Language): Create a new sub-section in 4.0 Outdoor Water-Efficiency Criteria about proper plants for a septic drainage area. Alternatively include the septic drainage area as part of the landscapable area but do not count turfgrass in that area against the limits under 4.1.1 Landscape design.

Commenter: Randall Merriott, CID
Affiliation: Owner, Irrigation Dynamics, WaterSense partner
Comment Date: July 7, 2009

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment: 40% is too arbitrary

Rationale: Non-turfgrass species are not always water efficient. In some regions and some locales, efficiently watered turfgrass is the most appropriate option. In other regions, limiting turfgrass is appropriate. This should be left up to the landscape designer using a water budget.

Suggested Change (or Language): Remove this option

Topic: 4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.

Comment: Again, this reflects an unfair bias against turfgrass. Choice of vegetation should be left up to the landscape designer.

Rationale: Turfgrass in narrow strips can be efficiently watered with a buried drip system.

Suggested Change (or Language): Spray sprinklers shall not be installed in strips less than 4 feet wide, when overspray into non-landscaped areas will occur.

Topic: 4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment: Runoff can occur with any type of plant material, not just turfgrass.

Rationale: Turfgrass is often the best choice for stabilizing slopes.

Suggested Change (or Language): Require that low precipitation rate equipment be used on slopes or require that the controller be set to cycle to reduce runoff. Do not require certain types of plants be used.

Topic: 4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment: Sprinklers should be allowed to water any type of plant material so long as the plants do not create interference.

Rationale: Properly designed sprinklers, such as MP Rotators, can be very efficient, and can be used to water bed areas with lower growing vegetation. In addition, some lawns are now being grown with thyme and other non-turfgrass species. This would eliminate these plants from being watered with sprinklers.

Suggested Change (or Language): Sprinklers shall have 4 inch or greater popup height in lawn areas and a higher popup height in other planted areas, such that the nozzles shall clear mature vegetation. Matched precipitation rate nozzles shall be used. Plantings with differing water requirements shall be separated and shall be watered on different zones.

Commenter: Jim McCabe, President
Affiliation: Sensible Technologies, Inc. and Editor of the Irrigation Association's "Irrigation Water Scheduling and Management" document
Comment Date: July 7, 2009

Topic: 4.1.1.1 Option 1

Comment: Option 1 is a prescription that is not based on any science or landscape design criteria.

Rationale: While a designer may choose to limit the use of turfgrass in small landscapes in favor of other landscape plants and features, it is very inappropriate to limit turfgrass to 40% of the landscape area in large landscapes such as estates and ranch/country homes.

Suggested Change (or Language): Remove Option 1 in favor of a single Option 2.

Topic: 4.1.1.2 Option 2

Comment: ET adjustment factors should not be based on one factor fits all. Instead, the EPA should consider using climate zones to help garner participation in the WaterSense program.

Rationale: By equating Equation A-1 (Landscape Water Allowance) of EPA's May 8, 2009 "Revised WaterSense Water Budget Approach" with Equation B-1 (Landscape Water Requirement) of the same document, and for an EPA-required lower quarter distribution uniformity (DULQ) of 70 percent, EPA has, in effect, set the RTM to 1.42 (for inverse of DULQ of 70 percent) which results in an approximate average landscape KL of 0.5 (i.e., 1.42 x 0.5 is approximately equal to 0.70 which is the ET adjustment factor). The following typical problems (for example) now result in the "one factor fits all" approach: (1) the negative effect of wind on the irrigation water distribution in coastal climates has not been considered, and consequently it is much harder to achieve "WaterSense" landscapes in coastal climates when compared to other areas of the USA. (2) An average landscape coefficient (KL) of 0.5 may do fine in some geographical areas, but may kill the landscape in areas with lots of trees or in areas where mid-to-high water use plants is the norm. The EPA method of one factor fits all will likely cause builders in those areas to forego creation of WaterSense homes thereby defeating the very purpose of the program.

Suggested Change (or Language): Option 2 – Landscape design shall be developed using the water budget tool based on a geographically-applied evapotranspiration adjustment factor. This factor is derived based on the 16 climate zones depicted in the following link: http://www.itreetools.org/elements/stratum_climate_zones_16.jpg. (EPA to work with industry professionals to derive appropriate ET adjustment factors based on geography and climate zone).

If the above rational of a geographical-applied ET adjustment factor cannot be adopted by the EPA, then consider increasing the evapotranspiration adjustment factor to 80 percent so as not to penalize large geographical areas of the USA.

Topic: 4.1.2 Turfgrass

Comment: Installation of turfgrass should not be limited based on prescription but rather with performance-oriented specifications such as that required by EPA-designated Option 2 (4.1.1.2).

Rationale: Turfgrass plays a vital role in the landscape, especially in smaller areas such as between sidewalk and curb and between houses and fence where it is impractical to put hardscape or other vegetation. These smaller areas can be efficiently irrigated with matched precipitation rate nozzles and irrigation components such as end strips, center strips, side strips and even drip. These components are readily available. Instead of not allowing the use of turfgrass in areas smaller than 4 feet-wide, let the water-limiting aspects of Option 2 guide the landscape designer in his/her selection of plant use in the landscape.

Suggested Change (or Language): Remove section 4.1.2 in favor of Option 2 being used by the designer as the guide to landscape plant selection.

Topic: 4.2.4 Distribution Uniformity

Comment: The requirement of 70 percent distribution uniformity may be hard to achieve for smaller landscapes with curved borders, and for areas that have average night-time wind speeds above 3 to 5 miles per hour. Allow for lower DU_{LQ} values for these landscapes or consider using a lower overall DU_{LQ} value.

Rationale: Areas with curved borders do not lend themselves to nice square and triangular irrigation head spacing which results in lower-than-normal DULQ values. Similarly, landscapes with normal night-time wind must be designed with wind derating factors that are not very accurate.

Suggested Change (or Language): Distribution uniformity – Irrigation systems shall achieve an overall lower quarter distribution uniformity (DULQ) of 63 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Topic: Equation B-1: Landscape Water Requirement

Comment: Effective rainfall should not apply to those areas of the landscape such as covered pools and spas, or those planting areas not exposed to rain.

Rationale: Effective rainfall does not apply to areas not exposed to rainfall.

Suggested Change (or Language): Change the description of R_a shown below Equation B-1 to "R_a = Allowable rainfall, designated by WaterSense as 25% of the site's peak month rainfall. Set R_a to zero for hydrozones not exposed to rain."

Commenter: Mike Baron
Affiliation: National Specification & Sales Manager, Water Management Product, The Toro Company
Comment Date: July 7, 2009

The following comments apply to the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. In addition to supporting the comments submitted by the Irrigation Association, I would like to emphasize the following:

1. The EPA should be commended on its WaterSense™ program goal of reducing water use on residential properties by 20% over the marketplace norm. This is a worthwhile goal and one that will gain visibility and importance as geographical areas across the United States struggle with droughts and environmental regulations that reduce the reliability and availability of water.

2. While the above mentioned goal is most worthwhile, the setting of arbitrary limits on landscape plant material, i.e. the 40 percent limit on turfgrass - irrespective of geography and climate - unnecessarily limits and restricts consumers and professionals without necessarily achieving the desired goal of water savings. Rather, Toro favors – as does the Irrigation Association - "promoting local and adapted plant material" that is most appropriate for each climate and geographical location without a percentage restriction.

3. From 1992 to the present, the California Model Water Efficient Landscape Ordinance has been using an ETAF of 0.8. Starting January 1, 2010, the updated Ordinance will lower that factor to 0.7. This was done over the objections of the California Landscape Contractor Association because the rationale for making this reduction was not science-based. Nevertheless, the ETAF was lowered. California designers and contractors will adapt; but they've had 17 years of experience abiding by the 0.8 ETAF to prepare. Wouldn't it make sense to have the rest of the nation have the opportunity to work into the lower 0.7 ETAF? Just as the Irrigation Association has recommended, we feel that an 80% ETAF would be a significant increase in efficiency (as much as 50%) from the current market norm and would result in more movement towards the end goal. For areas such as California, where there is lower ETAF, that lower ETAF would prevail.

4. Toro adds its support to the following position submitted to the EPA by the Irrigation Association: "The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification."

5. Toro supports the use of proper irrigation audits and also supports the Irrigation Association position: "… that "spot-checking" irrigation systems through a traditional audit protocol will allow the WaterSense™ program to keep the high integrity it is striving to achieve without increasing costs and the likelihood of significant delays in the labeling process."

6. With respect to the measurement of distribution uniformity in the field, it should be noted that every measurement process has some inherent variation. The measurement of distribution uniformity (DULQ) in the field is no exception. Each of the 24 (minimum number) catchments in an IA Certified water audit contains an amount of water than

must be “read” and then recorded by an individual. Reading the milliliters of water collected or the fraction of an inch of water collected in each catchment is a process with some inherent variation. Even those at the Center for Irrigation Technology acknowledge that there is variation in the assessment of the amount of water in a catchment from experiment to experiment when neither the nozzle being tested nor the pressure at which the nozzle is being tested is changed. Therefore, it is suggested that the 70% target be modified to 70% +/- 7%; providing an acceptable range of 63% - 78% for the DULQ. As the Irrigation Association has pointed out, the EPA can meet the goal of reducing water waste by 20% through a specification for the largest turf area to be a DULQ of .63 or greater.

Thank you for the opportunity to provide input into the process. Allowing stakeholders from across the United States to review the proposed guidelines and provide input makes for a much sounder process and eventually, a sound result. Towards that end, Toro would like to add its support to the proposal made by the Irrigation Association of providing yet another round of review and evaluation. We certainly recognize that it is a challenge to reconcile disparate input from across the United States. But working with a common goal in mind, a commitment to fact-based decision making and the understanding that progress will be ongoing and evolutionary, we remain committed to the process.

Commenter: Dave Jones
Affiliation: IPPCA (International Professional Pond Contractors Association). The Pond and Waterscape Industry's Trade Association On and in behalf of the Pond Industry Coalition
Comment Date: July 7, 2009

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. *Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.*

We recommend to the EPA that decisions impacting landscape design should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. We also recommend to EPA that the comments submitted by the Irrigation Association in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, we urge the EPA to take into consideration the comments below from the irrigation industry, as they are based on market data, best management practices and best available science.

Topic:
4.1 – At a minimum, the front yard shall be landscaped to meet the criteria in either option. The entire yard shall be landscaped to meet the criteria in either option where landscaping of the entire yard is financed, installed, or sold as an upgrade through the homebuilder. The entire yard shall also be landscaped to meet the criteria in either option when irrigation systems, pools, spas, or water features have been financed, installed, or sold by the homebuilder.

Comment:
If the EPA is going to support having any prescriptive requirements associated with the outdoor criteria, then the requirements should apply to the entire landscapable area, not just the front yard, regardless of whether an irrigation system, pool, spa or other water feature is installed.

Rationale:
We do not support any language that does not treat the entire landscape equally.

Suggested Change (or Language):
Any option associated with the outdoor criteria shall apply to the entire landscapable area.

Topic:
4.1.6 Ornamental water features
Comment:
The current text classifies (or implies) such water features as a high water using grass or landscapeable area, depending upon which option is exercised for program compliance. In addition, for the purposes of water budget compliance, the ornamental water feature is assumed

to be irrigated with the least efficient irrigation method available within the tool as indicated in the diagrams below, even though the ornamental water feature is not irrigated:

STEP 2B - COMPLETE TABLE 1 BELOW (enter data in white cells only)
Enter the area of the hydrozone (square feet). The total area must equal the landscape area entered in Step 1A.
Choose the plant type from the dropdown list (source data is displayed in Table 2).
Choose the irrigation type from the dropdown list (source data is displayed in Table 3).
For Pool, Spa, or Water Feature, select 'Fixed Spray'

Table 1. Landscape Water Requirement

Zone	Hydrozone/Landscape Feature Area (sq. ft.)	Plant Type or Landscape Feature	Landscape Coefficient (K_L)	Irrigation Type	Distribution Uniformity (DU_{LQ})	LWR_H (gal/month)
1		Pool, Spa, or Water Feature	0.8	No Irrigation	NA	-
2						-

STEP 2B - COMPLETE TABLE 1 BELOW (enter data in white cells only)
Enter the area of the hydrozone (square feet). The total area must equal the landscape area entered in Step 1A.
Choose the plant type from the dropdown list (source data is displayed in Table 2).
Choose the irrigation type from the dropdown list (source data is displayed in Table 3).

Table 1. Landscape Water Requirement

Zone	Hydrozone/Landscape Feature Area (sq. ft.)	Plant Type or Landscape Feature	Landscape Coefficient (K_L)	Irrigation Type	Distribution Uniformity (DU_{LQ})	LWR_H (gal/month)
1		Pool, Spa, or Water Feature	0.8	Fixed Spray	65%	-
2						-
3						-
4						-
5						-
6						-

Rationale:
Pond elements are unique in nature and provided best practices are followed, use far less water than turfgrass and ponds should not be the target of irrigation systems, rendering the assumptions made in the text and water budget tool flawed and prejudiced.

Suggested Change (or Language):
The EPA should use best available science to produce elements in the water budget tool specifically for ornamental water features and under no circumstances should ornamental water features be lumped with turfgrass for the purposes of complying with the 40% turfgrass allowance.

Topic:
Alternative water supplies for ornamental water features

Comment:
The current draft is silent about incorporating the use of alternative water supplies and the addition of this section would provide an excellent opportunity to promote the use of such resources for ornamental water features.

Rationale:
In addition to lessening the demand on domestic potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle. Additionally, ornamental water features can be incorporated into strategies that capture storm water runoff or other sources and moderate the return of these resources to a beneficial element of the hydrologic cycle.

Suggested Change (or Language):

Topic:
Water Meters

Comment:
Any voluntary water-use savings program should include the use of water meters.

Rationale:
Water meters are not required in all areas throughout the United States. The program should also promote using water wisely, which includes accurately knowing how much water has been used.

Water management is simply not possible without water measurement.

Suggested Change (or Language):
<u>Water Meters for Irrigation Systems and Ornamental Water Features</u> – The WaterSense® labeled new home shall include the installation of a separate, dedicated water meter, sub-meter or flow sensor that meets applicable local standards or otherwise measures water use in billing units used by the local utility. In the event such use is not monitored by the local utility, measurement units in either gallons or cubic feet are acceptable.

Thank you for your consideration of these weighty and important matters.

Commenter: Bob Dobson, WaterSense Partner
Affiliation: Middletown Sprinkler Company
Comment Date: July 7, 2009

Topic: General Comment – Outdoor Water-Efficiency Criteria

Comment: While the second draft is a vast improvement over the first, many of the sections are based on concepts or perceptions and not sound science. I believe a third draft needs to be released prior to guideline adaptation and that draft should be performance based and founded on sound science.

Comments on 2nd Draft:

Topic: 2.0 Summary of Criteria New homes must meet criteria in three areas:

- Indoor water use, including plumbing, plumbing fixtures and fittings, appliances, and other water-using equipment;
- Outdoor water use, including landscape design and irrigation systems, if installed; and
- Homeowner education.

Comment: I take objection to the words "if installed" after irrigation systems.

Rationale: The words "if installed" only appear after irrigation systems. They do not appear anywhere else in the guideline, i.e. after "other water-using equipment;" Remove the words "if installed".

Suggested Change (or Language): New homes must meet criteria in three areas:

- Indoor water use, including plumbing, plumbing fixtures and fittings, appliances, and other water-using equipment;
- Outdoor water use, including landscape design and irrigation systems; and
- Homeowner education.

Topic: 4.1.1.1 <u>Option1</u> – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment: This section simply provides an easy option for a home builder to comply with the guidelines <u>without</u> any assurance of water savings. Builders are likely to choose this option because it requires less effort, paperwork, and documentation. A 40% turf landscape is not appropriate in many areas of the country particularly northern sectors. The option unfairly penalizes the turf industry and other associated industries. The guideline would be better served if this option was removed.

Rationale: This option assumes that reducing turfgrass to 40% will result in water savings. There are many reasons why a 40% turf landscape would not be water efficient: turf species, poorly constructed soils, improper irrigation whether it be by hose or sprinkler system, just to name a few.

Suggested Change (or Language): Remove Option 1

Topic: 4.1.1.2 <u>Option 2</u> - Landscape design shall be developed using the water budget tool based on 70 percent evapotranspiration factor.

Comments: Water Budget Tool – The success of Option 2 depends on the Water Budget Tool. The tool requires further testing by shareholders in all areas of the country.

The tool should be based on an 80 percent evapotranspiration factor.

Rationale: An error exists in the Water Budget Tool for the link to effective rainfall. The fact that the WaterSense staff was unaware of this error indicates that the tool has not been widely tested. I calculated multiple landscape scenarios for my geographical area and found it rather easy to comply with the guidelines. This makes me question whether the tool would further promote water conservation in my area and achieve the desired 20% water savings.

In the first draft, the tool was based on 60% ET_o for a DU for the lower half or DULH. After comments, the ET_o was raised to 70% in the second draft, but the DU was changed to lower quarter or DULQ. The net result, no change. The DULQ should be changed 80%.

Suggested Change (or Language): Landscape design shall be developed using the water budget tool based on 80 percent evapotranspiration factor.

Topic: 4.1.2 Turfgrass shall not be installed in strips less than 4 feet wide.

Comment: By its own admission, the WaterSense staff conceded this restriction was based on the assumption that narrow strips cannot be efficiently irrigated. I do not agree. There are many applications where turf on a narrow strip is preferred and desired and can be efficiently irrigated, e.g. northern climates where snow is frequently placed on narrow strips.

Rationale: The premise that strips less than 4 foot cannot be efficiently irrigated is false and based on hearsay. Narrow strips can be efficiently irrigated if the proper method is selected and the system properly programmed and managed.

Suggested Change (or Language): Narrow strips shall be irrigated with a method that does not overthrow curbs, sidewalks, hardscapes, or other borders. The equipment shall be programmed and managed to apply the minimal amount of irrigation necessary and not create runoff.

Topic: 4.1.3 Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment: By its own admission, the WaterSense staff conceded this restriction was based on the assumption that slopes equal to or greater than 4 on 1 cannot be efficiently irrigated. I do not agree. There are numerous applications where turf is the preferred and the best method for stabilizing and maintaining a slope.

Rationale: The premise that slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1) cannot be efficiently irrigated is false and based on hearsay. Slopes can be effectively irrigated if the proper methods are selected and the system properly programmed and managed. Turf is often the preferred method for stabilizing slopes. Turf roots quickly, absorbs water, reduces runoff, cools the surface, and is cost effective.

Suggested Change (or Language): All slopes shall be irrigated with irrigation equipment that applies water at a rate equal to or less than the soils infiltration rate. The equipment shall be programmed and managed to apply the minimal amount of irrigation necessary and so as not to create runoff.

Topic: 4.2 Irrigation Systems – Irrigation systems, if installed, shall meet the following criteria:

Comment: I take objection to the words "if installed" after irrigation systems.

Rationale: The words "if installed" are not necessary.

Suggested Change (or Language): 4.2 Irrigation Systems – Irrigation systems shall meet the following criteria:

Topic: Add new section to be numbered 4.2.1, renumber all subsequent sections –

Comment: The requirement that all irrigation systems be installed by a WaterSense partner was deleted from the first draft. It should be reinstated in the second draft. A 24 month grace period should be established from the date of adaptation to allow more practitioners to become WaterSense Partners.

Rationale: The reasons given by WaterSense staff for the removal of this requirement are:

Builders could not find a WaterSense Partner in their area.
Establishing a 24 month grace period will allow additional practitioners to become partners. Including this requirement in the guidelines will foster and promote more practitioners to become WaterSense Partners.

The cost of a system designed by a WaterSense Partner was more expensive.
The cost of a well designed, water efficient, irrigation system is typically higher than a poorly designed, inefficient system. Cost should never be the sole deciding factor for selection, Promoting more WaterSense partners will further competition in the marketplace thus lowering the cost of a well designed, water efficient irrigation system.

Suggested Change (or Language): Installer - All irrigation systems shall be installed by a WaterSense irrigation partner. This requirement shall be implemented 24- months after the release date of these guidelines.

Topic: 4.3.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment: A DU_{LQ} of 70 percent is too high and often unattainable in the field. A study of almost 7,000 audits from a variety of states found an average DU_{LQ} of 52.4%. Setting the DU_{LQ} at 63%, which is achievable in the field, will result in a 20% water saving.

Rationale: A DU_{LQ} of 70% is unrealistic and, in most cases, unattainable.

Suggested Change (or Language): Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DULQ) of 63 percent or greater. Distribution uniformity will be measured during the post-installation audit on the largest turf area.

Topic: 4.2.7 Sprinkler irrigation - Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater pop-up height and matched precipitation nozzles.

Comment: Sprinkler irrigation is an effective and often preferred way to irrigate ground covers.

Rationale: Ground covers require minimal irrigation but cannot typically be irrigated with microirrigation.

Suggested Change (or Language): Sprinkler irrigation - Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than ground covers and maintained turfgrass. Sprinkler heads in turf areas shall have a 4-inch or greater pop-up height and matched precipitation nozzles. Sprinkler heads in ground cover areas shall have a 12-inch or greater pop-up height and matched precipitation nozzles.

Topic: 4.2.8 Microirrigation systems

Comment: The definition of "microirrigation system" needs to be changes.

Rationale: The current definition "Method where water is applied at or below the soil surface at low pressure and low volume" does not include micro-spray irrigation equipment that is frequently used to irrigate shrub beds and flowers.

Suggested Change (or Language): Micro-irrigation system the dispersion of low volume water and low pressure.

Topic: 5.2 Irrigation System – If an irrigation system is installed, the builder shall provide the homebuyer with a record drawing (schematic) of the system and copies of the irrigation schedules.

Comment: As previous commented, remove the "If"

Suggested Change (or Language): 5.2 Irrigation System – The builder shall provide the homebuyer with a record drawing (schematic) of the irrigation system and copies of the irrigation schedules.

Commenter: Matt Herb, President
Affiliation: Oregon Seed Trade Association
Comment Date: June 26, 2009

Topic: WaterSense, Outdoor Water-Efficiency Criteria 4.0

Comment: The draft specification's limitation on turfgrass appears not to be supported by science and may be contrary to other goals of the EPA in regards to air and water quality. Our major concerns are the 40% limitation on turfgrass area, the ban on using turfgrass for steep slopes, and the standard of .7 ET factor for calculating the water budget.

Rationale: The draft proposal does not take into consideration the regional differences in climate, nor does it regard storm events, local water management currently in place, turfgrass cultivars that have been specifically developed for low or no maintainance with enhanced drought resistance, and provisions of the federal Clean Air and Clean Water Acts.

Studies have shown that turfgrass is an efficient contributor to air quality by sequestering carbon from the air, lowering ground temperatures, and increasing oxygen levels. By providing a ground cover, turfgrass holds soil in place, reducing wind erosion and airborne particulate matter.

Turfgrass is a huge benefit for natural water management. The foliage breaks up the energy of rain droplets, reducing liquification of the soil. Turfgrass acts as an efficient filter system for water borne sediments, pollutants, and chemicals. The roots of turfgrass hold the soil together for enhanced water erosion control, improved drainage because of root penetration, and enhanced infiltration and percolation rates that increases aquifer regeneration.

By imposing restrictions on total area of turfgrass, hardscapes such as rock, pavers, concrete, decks, etc. will be encouraged. These do nothing for air and water quality. Trees, shrubs, and mulches do not give the same level of benefits to the environment. On sleep slopes, there is no better ground cover than turfgrass. With little or no maintenance, including water, after establishment, turfgrass provides excellent protection for slopes, and is written into many municipal specifications for new construction.

Suggested Change (or Language): We request that EPA set aside the proposed criteria until the science can be done to adequately address the concerns. We suggest that EPA continue their efforts to engage the construction, landscape, and irrigation industries to develop higher effiency systems and to develop an educational program for homeowners and other turfgrass users to heighten awareness of water management and to promote efficient water management through proper operation of existing and future systems.

Appendix A
Comments on the Outdoor Criteria Submitted by Numerous Commenters

The following comments are to serve as our official comments regarding the second draft of the WaterSense® *Water-Efficient Single-Family New Home Specification*. The comments below are to reflect the best options as we see fit given the draft presented to the public for comment. They should by no means be accepted as an "endorsement" of the full specification, as there is much science that, in our estimation, has not been considered during the development of the first and second drafts. Such deviations from best available science should be corrected and the specifications should be subject to an additional public comment prior to the formal release of the outdoor criteria.

As stated in California Assembly Bill 1881(enacted 2006): "…landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development…" we believe the statement within AB1881 can apply across the country and as such, is hopeful the EPA will make constructive improvements that embrace the value of the outdoor living environment prior to publication of its WaterSense Model New Home Specification.

We recommend to the EPA that decisions impacting landscape irrigation should be driven locally and that the EPA not move forward with the outdoor criteria of the specification until locally driven and clearer outcome-based performance criteria are developed in partnership with qualified stakeholders. We also recommend to EPA that the comments submitted by the Irrigation Association in September 2008 (supported by more than 90 individuals and organizations) in response to the first draft of the new home specifications are revisited as they are based on best available science and best management practices. If the EPA decides to move forward with the final publication, we urge the EPA to take into consideration the comments below from the irrigation industry, as they are based on market data, best management practices and best available science.

Topic: 4.1 – At a minimum, the front yard shall be landscaped to meet the criteria in either option. The entire yard shall be landscaped to meet the criteria in either option where landscaping of the entire yard is financed, installed, or sold as an upgrade through the homebuilder. The entire yard shall also be landscaped to meet the criteria in either option when irrigation systems, pools, spas, or water features have been financed, installed, or sold by the homebuilder.

Comment:
If the EPA is going to support having any prescriptive requirements associated with the outdoor criteria, then the requirements should apply to the entire landscapable area, not just the front yard, regardless of whether an irrigation system, pool, spa or other water feature is installed.

Rationale:
We not support any language that does not treat the entire landscape equally.

Suggested Change (or Language):
Any option associated with the outdoor criteria shall apply to the entire landscapable area.

Topic: 4.1.1.1 Option 1 – Turfgrass shall not exceed 40 percent of the landscapable area.

Comment:
We do not support any arbitrary limits on landscape plant material. This national criterion, voluntary or otherwise, is inappropriate and not based on best available science. For this reason, and as previously commented, we do not support the inclusion of Option 1.

Rationale:
We believe in the practice of "right plant in the right place," and works very closely with the green industry in promoting local and adapted plant materials appropriate for each climate and geographical location. The 40% turfgrass limitation, in our estimation, is an arbitrary limit placed on landscapes. Local geographies, climates and markets should guide the make-up of landscape materials, including types of turfgrass, trees and shrubs.

Suggested Change (or Language):
The EPA should use best available science to produce a performance-based approach to landscape design criteria, rather than an arbitrary prescriptive approach. We urge the EPA to continue the dialogue with all segments of the green industry on best practices and stewardship to determine the best performance-based criteria to implement as part of the new homes specification.

Topic:
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on a 70 percent evapotranspiration adjustment factor.

Comment:
Best available science dictates that evapotranspiration adjustment factors should be determined based on geography and climate. If a national water budget continues to be a part of the specification, we recommend that the ETAF be implemented at 80%.

In addition to the recommendation that the EPA use a 80% ETAF for the water budget calculator, we are also including, as part of these comments, significant comments focusing on the data and assumptions used within the proposed water budget tool. We urge the EPA to consider all recommendations associated with the water budget tool, in addition to the recommended change to 80% ETAF. We feel that an 80% ETAF would be a significant increase in efficiency (as much as 50%) from the current market norm. Any evapotranspiration adjustment factor that is implemented as a "one-size-fits-all" ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or applicable educational resources.

Rationale:
We believe that high irrigation efficiency can be reached with an evapotranspiration adjustment factor of 80%. According to the EPA, many irrigation systems are using approximately 50% more water than what is needed by the landscape. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% water-use savings.

Suggested Change (or Language):
4.1.1.2 Option 2 – Landscape design shall be developed using the water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic: Alternative water supplies for landscape irrigation

Comment:
The current draft is silent about incorporating the use of alternative water supplies and the addition of this section would provide an excellent opportunity to promote the use of such resources for landscape irrigation.

Rationale:
In addition to lessening the demand on domestic potable water, a goal of the EPA WaterSense® program, using alternative supplies can become part of a comprehensive disposal solution as natural plant processes aid in cleansing effluent, grey or other undrinkable water before its ultimate return to the hydrologic cycle.

Suggested Change (or Language):
The specification should include an option, or incentives, to use alternate, non-potable water for supplemental irrigation. All water sources must meet locally applicable standards and codes. Sources of such water could be untreated surface waters, wells, treated waste water, site collected grey water, captured rain/storm water or other reclaimed water meeting locally applicable standards and codes. Because of potential poor water quality, consideration should be made to accommodate the need for additional leaching fractions deemed appropriate to make the water useable in the landscape.

Topic: 4.1.2 Turfgrass – Turfgrass shall not be installed in strips less than 4 feet wide.

Comment:
We believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) in strips less than four feet wide can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. We recommend the removal of this restriction and urge the EPA to employ performance-based criteria, rather than the prescriptive approach currently taken in the draft, to determine irrigation efficiency in these areas.

Rationale:
The choice of plant material in the landscape should take geography, climate, local codes and requirements into consideration. In some areas of the United States four feet wide strips of turf may be inappropriate, in others it is a valuable part of the landscape that is much needed.

In many instances throughout the United States, areas of turfgrass of four feet wide are efficiently irrigated using methods such as drip, spray strip nozzles, and rotator-style nozzles, among others.

Suggested Change (or Language):
4.1.2 Turfgrass – Irrigation installed in strips less than 4 feet wide shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create runoff.

Topic: 4.1.3 Slopes – Plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).

Comment:
We believe that this section is not based on the best available science and that all plant material (turfgrass, trees, shrubs, etc.) installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise can be irrigated efficiently, if proper design and installation practices and manufacturer recommendations are employed during installation and best management practices are performed when scheduling and operating irrigation systems. In many areas throughout the United States turfgrass is used as the primary plant material on four feet of horizontal run per one foot of vertical rise (4:1) slopes in landscapes. Arbitrarily eliminating the planting of turfgrass on these slopes with this reactionary, prescriptive approach would significantly adversely change the market, without any assurance of less water-use or elimination of run-off. We believe that plant material for 4:1 slopes should be selected based on local climate, geography and markets.

Furthermore, we recommend the elimination of prescriptive choices of irrigation methods and that the choice of plant materials in the landscape should be made by a landscape designer, as this would be the competent person to decide what the appropriate planting should be throughout all portions of the landscape.

Rationale:
Based on years of research, science and best management practice development, the best applicable science indicates that all plant material, including turfgrass, planted on 4:1 slopes in landscapes can be efficiently irrigated, with little to no increase in run-off.

Soil Erosion Control and Dust Stabilization
Turf protects nonrenewable soil resources from water and wind erosion. Turf's high shoot density and root mass stabilize surface soil, preventing erosion. Mowed turfgrasses are estimated to have shoot densities ranging from 75 million to greater than 20 billion shoots per hectare. During storms, turf's high biomass matrix provides resistance to lateral surface water flow, which slows otherwise potentially erosive water velocities. Quality turfgrass stands modify the overland process of water flow so that run-off is insignificant in all but the most intense rainfall events. Perennial turfgrasses offer one of the most cost-effective methods to control water and wind erosion of soil, reducing dust and mud problems around homes, schools, factories, and businesses. Turf can function as vegetative filter strips that greatly reduce the sediment transported into surface streams and rivers, especially when positioned down slope from cropland, mines, and animal production facilities. The reduction in sediment movement not only protects soil resources, but it also reduces sediment-linked nonpoint surface water pollution in rivers, lakes, and streams. (Beard, J.B. and R. L. Green. 1994. The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans. J. Environ. Qual. 23:452-460.)

Irrigation systems have been and continue to be successfully installed and properly maintained throughout the United States not only on 4:1 slopes (15 degree angle), but also on slopes (of turfgrass and other plant material) at steeper inclines. Any limits of turfgrass and/or plant material on slopes have no scientific or best practice foundation and should not be implemented as part of the final specification.

Suggested Change (or Language):
4.1.3 Slopes – When irrigated turfgrass is installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the irrigation system shall be designed, installed and programmed to match the soil infiltration rate and not create run-off.

Topic: 4.2 Irrigation Systems

Comment:
We believe in the value of a labeled WaterSense irrigation partner and feel that these new home specifications, in addition to promoting water use efficiency compared to conventional home should be a tool to expand the label's value. EPA has removed the WaterSense Partner as designer and installer from the original draft citing issues related to "cost" and "availability". The Irrigation Association and others have worked and continue to work toward expanding the number of WaterSense partners available to install and audit irrigation systems. However, we would like to see more expanded data regarding the claim that there is a significant difference in cost between a WaterSense® labeled and non-labeled irrigation professional especially when compared to best practice-approaches vs. human economic decision-making. We are happy to commit to working with the EPA in developing this data.

We recommend that the EPA should implement a requirement that all irrigation systems installed upon a WaterSense® labeled new home be designed, installed and audited by a WaterSense® labeled irrigation partner.

Rationale:
As a public-private partnership, the WaterSense® program's irrigation partner label continues to grow throughout the irrigation industry, thus increasing the amount of efficient irrigation education and best management practice implementation throughout the United States. We agree with the EPA in standing behind excellence in efficient irrigation and feels that an essential tool to ensure that the irrigation partner label enjoys a high brand value is through the promotion of the label through the WaterSense® specifications for new homes.

We support concept of the WaterSense® irrigation partner label. According to the EPA, "…all too often, landscape irrigation wastes water—up to 1.5 billion gallons every day across the country. WaterSense irrigation partners can help you reduce your water consumption, save money, and maintain a healthy and beautiful landscape..." The EPA continues by stating "…when every drop counts, we count on our partners...." An efficient irrigation system is multi-faceted; it needs high-level competence, best available technology and regular maintenance to ensure efficiency. We urge the EPA to stand behind the labeled partners, as they have done the labeled products, through the specifications for new homes.

Suggested Change (or Language):
4.2.10 Irrigation Partner Requirement – The WaterSense® program believes in the quality of work associated with the WaterSense® label. All irrigation systems shall be designed, installed inspected and audited by a WaterSense® labeled irrigation partner.

Topic: 4.2.1 Post-installation audit – All irrigation systems shall be audited by a WaterSense irrigation partner. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Comment:
Irrigation system audits are an important component of any water-use savings program.

Though calculating distribution uniformity (DU) does measure how well water is applied to a landscape; it does not calculate efficiency. We maintain that the WaterSense® program can be successful in significant water-use savings in new homes if a visual inspection is conducted on all installed irrigation systems and full audits conducted at random, with the irrigation system designer, installer and builder partner not knowing whether or not a full audit will be performed at the time of installation.

Rationale:
Variable conditions, including weather, play an important role when calculating DU. Weather in many areas often delays the test for days, sometimes weeks, until conditions allow a test to be performed. When there is a re-inspection/co-inspection required, this process may be delayed even further. If efficient products and services already included within the criteria, an assumption for high distribution uniformity exists. The goals of the *Water-Efficient Single-Family New Home Specification* will be achieved without having to calculate each irrigation system's DU. DU measures how evenly water is applied to an area, not the rate of application. Water savings will be achieved through proper irrigation scheduling.

We do believe in the use of proper audits and believes that "spot-checking" irrigation systems through a traditional audit protocol will allow the program to keep the high integrity it is striving to achieve without increasing costs and the likelihood of significant delays in the labeling process.

Suggested Change (or Language):
4.2.1 Post-installation audit – All irrigation systems shall be visually inspected by a WaterSense irrigation partner. All audits conducted on an installed irrigation system shall be conducted on a random basis and should be conducted by a WaterSense® partner who is not the installer of the irrigation system. The irrigation system designer, installer and the WaterSense® builder partner shall not be aware of whether or not a full audit protocol or a visual audit will be conducted on the system. A listing of irrigation partners by state can be found at www.epa.gov/watersense/pp/lists/irr_partners.htm.

Topic: 4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DU_{LQ}) of 70 percent or greater. Distribution uniformity will be measured during the post-installation audit.

Comment:
EPA can meet the goal of more than 20% water savings through a specification for the largest turf area to be a DU_{LQ} of .63 or greater.

Rationale:
The chart below, referenced from (http://www.ncwcd.org/ims/ims_info/SummaryEvaluationSprinklerSystems.pdf), represents the lower quarter distribution uniformity results from audits performed on residential sprinkler systems as well as large commercial type projects. Over 6800 audits are represented in this table with the average results shown.

Sprinkler System Performance

Residences		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	4500	**52**		1.4	.70-3.70	**58**		.70	.10-2.30
Utah USU	164	**52**	18-80	1.57	.50-3.20	**49**	15-86	.76	.20-1.70
Colorado	973	**53**	20-89	1.34	.22-4.06	**54**	19-92	.62	.12-1.60
Oregon	398	**55***				**54***			
Florida MIL	576	**54**	11-89						
U of FL Case Study	19	**40**				**48**			
California Case study	19	**41**	16-54	1.61	.66-2.97				
Commercial		**Fixed Spray**				**Rotors**			
Location	# of Audits	Avg. DU_{LQ}%	Range %	Avg. PR (in/hr)	Range (in/hr)	Avg. DU_{LQ} %	Range %	Avg. PR (in/hr)	Range (in/hr)
Utah	166	**55**	7-82	1.49	.26-3.10	**55**	8-84	.74	.13-2.46
Colorado	20	**52**	6-77	1.36	.60-2.12	**50**	3-88	.60	.10-1.12
Arizona	7					**41**	20-56	.76	.57-.92
Texas	6					**58**	27-79		

* reflects the lower-third distribution uniformity information of 61 and 60 reduced by 6 points (weighted average)

According to the data used in the table above, the weighted average DU_{LQ} for residential sprinkler systems is .524 and this is for the visually best performing sprinkler zones when the auditor selected a zone to do a catch can test. Case studies from Florida and California shows even lower DU but these audits were for the entire turf area, not the visually best sprinkler zones.

Using the EPA WaterSense® goal to decrease water use by 20%, the DU_{LQ} of .524 x.20 = .105. The proposed value for sprinkler uniformity would be .629 rounded to .63. This will represent a significant improvement because of the challenges of achieving high uniformity on small, curvilinear turf areas that will be typical in the proposed specification. The audit of the sprinkler system should be on the largest turf area and the DU_{LQ} calculated for that area.

Suggested Change (or Language):
4.2.4 Distribution uniformity – Irrigation systems shall achieve a lower quarter distribution uniformity (DU_{LQ}) of .63 or greater. When an audit is performed, distribution uniformity will be measured on the largest turf area during the post-installation audit.

Topic: 4.2.5 Rainfall shutoff device – Irrigation systems shall be equipped with technology that inhibits or interrupts operation of the irrigation system during periods of rainfall (e.g., rain sensors).

Comment:
We support the inclusion of rainfall shutoff technologies.

Rationale:
N/A

Suggested Change (or Language):
N/A

Topic: 4.2.6 Irrigation controllers

Comment:
We support the inclusion of "smart controllers" in installed irrigation systems.

Rationale:
Smart controllers are an integral part of any efficient irrigation system.

Overall water usage in a landscape can be reduced with proper installation and programming of a smart controller.

Suggested Change (or Language):
4.2.6 Irrigation controllers –Irrigation systems shall be equipped with irrigation smart control technology.

Topic: 4.2.7 Sprinkler irrigation – Sprinkler irrigation, other than as components of a microirrigation system, shall not be used to water plantings other than maintained turfgrass. Sprinkler heads shall have a 4-inch or greater popup height and matched precipitation nozzles.

Comment:
There are many variables that are taken into consideration when determining the best and most efficient way to irrigate plant material in a landscape. Climate, geography, location in the landscape, etc., all play major roles and the responsibility should be placed the irrigation designer to determine the best type of irrigation for each portion of the landscape.

Rationale:
Certified irrigation professionals should have the flexibility to make the correct determination for each individual site and location.

Suggested Change (or Language):
Sprinkler and microirrigation installed in turfgrass and other plant material shall not result in overspray onto sidewalks, curbs, and roadways and shall be programmed to not create run-off.

Topic: Water Meters

Comment:
Any voluntary water-use savings program should include the use of water meters.

Rationale:
Water meters are not required in all areas throughout the United States. The program should also promote using water wisely, which includes accurately knowing how much water has been used.

Water management is simply not possible without water measurement.

Suggested Change (or Language):
Water Meters for Irrigation Systems – The WaterSense® labeled new home shall include the installation of a separate, dedicated water meter, sub-meter or flow sensor that meets applicable local standards or otherwise measures water use in billing units used by the local utility. In the event such use is not monitored by the local utility, measurement units in either gallons or cubic feet are acceptable.

Topic: Soils

Comment:
A key component to landscape design and water-use efficiency in a landscape is appropriate soil preparation. Neglecting its inclusion in the final specification is equitable to neglecting the key component to ensuring the landscape can thrive in a water efficient manner.

Rationale:
Soil is the reservoir that both stores and delivers water and nutrients to plants as well as the support structure for root development. Many of the reactionary proposals set forth in these specifications (including but not limited to 40% turfgrass restriction, 4:1 turfgrass slope restriction, etc.) would not be needed if performance criteria were put forward and the proper soil preparation were included in the specification.

Suggested Change (or Language):
Soils – During the construction process, the WaterSense ® builder partner shall minimize site disturbance to preserve existing topsoil. The property's landscapable area shall receive appropriate soil preparation according to locally accepted best practices including soil amendments and tillage requirements to create an acceptable planting medium for all plant material, including shrubs, turfgrass, flowers and trees. Conformity to soil preparation requirements shall be verified by a WaterSense® program inspector, referencing the criteria set forth by the WaterSense® *Water-Efficient Single-Family New Home Specification* guidelines and inspection checklist.

Topic: The Use of the Words "If Installed"

Comment:
Throughout the draft specifications, the words "if installed" are associated to the installation of irrigation systems. The words "if installed" should be removed from the specification.

Rationale:
Irrigation systems are the only equipment referenced in the specification that is singled out by stating "if installed."

Suggested Change (or Language):
Remove "if installed" and replace with language referencing "installed irrigation systems."

Topic: Definition of Landscapable Area

Comment:
The definition in the revised draft, though favorable to the landscape community, is confusing as it is not a widely-used definition. The specification should revert to the original definition as stated in the original draft specification. Due to the changes this will cause within the outdoor criteria, we urge the EPA to accept the recommended changes throughout this document, in addition to the recommended definition change.

Rationale:
The definition of "landscapable area" as the building lot area not under the roof is not based on science nor is it the market accepted definition of "landscapable area.

Suggested Change (or Language):
Landscapable Area: The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Topic: Water Budget Calculator – Peak Watering Month

Comment:
When performing steps 1B and 2A, it should be more clearly stated to use the same peak month data in each area. Also, it should state that the peak watering month in each section should be the same month to avoid any confusion that may occur.

Rationale:
The data entered into the calculator may be misapplied, thus providing incorrect data at the outset.

Suggested Change (or Language):
Explicitly state, in detail, that the peak watering month data should be used in each step and that the same month's data needs to be used to determine the LWA and LWR.

Topic: Water Budget Calculator – Run Time Multiplier (RTM)

Comment:
Run Time Multiplier should be defined as 1/[.4 + (0.6 x DULQ)].

Rationale:
The method for determining Run Time Multiplier (RTM) is stated incorrectly in the Water Budget Tool as $1/DU_{LQ}$. The correct method would be to use the equation as defined in the document Landscape Irrigation Scheduling and Water Management (IA 2005), which is 1 / .4 + (.6 x DU_{LQ}).

Suggested Change (or Language):
Run time multiplier (RTM) – 1/[.4 + (0.6 x DULQ)] (Landscape Irrigation Scheduling and Water Management IA 2005).

Topic: Water Budget Calculator – Distribution Uniformity (DU)

Comment:
The distribution uniformity for the new home specification should be .63 and should likewise be used in the water budget calculator so that the water budget tool reflects the performance standard for the irrigation system.

Rationale:
Distribution uniformity for the water budget calculator should match the specification for acceptable DU. Currently the calculator uses .65 but the specification calls for .70.

Suggested Change (or Language):
Change DU_{LQ} from .65 to .63, as recommended by the Irrigation Association.

Topic: Irrigation Audit Guidelines – Data

Comment:
The WaterSense® irrigation audit guidelines should reflect the changes recommended as part of the WaterSense® Specifications for New Homes.

Rationale:
There are many suggestions we have put forth that have bearing on the specifics of the irrigation audit guidelines. In order for there to be uniformity throughout the specifications, the EPA should reflect the changes in the guidelines as well as the specifications.

Suggested Change (or Language):
Incorporate the recommended changes in the audit guidelines as well as the Specifications for New Homes.

Topic: Irrigation Audit Guidelines

Comment:
The Irrigation Association has developed a set of minimum guidelines to create a standardized procedure to perform an audit of a landscape irrigation system. These guidelines were published in May 2009 and ASABE standards have been reviewed and incorporated wherever possible. Consultation and review of the guidelines has been conducted with many irrigation auditors, contractors, statisticians, educators, irrigation consultants and the Irrigation Association Certification Board. We urge the EPA to take the following changes into consideration for those irrigation systems that will be audited as part of the labeling process.

Rationale:
The guidelines were developed by the Irrigation Association and are intended to function as recommendations in the auditing of landscape irrigation systems. They have been designed to aid irrigation professionals in fieldwork procedures, techniques and performance calculations.

Recommendations and projections from the guidelines and their accuracy depend upon the quality of measurements and data provided by the individual user. It should be pointed out, the Irrigation Association makes no warranty, implied or expressed, as to the results obtained from these proposed procedures.

Suggested Change (or Language):
Implement the Irrigation Association recommended guidelines for an irrigation system audit, which can be found at http://www.irrigation.org/certification/pdf/AuditGuidelines_FINAL.pdf

Appendix B
Additional Comments on the Outdoor Criteria Submitted by Many Commenters

Topic: 4.1.1 Landscape Design

Comment: No exemption provided for irrigation systems using untreated surface water, graywater, harvested rainwater or other alternative sources of water meeting local standards.

Rationale: Encourage the use of non-potable alternative water.

Suggested Change (or Language): Add a third option 4.1.1.3 Option 3 Irrigation system shall use non-potable water supply and all restrictions to landscape design shall be removed.

Topic: 4.1.1.2 Option 2 Water Budget Tool

Comment: Part 1 of the Worksheet- ETAF- The definition described in attachments to the May 8th Sheila Frace cover letter are not included in the tool.

Rationale: Part 1- Very few users will understand that this.

Suggested Change (or Language): 1. Part 1 Add definition somewhere in tool.

Topic: 4.1.1.2 Option 2 Water Budget Tool

Comment: Definition of ETAF designated by ETA as .70 (70%)

Rationale: Where is the justification or scientific evidence for this number? Can documentation be provided showing that this adjustment factor will sustain the landscape in all geographical areas over an extended period of time? Any evapotranspiration adjustment factor that is implemented as a "one-size-fits-all" ETAF less than 80% is not based on the best available science and is not supported by any of the best management practices or applicable educational resources. Implementing 80% ETAF will meet and surpass the goals set forth by the WaterSense® program of 20% water-use savings.

Suggested Change (or Language): – Landscape design shall be developed using the water budget tool based on an 80 % evapotranspiration adjustment factor.

Topic: 4.1.1.2 Option 2 Water Budget Tool

Comment: Step1B no resource for local ET_O

Rationale: Without a clear way to get this info- users will guess.

Suggested Change (or Language): Add link to ET_O tables.

Topic: 4.1.1.2 Option 2 Water Budget Tool

Comment: Step 2A. Link does not work

Suggested Change (or Language): Repair Link.

Topic: 4.1.2 Turfgrass

Comment: Why should this specification dictate a landscape design feature? We urge the EPA to employ performance-based criteria, rather than the prescriptive approach currently taken in the draft, to determine irrigation efficiency in these areas.

Rationale: If the system complies with 4.2.3, and meets the requirements of 4.1.1.1 or 4.1.1.2 then what difference does it make?

Suggested Change (or Language): Strike 4.1.2 entirely.

Topic: 4.1.3 Slopes

Comment: Why should this section also dictate a landscape design feature? We do not believe that this specification should not dictate plant material choices nor how to maintain them.

Rationale: If the system complies with 4.2.3, and meets the requirements of 4.1.1.1 or 4.1.1.2 then what difference does it make? Let the technology of irrigation manufacturers and the skill of irrigation designers address the condition instead of restrictive specifications.

Suggested Change (or Language): Strike 4.1.2 entirely.

Topic: Definition of Turfgrass

Comment: At least six references are made to "Turfgrass" within the paragraphs of this specification but no definition of "Turfgrass" is included. Turfgrass is a collective term for a large collection of varieties and blends of grasses. There is no one universal "turfgrass" suitable to all regions of the United States, nor is there a universal water requirement.

Topic: 4.2.1 Post Installation Audit

Comment: Specifies that audit performed by WaterSense irrigation partner without requiring that they be certified as an auditor**.**

Rationale: The irrigation system could be inspected by someone who is not qualified.

Suggested Change (or Language): ….shall be audited by a *qualified* WaterSense irrigation partner *who is certified to conduct residential audits.*

Topic: 4.2.1 Post installation audit

Comment: No reference made here to Inspection Guidelines.

Rationale: Audits would not be consistent.

Suggested Change (or Language): shall be audited, using *EPA published Guidelines for inspecting WaterSense water efficient single family homes*, by a qualified WaterSense irrigation partner who is certified to conduct residential audits.

Topic: 4.2.4 Distribution Uniformity

Comment: No explanation is given for selecting a DU_{LQ} of 70% or greater. This is arbitrary, restrictive and may not be achievable in some landscape designs without being economically prohibitive.

Rationale: Reduce this number to 63% as recommended by the Irrigation Association referencing a study of approximately 6800 audits.

Suggested Change (or Language): Change to DU_{LQ} of 63% or greater.

Topic: 4.2.6 Irrigation Controllers

Comment: no requirement to use WaterSense listed devices.

Rationale: If indoor plumbing fixtures and controls are required to be EPA WaterSense listed then why not outdoor?

Suggested Change (or Language): All irrigation controllers installed shall be EPA WaterSense labeled.

Topic: 4.2.6 Irrigation Controllers

Comment: controllers could prevent catastrophic water loss if they were required to include flow measurement capabilities. With the minimum ability of reacting to a programmable high flow limit, initiating a signal to close a mainline master valve and signaling the operator, the controller could protect the homeowner from system breaks and valve malfunctions.

Rationale: a cracked riser, leaking at a rate of 10 gpm over a 36 week irrigation season could lose over 21,000 gallons.

Suggested Change (or Language): add another line item to controller features:
Capable of connecting to flow sensor and master valve and reacting to a programmable high flow setting that would initiate actions to advance to the next zone valve in sequence and/or activate a mainline master shutoff valve.

Topic: 4.2.7 Sprinkler Irrigation

Comment: Why the statement about a minimum pop-up height? Again why dictate design?

Rationale: Depending on turfgrass variety, blend etc, geographic location and season of the year, turf is maintained at different heights of cut. Since lifting the spray pattern higher into the air contributes to more rapid evaporation and more pattern distortion why not allow for the lowest pop-up height that is practical. Let the system designer pick the best equipment.

Suggested Change (or Language): Strike the last sentence.

Topic: 4.2.7 Sprinkler Irrigation

Comment: Why is this design requirement in here at all? With the performance specs of 4.2.3, 4.2.4, etc why are you dictating what equipment shall be used**?**

Rationale: Let professional designers, correctly using available technology design the irrigation system.

Suggested Change (or Language): Strike all 4.2.7

Topic: General

Comment: Why is there no requirement for the irrigation system designer or installer to be a WaterSense irrigation partner? Isn't this an important program? What incentive is there for designers or installers to become WaterSense partners if the EPA does require it in their own specification?

Rationale: If a goal of the EPA WaterSense program is to increase awareness and proficiency in water conservation of irrigation designers and installers then they should promote the program in their own specifications.

Suggested Change (or Language): Require that all designers and installers are WaterSense partners (qualified in the appropriate category). Also stipulate that no person/ entity can audit its own irrigation system installation.

Appendix C
Additional Comments on the Outdoor Criteria

Topic: Outdoor Water Efficiency Criteria 4.0

Comment: The draft specification's limitation on turfgrass is arbitrary, not supported by science and may undermine the goals of the Water Sense program. Our concerns are specific to the 40 percent turfgrass limitation, the ban on turfgrass for steep slopes and the single, nationwide .7 evapotranspiration factor for calculating the water budget.

Rationale: The one-size-fits-all home specification imposes a 40 percent turfgrass limitation on landscapable areas of new home sites whether that home site is located in the arid, desert southwest or in cooler, damp climates such as Duluth, Minnesota, Seattle, Washington or Portland, Maine. Under the proposed criteria, a homebuilder constructing a house in Phoenix could plant cool season Kentucky Bluegrass on 40 percent of the property-a scenario that would require non-stop irrigation--and qualify that house for the Water Sense label. Conversely, a homebuilder in Northeast Michigan could mulch and hardscape the entire landscapable area and also qualify for the label. We believe that these are outcomes that should be avoided. There are many other scenarios that we could provide that would fit the Water Sense criteria, yet be environmentally unsound as well as undesirable to the consumer.

The proposed restrictions assign a negative environmental value to turfgrass and suggest that a yard covered in turf is somehow less preferable or less eco-friendly than other landscape choices. On the contrary, studies show, in compelling fashion, the myriad environmental benefits of turfgrass. Consider, for example, the cooling benefits of turfgrass. In some instances, ground level temperatures of grass-covered land areas are 30 to 40 degrees cooler than bare soil. They are also 50 to 70 degrees cooler than hardscaped (asphalt or concrete) areas[1]. Reducing turfgrass only contributes to the "heat island" effect that plagues urban areas across our nation. In addition to its cooling properties, managed turfgrass plays a positive role in our efforts to confront climate change. A well maintained, growing lawn that is fed by nutrients from grass clippings sequesters carbon from the atmosphere and helps to minimize the property's carbon footprint[2]. Reducing the turf area and replacing it with mulch or hardscape makes an active carbon "sink" inactive, and it may actually increase the carbon released back into the atmosphere by exposing soils or using non-growing, decaying materials such as mulch. These alternative methods have great aesthetic value and help control water run-off and use, but they do not contribute to the reduction of greenhouse gas emissions, a major environmental concern today. Finally, the benefits of turfgrass in regard to soil erosion are also well documented. According to the University of Minnesota[3], storm water runoff due to increased impervious surfaces has reduced the quality of runoff water that ends up over-burdening our storm sewer systems and ultimately pollutes our lakes, streams, and rivers. However, research shows that a healthy, well-managed lawn, with dense turfgrass, has near zero storm water runoff.

These erosion and stormwater control benefits that turfgrass delivers makes the steep slope ban on turfgrass in the specification perplexing. Under the draft specification, plants other than turfgrass can be planted on steep slopes. Turfgrass, because of its fibrous root system, is better than other plant in controlling erosion, a key factor in choosing a ground cover for slopes. Turfgrasses are used on most roadside slopes because turfgrasses are the best species at controlling erosion. And in the case of roadsides, turfgrass is effective on slopes, when using an adapted species and cultivar, without requiring supplemental irrigation. The same came be said for turfgrass on slopes within a landscape.

Our final concern regards the single, nationwide ET factor for calculating a water budget. We believe strongly that builders seeking the Water Sense label will avoid the complexities of a water budget and related calculations and simply opt to limit turf. Furthermore, designating a single ET rate ignores the regional climatic variations and average rainfall levels in different regions of the country.

In addition, the new draft specs require that the user of the water budget tool, to determine monthly ETo, access the International Water Management Institute World Water and Climate Atlas. To utilize the tool, the user is required to input exact latitude and longitude, after which an estimate of monthly ETo is provided. This is interesting as the scientists that met with EPA on Feb. 10th discussed the lack of ETo data available nationwide. Therefore, it is highly questionable how useful this tool really is in providing accurate ETo, as well as if most people will go through the trouble of identifying their longitude and latitude. We feel most builders will opt for the 40% turf limit because this is easiest. This brings us full circle back to the many concerns listed above.

In summary, there is no research supporting any of the tenets of the Section 4.0. Turfgrass can be maintained with limited or no supplemental irrigation in many regions of the U.S, but this fact seems to get lost in the shuffle when the only concern is water savings on the outside portion of the home. As the scientists told you back on Feb. 10th, using the latest in irrigation technology, with smart controllers and efficient systems, will easily result in 20% (or more) water savings, without having to limit builders and consumers in their desire to plant turfgrass. The scientists also recommended that the outdoor requirements be instituted in phases, as more regional information on ETo is available. We think the turf limitation will have serious consequences on the success of Water Sense and its adoption. We want to see Water Sense succeed, but we also know that many people want to plant, cultivate and enjoy turfgrass at their homes. We feel the current draft of the outdoor portion of the new homes specs will not satisfy this desire and will ultimately lead to the demise of the Water Sense new homes program.

[1] The Lawn Institute; How The Environment Benefits From a Well-Maintained Lawn; http://www.turfgrasssod.org/lawninstitute/environmental_benefits.htm
[2] Dr. Ranajit (Ron) Sahu; *Technical Assessment of the Carbon Sequestration Potential of Managed Turfgrass in the United States; www.opei.org/carbonreport/*
[3] University of Minnesota; Sustainable Urban Landscape Information Series; Environmental Benefits of a Healthy, Sustainable Lawn. http://www.sustland.umn.edu/maint/benefits.htm.

Suggested Change (or Language): We respectfully request that EPA set aside the Outdoor Water Efficiency Criteria at this time. Based on reaction at the public hearings and the webinar the Agency hosted, the outdoor criteria has raised many concerns about the negative impacts these criteria will have on the environment and suppliers that serve the homebuilding industry. Setting aside the Outdoor component will allow time for a stakeholder process to forge outdoor water efficiency solutions that actually reduce water consumption and do not result in unintended consequences.