



Comments on the October 2011 Notification of Intent  
to Modify the WaterSense Final Specification for Single  
Family New Homes

April 16, 2012

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**Commenter:** Mark Taratoot  
**Affiliation:** Corvallis Public Works  
**Comment Date:** October 25, 2011

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Hello,

I feel strongly that there should be a limit on the amount of turfgrass allowed for WaterSense labeled new homes.

I also think that there should be a requirement that some kind of water budget be used in planning and in operating irrigation systems. This is, however, a completely different requirement than a limit on the amount of turfgrass in a landscape. A turfgrass landscape is inherently not water-efficient; other options are available. WaterSense should be a driver towards increased water efficiency. WaterSense, like EnergyStar, generally strives for 20% improvement over current technology or code. This suggests that a reasonable limit on turfgrass in a WaterSense landscape be no more than 80% of the amount of turfgrass in a "standard" landscape. Assuming that driveways and sidewalks take up part of the landscape, perhaps the limit of 40% turfgrass should remain as-is.

Thank you for your consideration.

-m

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**Commenter:** Thomas Reynolds  
**Affiliation:** Water Balance  
**Comment Date:** October 25, 2011

**Water Balance<sup>ES</sup>**

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October 25, 2011

EPA WaterSense

RE: Comments from WaterSense Partner to NOI Changes to WaterSense New Home Specification

**Forward**

**I am pleased to contribute further to your efforts to incentivize builders to build homes which are, by design, potentially efficiently managed real estate properties. The fact remains, a great system that is mismanaged is not worthy of any label of value. As I have argued, the plans should include incremental (as landscape matures) water budgets, plain and simple exemplifying system capacity during peak use period and at expected system irrigation efficiency, including management.**

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Your NOI:

WaterSense believes that most of the criteria for a WaterSense labeled new home can be applied to a majority of low-rise multi-family buildings and is considering modification of the scope as stated in Section 1.0 to allow for multi-family buildings three stories or less and multi-family buildings of four or five stories under certain circumstances.

**Comment:**

**There are significant distinctions between multi-family electric and multi-family water. If that's the basis,**

- 1. Water metering is usually different; it becomes feasible for exterior use.**
- 2. Homeowner can prefer to maintain the front yard, allowing neglect of the rear.**
- 3. Who manages the system is different; proud renter does not regulate irrigation.**

**If Team WaterSense could delve into how the system is managed, we all could respond with more certainty. There seems to be a patent aversion to the complexities of soils, expanding rootzones, water, micro-climates, best practices, and economics that unsettles some; lipstick on a pig?**

**If WaterSense does this, I can't imagine why you don't include industrial and commercial facilities. As a designer, I design a system with a specific owner-operator in mind. I will have to consider this further, but for now this may have low, medium, or doubtful merit.**

+++++

#### **IV. Section 4.1.1: Landscape Design**

The final specification for single family new homes includes two options for complying with the landscape design criteria:

*Option 1 – Design of the landscaped area shall be developed using the WaterSense Water Budget Tool...*

*Option 2 – Turfgrass shall not exceed 40 percent of the landscaped area.*

Of these two options, the Water Budget Tool (option 1) is recognized as the preferred option as it takes ... that, as use of the Water Budget Tool became more widespread, the program would revisit the on-going need for the option in future versions of the specification.

Since the release of the final specification....WaterSense believes that it is appropriate to remove Option 2 from the specification. Homes receiving the WaterSense label would therefore be required to use the Water Budget Tool in order to comply with the landscape design criteria.

#### **Comment:**

**I concur, but still hold definite disagreement that once labeled, benefits are automatic, like dual-pane windows. At least for those that register the anachronism, there should be a disclaimer that “a WaterSense labeled new home can never achieve any water sense if mismanaged by the owners. Regular inspections by qualified individuals, to fine-tune plant nutrition, system performance, input application scheduling, and landscape quality and health will be essential.”**

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#### **V. Section 4.2.7: Irrigation Controllers**

Section 4.2.7 of the new homes specification currently requires irrigation controllers that meet a list of criteria:

*1. Multiple programming capabilities – shall be capable of storing a minimum of three different programs to allow for separate schedules.*

*2. Multiple ... shall be capable of varying run times, for example one minute to a minimum of one hour.*

*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.*
- 5. ... moisture and/or rain sensors.*
- 7. Non-volatile memory or self-charging battery circuit.*
- 8. Complete shutoff capability for total cessation of outdoor irrigation.*

WaterSense will release a final [Specification for Weather-Based Irrigation Controllers](#) by the end of 2011. Once WaterSense labeled weather based irrigation controllers are available, labeled products will be a quick and easy way ... controllers.

**Comment:**

Humbly, “quick and easy” does not belong here. The Weather-based Test Protocol is already using the error-prone model (albeit a reference station) to evaluate the error-prone model (often low-Q/A data embedded in the controller). Seems nobody advised those involved that we are attempting to trim-back or ramp-up in 2%, 3%, 6% increments, which is never been proven possible when the reference comes from miles away, without ground-truthing corrections.

I hope the EPA will step up to the plate and take the results from the Irrigation Association, use them wisely by establishing 10 or so 3-acre sites across the US whereat the IA-vetted weather based controllers are evaluated in replicated plots for accuracy, using soil water measurement techniques. Put some people to work addressing the rest of the question, the “trimming back to deficit with statistical certainty” challenge, honoring GIGO.

+++++

**Scope & Objective**

- Are there additional uses of water in low-rise multi-family buildings that should be considered?  
.... in section 3.6 regarding shower compartment size and the use of multiple showerheads clear?

**Landscape Design**

- Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?
- Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?
- Is a simple option similar to Option 2 still required? If so, what should it be?
- What parties are typically responsible for landscape design for multi-family buildings? What are the standard practices?

**Irrigation Controllers**

- Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?

**Landscape Design Comments:**

I think your considerations are solid, and the single option can be used. I retested the model and checked a number of the assumptions. The application rates (inches) per day seem reasonable. Some might be interested to see those underlying allotments by zip code and plant type.

The results looked liberal, if anything, to me. It appears you sought expert advice.

However, I found that the calculation of water consumption by a pool/spa/water feature was in rather gross error. The result indicated my pool would demand over 6" per day. Was there a technical paper in the factors and algorithms. The Florida work didn't reduce it, did they?

I found the WBT sufficiently friendly. If we can move to thinking in terms of inches of water, that would be great.

As mentioned, the parties are so different between a single-family home and a multi-family. Not as much at the design level, as at the accountability level. When a family residence is built with the same efficiency elements as the golf course or the industrial park, seems like we all win. I have no problem thinking this way, but other designers should be queried. I just know that the tree has no clue it sits at a home or a park, and that's what pre-occupies me.

**Irrigation Controller Comments:**

Not sure what you mean by the question, "Other products?"

I believe labeling the ET-based controller will disadvantage soil moisture Smart Water Application Technologies.

**Other remarks:**

Seems the stark distinction between turf and woody plants and trees is absent from the radar. Likewise, rooting habits under sprinkler irrigation versus drip irrigation is problematic.

Just how's all the turf and sprinklers doing at all those sites using the existing tax-payer funded weather stations since 1980? What are the subscription rates and at (or with) what results?

I believe ET-based control on turf should have been made law 20 years ago, given the costs to society, and all it would have taken was a visit from a Certified Professional.

Expanding, constrained, genetically variable trees and shrubs under drip are not likely so easy to manage with weather-based only approaches. Fortunately ground-truthing

**resolves the base schedule from historical ET (from university weather networks), ..in all landscape biomass materials. Turning a base hit into a home run.**



**Commenter:** Wayne Thorson  
**Affiliation:** The Grassroots Program  
**Comment Date:** October 26, 2011

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The final specifications pick on turfgrass as a major water user. That is true of most turfgrass species but not all. As stated in the report most turfgrass takes water but putting all turfgrass in that category is unfair. It is like saying cars are bad and should be banned because they are gas hogs. A Hummer is, but a hybrid isn't. Likewise, Bluegrass, fescues and St Augustine are use large amounts of water while Bermuda and Zoysia will reduce that water usage by 30 to 40%. I applaud the spec's for pointing that out, but I wish they would make note of the only species that is native to the US and reduces water use and mowing up to 70-80%, Buffalograss. Buffalograss has been growing in this country for millions of years and has survived on its own during that time. Man plowing the buffalograss ranges during the 20's and 30's has been linked directly to the dust storms in the 30's during the worst drought in American history. Where buffalograss flourished, no other plant would grow leaving the ground barren and subject to the wind. Today, natural breeding has turned a pasture grass into an environmental friendly turfgrass. Turfgrass has too many positives to be taken away from our landscapes. And everyone needs some common sense. It is crazy to grow bluegrass, fescue or St Augustine a desert.

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**Commenter:** Chris Dundon  
**Affiliation:** Contra Costa Water District  
**Comment Date:** October 27, 2011

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I recently read the NOI to revise the new development requirements. I applaud the EPA for standing up against the Turf industry. No matter how you slice it, turfgrass uses more water than most other landscape plants and it represents a large part of our annual use. When it is not functional, there is really no use for it. It is a remnant with the past and we need to move on. I wish the specification simply stated 0% turfgrass unless proven to be "Functional" and then up it to 40%. However, the budget approach seems to work, but I would tighten it up over time. Thanks

Chris Dundon, Water Conservation Supervisor, Contra Costa Water District

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**Commenter:** Cado Daily

**Affiliation:** University of Arizona Cochise County Cooperative Extension

**Comment Date:** October 28, 2011

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Greetings,

First, thank you for developing and fine tuning the WaterSense Homes specifications. I have a comment on Section 4.2.7 Irrigation controllers, criteria 5: Water Budget feature: Although in concept the idea of conserving water by easily reducing irrigation run times sounds good, in fact it is the wrong way to manage plant watering.

To develop good, deep root systems that are below hot, dry soil surfaces, we recommend that each watering be of a long enough duration to reach the root zone depth: 1 foot for small plants, 2 feet for shrubs and 3 feet for trees AT EACH WATERING. Once the irrigator knows how long (duration) to irrigate for the water to reach the prescribed depth, the duration of the watering schedule should not vary. What should vary is the frequency.

The water budget feature retains the same the frequency but reduces the run time. This reduces the amount of water the plant gets per watering which results in the water not reaching down to the root zone depth. This can result in shallow root systems that need more frequent watering and are poorly rooted, unable to withstand blow-overs.

Water Budgets on irrigation controllers are an unintentional deceptive conservation strategy.

Thank you,

Cado

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**Commenter:** Jeff Smith  
**Affiliation:** Storr Tractor Company  
**Comment Date:** November 22, 2011

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I would like to comment on the question:

Would requiring WaterSense Labeled weather based irrigation controllers unintentionally exclude certain products?

I support the use of WaterSense labeled weather based irrigation controllers as a requirement in the single (and multi-) family new home specification. I do not believe that this requirement will exclude any products from having an opportunity to be used in an irrigation system installed in a WaterSense-labeled new home landscape. I think that this requirement will encourage more manufacturers to implement the use of the most current weather based technology within their product lines in order to achieve the WaterSense label requirements. This can only serve to increase the effectiveness of our overall industry's water conservation goals.

I hope that any future irrigation product label would be required in the single-(multi-) family new home specification.

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**Commenter:** Greg Chick

**Affiliation:** Certified Green Plumbers Trainer

**Comment Date:** November 22, 2011

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Sec. 3.6 Shower heads are available everywhere, as are all other building materials.

Sec 4. I suggest Alternate Water sources be required for larger Turf areas. Rain is easily enough stored for the use even in 10" per yr rainfall the whole roof area of a large house that might want large turf could be proportionate. Gray Water is also an option. The budget minded people should not have disproportionate amount of expensive turf to maintain water. If a 5,000 sq. ft. house wants 5,000 sq. ft. lawn it can use 5,000 sq ft. roof to capture 3,000 gal of rain per inch of rain. Rain Water makes for a better lawn anyway. Why not make a req. of 51% of turf water needs to be alt. Water? if over 500 sq. ft. If that is a problem then use a smaller turf area, or move to area where lawn grows.

Sec. 3.2 I suggest Water Distribution piping be designed by qualified personnel. Pressure Gauges be required where multiple Pressure Zones exist. (more than 20' head). Also, water pressure be limited to 80 psi Max for outdoor Water systems, since that is the recommendation already using BMP. Higher pressures can lead to surges, blow-outs, noise, energy loss due to friction, misting and waste of spray water.

Sec. 3.3 The Hot Water Line needs to be Circulated, or the amount of .5 is unachievable, and a meaningless number.

Please ask if any doubt exists as to the relevance or accuracy of my comments.  
It is an honor to serve this cause, thank you for your part.

Greg Chick, Certified Green Plumbers Trainer  
[greg@ramonasplumber.com](mailto:greg@ramonasplumber.com)



**Commenter:** Chris Pine  
**Affiliation:** C.Pine Associates, Inc.  
**Comment Date:** November 23, 2011

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I support the changes to the WaterSense program proposed on 10/25.

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**Commenter:** James Weil  
**Affiliation:** EPA WaterSense Partner  
**Comment Date:** November 29, 2011

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In the design of the initial law, I believe a basic consideration was somehow missed. That consider is that it is not as important as to what is planted and how much as compared to how much water is used to keep it alive. It is my belief that be it single family dwelling or multifamily dwellings, that an irrigation water allocation makes more sense that trying to control what is planted. Such an irrigation quote could be based on long term weather conditions, ET, total landscape area, and available water in the community.

If a site used all the current methods for water management, such as rain switches, smart controller, moisture sensors, and the site was properly designed for proper precipitation rate, and DU, it my very well use less water with more turf than a site with leaks, poor DU, water running on the sidewalks or into the street, and a "dumb" controller but having no turf. This is why having a water budget makes more sense that dictating what or how much is planted.

For single family homes a water budget could be constructed based on number of occupants, and potential landscaped area, leaving the homeowner to deal with the best method of allocating their water budget to their needs.

For multifamily dwellings, separate meters or sub meters for irrigation should be mandatory with the potential landscaped area having a water budget. That way it would be up to the owner to decide on using hardscape, vs, landscape, vs, turf. I see nothing wrong with a property owner having 100% turf providing they can keep within their water budget.

Given climatic and seasonal conditions, any water budget should be based on a yearly quota as opposed to a monthly quote.

So how is this enforced?

I am of the opinion that "water police" but that tiered pricing could become an excellent control and percentages could be set into the law.

- Tier 1: up to the water budget - basic rate
- Tier 2: up to 10% over the water budget - 2X basic rate
- Tier 3: 10%-50% over the water budget - 4X basic rate
- Tier 4 - Over 50% of the water budget - 8X basic rate or more.

I suspect that such a rate structure would lead to owner corporation rather quickly.

Additionally encouraging water districts to offer year end rebates in the forms of some credits towards the following years statements show the user maintain their water usage significantly under budget, thus rewarding those who save.

In an ideal world, any irrigation design work should be done by a certification landscape designer or contractor. However from a practical standpoint for a small area or retrofit, this may be bypass due to increased costs. Forcing the dwelling owner to adhere to a water budget somewhat to completely eliminates this written requirement as unless the dwelling has practical experience in this area, they are likely to do this anyway in order to stay within their water budget.

Besides, the ultimate purpose of water conservation is to conserve water, not to make more jobs for the landscaping industry. If the desire is to make jobs for the landscaping industry, then it should not be done under the guise of water conservation. Without jobs, life is tough. Without palatable water, the planet dies.

Regards,

James Weil, CLIA

EPA Watersense Partner

IEEE Life Member



**Commenter:** Mark Petersen  
**Affiliation:** Water Ketch Sprinkler  
**Comment Date:** December 1, 2011

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Hello,

Although I am a member of the Irrigation Association, I do not agree with their stance on removing the proposed turfgrass restrictions. I have been in the sprinkler repair and installation business for 30 years. ***I agree with restricting turfgrass in all facilities.*** The ridiculous over use of turf on nearly every landscape that I see is astounding. I have been very successful in encouraging many commercial and residential clients in reducing the size of their turf area. Turf reduction on existing sites is a current goal of the Denver Water Department Conservation Program, which I support.

The vast majority of landscape professionals that I have talked with are asleep, and have no genuine interest in saving water whatsoever. Large numbers of business owners are simply attempting to stick to the same formulas they have been using for years. There is an overwhelming lack of creativity, a complete disregard for the environment, and total disregard for how the current assault on our resources can be sustained. Self regulation is no regulation at all.

**Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?**

The irrigation industry has leaned toward weather based control not because it is the superior method, but because it is easy to sell and sounds great. Emphasis on weather based methodology completely ignores time tested root zone sensor technology.

Thank you,  
mark petersen  
Water Ketch Sprinkler  
303-660-8360

**Commenter:** Dan Stever  
**Affiliation:** Klausing Group, Inc.  
**Comment Date:** December 13, 2011

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Please keep the 40% turf restriction in the code. Reducing turf area has benefits well beyond saving water. Of all areas of a landscape, turf has the lowest up-front cost for installation, but turf also has the highest lifetime cost because it requires the most labor and resources to maintain. Turf is essentially an ecological dead zone as it provides no benefits to wildlife and turf's shallow roots make it a bad choice for soil stabilization.

Additionally, the following article is a strong argument against turf:

ScienceDaily (Jan. 19, 2010) — Dispelling the notion that urban "green" spaces help counteract greenhouse gas emissions, new research has found that total emissions might be lower if lawns did not exist.

Turfgrass lawns help remove carbon dioxide from the atmosphere through photosynthesis and store it as organic carbon in soil, making them important "carbon sinks." However, greenhouse gas emissions from fertilizer production, mowing, leaf blowing and other lawn management practices are four times greater than the amount of carbon stored by turfgrass, a UC Irvine study shows. These emissions include nitrous oxide released from soil after fertilization. Nitrous oxide is a greenhouse gas that's 300 times more powerful than carbon dioxide, the Earth's most problematic climate warmer.

I am a member of PLANET and have been active in the 'green industry' for more than a decade. PLANET's politics and short sighted goals are not based in scientific fact, nor do they represent proper ecological management. Please keep the 40% turf restriction in the code.

Thank you for your time,

**Dan Stever**  
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**Commenter:** Tom Delaney  
**Affiliation:** Professional Landcare Network  
**Comment Date:** December 13, 2011

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**Thank you for the opportunity to make comments in support of the elimination the 40% turfgrass limitations in the WaterSense Final Specification for Single New Homes Program.**

**WaterSense Questions with Responses:**

**WaterSense Question:** Which products or criteria mentioned here or in the specification differ substantially between single-family and multi-family dwellings?

Landscape design of a multifamily dwelling, unlike single-family homes, is usually performed (and sometimes required to be performed) by a landscape designer or landscape architect.

The installation of a multifamily dwelling, unlike single-family homes, is usually performed (and sometimes required to be performed) by a landscape contractor.

The multifamily dwelling specification should take these factors into account, as landscape design and installation are performed differently for a single-family new home landscape design/build/installation process.

Certain residential applications require the use of irrigation components to be used for dust control, cooling, or other non-traditional applications. These include, but are not limited to dust control of horse riding areas and other surfaces used in human recreation such as clay tennis courts and baseball or softball infields. Irrigation components are also utilized for cooling of artificial playing surfaces. While these applications are more common in multi-family residential projects, they can also sometimes be found in single family homes. We are concerned that the use of a water budget or any other globally limiting water management tool may unintentionally prohibit irrigation components to be used in such non traditional manners. Such a prohibition would have negative affects on not only the use of the site, but also on the ability of our members and others in the construction and green industries to address the specific, unique needs of their client's site needs. Thus we feel there should be exceptions allowed to the landscape area for examples like these and not subject to the same limitations on a WaterSense property.

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**WaterSense Question:** Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?

The use of water budgets has proven to be a very successful management tool when determining the water-use requirements of a landscape; taking into account local data such as rainfall, ET, and other locally derived climatologic factors.

Landscape design based on the WaterSense Water Budget Tool allows local landscape experts to design a landscape using climate appropriate plantings that creatively meets the needs of the family living in the home and the neighborhood, thus enhancing its marketability.

Builders, landscape design professionals, irrigation professionals, and property owners will all benefit from the appropriate use of the Water Budget Tool's single-family new home specification to provide a water-efficient outdoor environment over a one-size-fits-all approach.

Having a single option of using the Water Budget Tool facilitates training of builders and irrigation professionals, minimizing confusion when multiple options are presented.

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**WaterSense Question:** Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?

The beta version of the Water Budget Tool works nicely and is less intimidating than the Excel spreadsheet. Suggested improvements regarding the irrigation options are as follows:

*For turfgrass irrigation:* Fixed spray; rotor (needs to be added as a choice); drip (pressure compensating), which would allow for the use of subsurface drip irrigation if chosen, and micro-irrigation, which includes micro-sprays, micro-bubblers, micro-streams, and standard drip which non-pressure compensating, etc.; and no irrigation. Very little "drip" irrigation used in landscape applications is not pressure compensating, and the difference in water requirement between drip (standard) and micro sprays is exactly the same. Fewer categories that are unique would make it more relevant to the marketplace and easier to choose an irrigation method.

*For the other plantings:* Irrigation choices for other plantings, such as trees, shrubs, ground covers, etc., could likewise be simplified to drip (pressure compensating) and micro-irrigation, as described above, and no irrigation. In addition, it would be nice to have a simple "drop-down" explanation or description of the irrigation terms for those not familiar with the industry's terminology.

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**WaterSense Question:** Is a simple option similar to Option 2 still required? If so, what should it be?

Appropriate landscape and irrigation design and installation are complex and should be treated as such. Just trying an easy approach is not an appropriate solution to something that is as important as landscape plant-material choice and irrigation design and installation.

The Water Budget Tool is a user-friendly way to afford builders and landscape design professionals the opportunity to determine appropriate landscape plant material, based on local variables.

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**WaterSense Question:** What parties are typically responsible for landscape design for multifamily buildings? What are the standard practices?

Unlike single-family new homes, multifamily buildings use and/or require a professionally designed and installed landscape by either a landscape designer or landscape architect and a landscape contractor.

The use of the Water Budget Tool is appropriate for both single-family homes and multifamily units.

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**WaterSense Question:** Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?

We are concerned in the exclusion of soil moisture based control systems from the specifications.

Specifying weather based control systems may preclude other technologies. It could exclude new, as yet undeveloped, technologies which may stifle R&D and innovation.

Tom Delaney  
Director of Government Affairs

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**Commenter:** Michael Mancini  
**Affiliation:** Meritage Homes  
**Comment Date:** December 14, 2011

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Jonah,

We recently completed a national rollout where we will be offering WaterSense in every community, coast to coast. This will allow us to gain more traction in the marketplace, and begin delivering even greater water savings in the homes we build. The WaterSense label will be available in all communities starting 1/1/12.

During the rollout, the consistent challenge we see is the Outdoor Water Efficiency Criteria (section 4.0). Below are the challenges we face:

#### 4.1.1. Landscape Design

- In most markets, a landscape design is not typically done for each home. In most cases, two to four generic layouts are available to each home buyer, That buyer selects the generic layout at sale, and the landscape is installed within reasonable adherence to the layout. Because of this, the landscape contractors that are contracted for the installations, typically won't have design services at their disposal.

#### 4.2.1. Irrigation Design & Installation

- In most markets, the landscape and irrigation companies, that are contracted, are not WaterSense Irrigation partners. We do have a few companies that are, but the majority are not. It is not to say that there are insufficient irrigation partners. But, most are custom landscape contractors that come at a much higher cost.

I believe this is a challenge the program will face with all large production builders. However, I do believe there is a solution. If the WaterSense program had a prescriptive path for Outdoor Water Efficiency that could be verified by the same WaterSense inspector that does the Indoor Water Efficiency, this would eliminate the complexity of having two parties (indoor and irrigation) performing inspections on the home.

In most cases, the builders that will be participating in the WaterSense program will already be participating in the Energy Star for Homes program, therefore, they will have an Energy Rater contracted. The Energy Raters, that we use, already are, or are willing to become, WaterSense providers. Adding WaterSense certification to their scope of work, while already performing Energy Star inspections, makes the program more practical.

I truly believe that this will allow the WaterSense Program to better fit in the production building process.

Please let me know if I can be of any help in further development of the program.

Michael Mancini  
National Director of Project Integration



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[michael.mancini@meritagehomes.com](mailto:michael.mancini@meritagehomes.com) | [www.meritagehomes.com](http://www.meritagehomes.com)

**Commenter:** Neal Shapiro

**Affiliation:** Santa Monica Office of Sustainability and the Environment

**Comment Date:** December 20, 2011

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**Topic:** Is the Water Budget Tool sufficient as the sole option for meeting the landscape criteria?

**Comment:** No, option 2 should still be allowed as simpler alternative.

**Rationale:** Oversimplification of the water budget tool may make it ineffective. If simplification is the goal, then leave an option to limit the known high water using plants like turfgrass. Consider lowering limit to 20 percent of landscape.

**Suggested change (or language):** Leave option 2 but define turfgrass.

**Topic:** Would requiring WaterSense labeled weather-based irrigation controllers unintentionally exclude certain products?

**Comment:** Yes, an alternative means provision should be offered however, WaterSense labeled weather-based irrigation controllers should be required on all new homes.

**Rationale:** In theory, a weather based irrigation controller will act as a water budgeting tool on a properly maintained irrigation system.

**Suggested change (or language):** Require WaterSense labeled weather-based irrigation controllers on all new homes with new irrigation systems.

Neal Shapiro, CPSWQ®, CSM  
Supervisor, Watershed Section  
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[www.sustainablem.org/runoff](http://www.sustainablem.org/runoff)



**Commenter:** Rick Moore  
**Affiliation:** Rain Bird Corporation  
**Comment Date:** December 21, 2011

---

Please find Rain Bird Corporation's comments on the NOI to Modify the WaterSense Final Specification for Single Family New Homes. If you have any questions or have any trouble retrieving the attachment, please contact me directly.

Regards,

Rick Moore  
Marketing Manager  
Contractor SBU

Rain Bird Corporation  
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**Rain Bird Comments on the Notification of Intent to Modify the  
WaterSense Final Specification for Single Family New Homes**

December 21, 2011

The Rain Bird Corporation supports the EPA WaterSense recommendation to remove Option 2 – Turfgrass shall not exceed 40 percent of the landscaped area from the WaterSense Single Family Home Specification under Section 4.1.1 Landscape design. We concur that the WaterSense Water Budget Tool (Option 1) is the preferred method for determining how water efficient the landscape and irrigation design is likely to be. We believe a less prescriptive and more science-based approach is appropriate and much more meaningful than enforcing an arbitrary maximum amount of turfgrass allowable. The fact that a majority of the Home Builders participating in the program have selected the Water Budget Tool (Option 1) further supports EPA's position to remove Option 2 from the specification.

In addition, we agree with the EPA WaterSense that most of the criteria for a WaterSense labeled new home can be applied to many low-rise multi-family buildings and support the inclusion of multi-family buildings three stories or less and multi-family buildings of four or five stories under certain circumstances.

The following represents Rain Bird's responses to some of the questions that EPA WaterSense has raised.

### **Landscape Design**

***WaterSense Question:*** *Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?*

The Rain Bird Corporation supports the use of the Water Budget Tool (Option 1) as the sole option for meeting the landscape design criteria for single-family homes. Rain Bird believes that this tool, utilizing local data such as rainfall, ET, and other locally derived climatologic factors to determine the site specific plant water requirements for each irrigation zone, has proven to be very successful in determining the efficient water use requirements of a landscape. We oppose the use of an arbitrary standard to limit the plant material selection inherent in Option 2 as it is not based in science nor does it account for local weather conditions.

Landscape design, based on the WaterSense Water Budget Tool, allows local landscape professionals to design a customized landscape utilizing climate and appropriate vegetation that uniquely meets the needs of the family living in the single-family home and the neighborhood, thus enhancing its sustainability and marketability.

In addition, having a single option of using the Water Budget Tool facilitates the training of builders and irrigation professionals. This has the dual benefit of allowing these professionals to gain proficiency in using the tool while minimizing the confusion that could arise when multiple options are presented.

***WaterSense Question:*** *Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?*

The beta version of the Water Budget Tool is much easier to use and less intimidating than the current tool that uses a Microsoft Excel® spreadsheet format. Suggested improvements regarding the irrigation options are as follows:

For turfgrass irrigation: modify the choices to: "Fixed Spray", "Rotor", "Rotary Nozzle", "Subsurface Drip" (which would allow for the use of subsurface drip irrigation if chosen) and "No Irrigation". Eliminate Micro-Spray as a choice for irrigating turfgrass as this sprinkler type is rarely used as a method of irrigating turfgrass. They are much more applicable to irrigating non-turfgrass areas.

Irrigation choices for the non-turf landscape applications such as trees, shrubs, ground covers, etc., could likewise be simplified to: "Drip", "Micro Irrigation" (as described above), and "No Irrigation". Additionally, we recommend adding a simple "pop-down" description of each of the plant material options, the water use classifications for each of plant material types (low, medium, high), and the irrigation emission device types for those not as familiar with the industry's terminology.

For those that are more familiar with the methodology associated with determining water budgets, it would be highly desirable to have a more advanced version of the tool that showed the default values used for each of the menu options for each choice from the pull down menu. The user could either accept the “default” values or enter a “custom” value that more accurately reflects the actual values of the landscape and irrigation design. For example: “Fixed Spray” is selected and the default value for this selection is a precipitation rate of 1.5 inches per hour and an overall efficiency of 65%. The designer determines that the actual precipitation rate of the designed zone is actually only 1.2 inches per hour and that the efficiency will be over 75% based on calculations. In this case, the default values would be modified to the calculated values and the overall water usage estimate would be significantly less than that estimated using the default values.

***WaterSense Question:*** *Is a simple option similar to Option 2 still required? If so, what should it be?*

No, a simple option similar to Option 2 is not required. Rain Bird believes that water efficient landscape and irrigation designs and installations are complex and should be treated as such. Finding a “one answer fits all” approach is not an appropriate solution to something that is as important as landscape plant-material choice and water efficient irrigation design and installation. We believe the Water Budget Tool, incorporating our recommendations above, is a less prescriptive, user-friendly way to afford builders and landscape design professionals the opportunity to determine appropriate landscape plant material based on local and site-specific variables as they design and install an efficient irrigation system.

***WaterSense Question:*** *Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?*

Rain Bird supports the use of WaterSense-labeled irrigation controllers as a requirement in the Single-Family (and if adopted Multi-Family) New Home Specification. We do not believe that this requirement will exclude any “smart” controllers from having an opportunity to be used in an irrigation system installed in a WaterSense-labeled new home landscape if they meet the criteria that is stated in Section 4.2.7 and conformance is certified by a licensed certifying body accredited in accordance with the WaterSense product certification system.

**Commenter:** Kevin Morris

**Affiliation:** National Turfgrass Federation, Inc.

**Comment Date:** December 21, 2011

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To Whom It May Concern:

We agree with EPA's Notification of Intent to make changes to the Water Sense Final Specification for Single Family Homes. We particularly agree with the removal of Option 2, within Section 4.1.1: Landscape Design. The 40% turfgrass limit prescribed by Option 2 does not address or necessarily contribute to reduction in water use in the landscape. We have always stated that the water budget tool was a much better option and a prescription for success in landscape water conservation. Therefore, we are pleased that EPA has suggested dropping Option 2 from Section 4.1.1.

Thanks for your diligent work on these changes and if we can help in any way in the future, please let us know.

Kevin Morris  
President, National Turfgrass Federation, Inc.  
P.O. Box 106  
Beltsville, MD 20704  
Phone (301) 504-5125  
Fax (301) 504-5167  
Mobile (301) 873-6545

**Commenter:** Ralph Egües, Jr.  
**Affiliation:** National Hispanic Landscape Alliance  
**Comment Date:** December 21, 2011

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Dear Veronica,

Attached is our formal reply to the WaterSense NOI. Thanks again for providing us this opportunity to opine.

With best regards and the warmest of holiday greetings,

Ralph

Ralph Egües, Jr.  
Executive Director  
National Hispanic Landscape Alliance  
Telephone [\(877\) 260-7995](tel:877-260-7995)  
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December 21, 2011

Veronica Blette  
Chief, WaterSense Branch  
Office of Water  
Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460-0001  
Via electronic mail to [watersense-homes@erg.com](mailto:watersense-homes@erg.com)

Dear Ms Blette:

Thank you for sharing with us the Notification of Intent (NOI) to Modify the WaterSense Final Specification for Single Family New Homes. While your NOI outlines several modifications to the specification currently under consideration including expanding the scope of the specification so that some types of multi-family buildings will qualify for the WaterSense label, modifying the landscape design options, and addressing other minor technical issues, we specifically wish to address your intent to modifying the landscape design options.

We are grateful for the opportunity to provide these comments as an interested party. The National Hispanic Landscape Alliance (NHLA) is a trade association organized as a 501(c)(6) corporation. The NHLA facilitates and promotes the advancement of Hispanics as landscape industry professionals and leaders, and provides U.S. Hispanic landscaping professionals a voice in the national dialogue on environmentally responsible landscape practices, and a means through which to advance the interests of their businesses, the livelihood of their employees, and the quality of life in the communities in which they live and work. Being keenly aware of the significant body of academic research findings attesting to a wide range of environmental and human health benefits derived from the use of natural turfgrass, we are opposed to arbitrary limits on its use.

The NHLA is pleased that your office believes that it is appropriate at this time to remove Option 2 from Section 4.1.1: Landscape Design of the WaterSense specification limiting turfgrass to 40% of the landscaped area, and we strongly support your doing so as soon as possible. We believe that creating greater awareness of the many benefits of turfgrass is a key first step in achieving our goal of better educated homeowners who readily adopt sustainable landscaping practices, and that we and others can best accomplish this goal in close collaboration with the EPA.

As we remarked during our meeting in September and have noted in prior correspondence, we applaud the WaterSense program for creating a race to the top

Veronica Blette  
Chief, WaterSense Branch  
Office of Water  
Environmental Protection Agency  
December 21, 2011  
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among indoor appliance manufacturers and for doing much to raise awareness among consumers and educate them on best practices. The result has been broad popularity of the most efficient manufacturer offerings not only in new construction but in the remodeling of existing homes as well. This success has been the result of a broad collaborative effort which we believe can be duplicated on landscape matters subsequent to the removal of the turfgrass limitation (Option 2) from Section 4.1.1.; a specification which you have pointed out has no scientific basis.

Rather than focusing on one landscape material, we urge the WaterSense program to focus instead on promoting sustainable practices and creating an environment where ever more efficient irrigation system components and landscape materials will be developed and adopted over time. We believe that focusing attention on the most efficient water delivery devices and materials will significantly impact consumer preferences and practices; particularly once they come to better understand the environmental benefits of their landscape choices. More than just a pretty place and refuge the exteriors of their homes can be important oxygen generators and carbon sinks, they can control erosion and capture and filter storm water helping to recharge ground water sources and reducing demand on municipal sewer systems, and they can provide natural cooling that lessens our dependence on solutions dependant on the burning of fossil fuels. Educating consumers to these facts is an important part of the NHLA's mission and we know that we will be more successful if we can work together with the EPA.

We will not detail the significant body of academic finding that have uncovered a wide range of benefits associated with the use of natural turfgrass, but recognize Cockerham, S. T., and Leinauer, B. eds. 2011. Turfgrass Water Conservation. II. University of California Agriculture and Natural Resources Publication 3523 as a useful resource that summarizes more than fifty years of turfgrass research findings. We also note that turfgrass breeding programs have made considerable progress in improving turfgrass performance and adaptation, as a result of greater focus on the production of varieties that are more drought-tolerant, heat-tolerant, and salinity stress tolerant. A WaterSense program that rewards performance, rather than limiting options, encourages the continuation and expansion of such efforts. By removing the turfgrass limitation, equipment manufacturers and developers of landscape materials will both be encouraged to provide a continually evolving array of better choices. Our vision for the future is one where better informed consumers make more enlightened choices fully aware of their impact on our collective well being, and we believe much more will be accomplished with respect to our water conservation goals and other ecological objectives in this fashion than through rationing and limits.

Veronica Blette  
Chief, WaterSense Branch  
Office of Water  
Environmental Protection Agency  
December 21, 2011  
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In the NOI you included a number of questions which we are happy to opine on below.

**WaterSense Question:** Which products or criteria mentioned here or in the specification differ substantially between single-family and multi-family dwellings?

The design and installation of the landscaping of a multifamily dwelling, unlike single-family homes, is usually performed (and sometimes required to be performed) by a landscape designer/architect and a landscape contractor. Residential developments sometimes use irrigation system components for dust control, cooling, and other non-traditional applications in a variety of sites including horse riding areas, clay tennis courts, and artificial grass playing surfaces. These applications are most common in multi-family residential projects. We are concerned that the use of a water budget or any other globally limiting water management tool may unintentionally prohibit the use of irrigation equipment for such uses and impede on the ability of our members and others in the construction and green industries to address the specific, unique needs of their client's site needs, we thus agree with others in our industry that accommodations should be made for such uses of irrigation systems on a WaterSense property.

**WaterSense Question:** Is the Water Budget Tool sufficient as the sole option for meeting the landscape design criteria?

While recognizing that opportunities to make further refinements may present themselves from time to time as a result of a number of factors including the advancement of equipment and materials, and the use thereof, and suggesting that the best solutions available at any point in time should be adopted, we favor the use of a water budget tool as the sole option for meeting the landscape design criteria at this time and urge removal of Option 2. The use of water budgets that recognize local climatologic factors such as rainfall and evapotranspiration (ET) have proven useful in determining the water-use requirements of a landscape. They also allow local landscape experts to design a landscape using climate appropriate plantings that creatively address the needs of homeowners and neighbors; enhancing the marketability of residential properties. Having the single option of a water budget tool minimizes confusion, and facilitates the promotion and adoption of the program and the training of builders and irrigation professionals on program requirements.



Veronica Blette  
Chief, WaterSense Branch  
Office of Water  
Environmental Protection Agency  
December 21, 2011  
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**WaterSense Question:** Do you have any suggestions on how we could make the online Water Budget Tool more user-friendly?

We endorse the following improvements also suggested by others:

*For turfgrass irrigation:* Fixed spray; rotor (needs to be added as a choice); drip (pressure compensating), which would allow for the use of subsurface drip irrigation if chosen, and micro-irrigation, which includes micro-sprays, micro-bubblers, micro-streams, and standard drip which non-pressure compensating, etc.; and no irrigation. Very little “drip” irrigation used in landscape applications is not pressure compensating, and the difference in water requirement between drip (standard) and micro sprays is exactly the same. Fewer categories that are unique would make it more relevant to the marketplace and easier to choose an irrigation method.

*For the other plantings:* Irrigation choices for other plantings, such as trees, shrubs, ground covers, etc., could likewise be simplified to drip (pressure compensating) and micro-irrigation, as described above, and no irrigation. In addition, it would be nice to have a simple “drop-down” explanation or description of the irrigation terms for those not familiar with the industry’s terminology.

**WaterSense Question:** Is a simple option similar to Option 2 still required? If so, what should it be?

We maintain that Option 2, while simple, was flawed and encourage the removal of Option 2. We favor the use of a water budget tool as the sole option for meeting the landscape design criteria at this time. Landscape and irrigation design and installation, plant-material selections, and other related matters are complex and rather than offering flawed over-simplified alternatives, we encourage the EPA to adopt the best scientifically-supported solutions and make their adoption as user-friendly as possible.

**WaterSense Question:** What parties are typically responsible for landscape design for multifamily buildings? What are the standard practices?

The design and installation of landscaping for multifamily developments is typically performed (and often required to be performed) by a professional (i.e. a landscape designer or landscape architect and a landscape contractor.) The use of a water budget tool is appropriate for both single-family homes and multifamily sites.

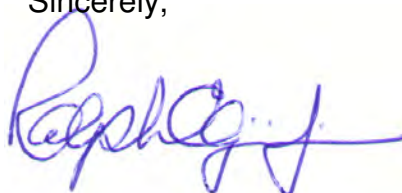
Veronica Blette  
Chief, WaterSense Branch  
Office of Water  
Environmental Protection Agency  
December 21, 2011  
Page 5 of 5

**WaterSense Question:** Would requiring WaterSense labeled weather based irrigation controllers unintentionally exclude certain products?

Requiring that only weather based control systems be eligible for use would preclude existing soil moisture based control systems and may stifle R&D on alternative approaches. We suggest that whenever possible, program specifications be goal oriented rather than prescriptive as to acceptable solutions.

Thank you for the opportunity to provide these comments. We are delighted to see progress being made towards the removal of the 40% turf limitation from the WaterSense program. We believe Option 2 of Landscape Design specification to be inconsistent with a WaterSense program that does so much right. There is, we believe, much that we can accomplish together once this obstacle is removed. We look forward to hearing from you again soon, and close by wishing you and yours a greater measure of joy and peace during this holiday season.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Ralph Egües, Jr.', with a stylized flourish at the end.

Ralph Egües, Jr.  
Executive Director

cc: Jesus "Chuy" Medrano  
President, National Hispanic Landscape Alliance  
President, Co-Cal Landscapes (Denver, CO)  
Via electronic mail to [chuy@cocal.com](mailto:chuy@cocal.com)

Raul Berrios  
President-elect, National Hispanic Landscape Alliance  
President, RulyScapes (Centreville, VA)  
Via electronic mail to [raul@rulyscapes.com](mailto:raul@rulyscapes.com)

**Commenter:** Gerry Coons

**Affiliation:** Outdoor Power Equipment Institute

**Comment Date:** December 22, 2011

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Please find attached the comments from OPEI to the Notification of Intent to Modify the WaterSense Final Specification For Single Family New Homes.

We look forward to meeting with your office on January 10 for further discussions.

Thank You,

Gerry Coons

OPEI

VP Industry Affairs

703-549-7600



**OUTDOOR POWER EQUIPMENT  
INSTITUTE**

December 22, 2011

Veronica Blette  
U.S. Environmental Protection Agency  
Ariel Rios Building  
1200 Pennsylvania Avenue, N. W.  
Mail Code: 4204M  
Washington, DC 20460  
bllette.veronica@epa.gov  
watersense-homes@erg.com

**Re: OPEI Comments to the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes**

Dear Ms. Blette:

On behalf of the Outdoor Power Equipment Institute (OPEI), we submit these comments in response to the October 25<sup>th</sup> Notification of Intent (NOI). In that NOI, the WaterSense Office proposes to delete the 40% turfgrass restriction in the current Water-Efficient Landscape Design - Section 4.1.1.2 (option #2). OPEI strongly supports the proposed deletion and urges EPA to make this needed improvement on an expedited basis.

OPEI would like to partner closely with the WaterSense Office to educate key stakeholders on the benefits of a water budget and the use of such a tool. As part of this education, EPA should adopt and endorse a water budget tool that includes regional climate conditions. The EPA should also highlight the problems and unintended consequences with any "one size fits all" restriction on the amount of turfgrass.

There is no compelling reason to retain either the 40% turf-restriction option - or any other similarly inflexible option. If such a default option is made available, it will further confuse the stakeholders and make it more likely they select an approach that does not account for regional climate conditions and other factors.

Given the influence of the EPA WaterSense program, green building codes and standards may continue to consider and incorporate the 40% turfgrass limitation as long as it is a designated option in the WaterSense program. We therefore recommend that EPA notice a specific date as soon as possible to close the comment process (on at least Section 4.1.1) and to proceed on finalizing that change.

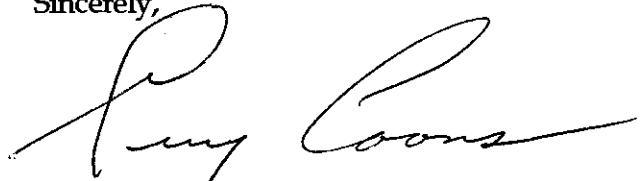
We also urge the EPA WaterSense Office to brief other departments in the EPA and other contacts on the Interagency Sustainable Working Group (ISWG) developing the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings Guidance. It is our understanding that this draft guidance currently includes the problematic 40% turf restriction.

Finally, OPEI urges the EPA WaterSense Office to participate in a new ANSI consensus process to develop a "Standardized Procedure for Determining Available Water for Landscapes and Estimating Landscape Water Use." This process will be administered by the American Society of Agricultural and Biological Engineers (ASABE) and will include national experts and engineers in turf, soil, and water management, among others. The expertise, experience, and insight of the WaterSense Office will benefit the ASABE process and its committee leadership. ASABE and its assigned technical committee is currently developing the scope of the proposed standard. We will keep you informed of new developments, especially when there is opportunity for EPA and other stakeholder input, per the ASABE process.

\* \* \*

We look forward to meeting with you on January 10<sup>th</sup> to further discuss developments and opportunities for collaboration.

Sincerely,

A handwritten signature in black ink, appearing to read "Gerry Coons". The signature is fluid and cursive, with a large initial "G" and "C".

Gerry Coons  
V.P. Industry Affairs  
Outdoor Power Equipment Institute (OP

**Commenter:** Rachel DellaValle  
**Affiliation:** Southern Energy Management  
**Comment Date:** January 17, 2012

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### **Comments to NOI suggesting to remove Section 4.4.1 Landscape Design Option 2:**

I would like to highlight the importance of a prescriptive path for the Section 4.4.1 Landscape Design item. We have not worked on many homes since the WaterSense Program became official, but we did work on several homes in the Pilot Phase with Anderson/Vanguard Homes. Anderson/Vanguard Homes selected Option 2, also known as the prescriptive path of "Turfgrass shall not exceed 40 percent of the landscaped area." for all homes that they built in the WaterSense Pilot Program. They chose it because it was a more simple, straight forward method that they could apply to all of their projects, whether they were in different cities or different climate zones. It was a method that the landscape design professional could easily understand and plan for, the landscape technician could simply install, and the WaterSense Field Inspector could verify on site.

In our experience working with builders and developers in building certification programs there is always a prescriptive and performance path. This can apply to the whole program (IE: Energy Star) or a part of a program (IE: LEED for Homes or NGBCP Energy Sections). I wouldn't limit the pathways of achieving water efficiency, only enhance them.

### **Comments on Outstanding Issues for Integrating Multifamily Buildings:**

General: The Energy Star for New Homes program certifies each unit in a Multifamily building and does not approach common areas or the building IE: hall ways, storage areas, laundry, kitchen, game rooms. It would be most simple to copy that standard for the WaterSense for New Homes program.

- 1.) There are additional water uses in low-rise Multifamily buildings besides residential uses. There are common areas, common kitchens, common laundry areas, common landscaping etc. I would say most Multifamily buildings we work on have shared laundry space shared landscaping area/use.
- 2.) Most Multifamily buildings we work with have implemented water heating per unit. Each unit has their own water heater and hvac system. Typically the equipment is in a closet within the unit. We see a lot of low-boy water heaters.
- 3.) One thing to look at that might differ between Single family and Multifamily buildings in the WaterSense criteria is item 3.3 Hot Water Delivery System. You may want to look at the average distance/efficiency in the hot water heating systems in Single Family versus Multifamily. The requirement of "no more than 0.5 gal of water in any piping/manifold between the hot water

source and the fixture" may differ when dealing with one multifamily unit based on the area of the unit and number of bathrooms/kitchen.

4.) WaterSense labeled showerheads are available in our area.

5.) Yes, a simpler option similar to Option 2 of the Landscape Design is still necessary for the programs success. No more than 40% turf is fine, but it does not have to 40%. Aligning this item with other green building programs makes sense. I recommend researching what they are doing and what they plan to change.

We look forward to the Public Meeting tomorrow. Thank you.

Rachel Della Valle, Building Performance Project Manager

Southern Energy Management

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101 Kitty Hawk Drive

Morrisville, NC 27560

[www.southern-energy.com](http://www.southern-energy.com)



**Commenter:** Doug Bennett  
**Affiliation:** Southern Nevada Water Authority  
**Comment Date:** January 26, 2012

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Dear WaterSense,

The attached document contains the Southern Nevada Water Authority's comments relating to the WaterSense New Home NOI.

Sincerely,

Doug Bennett  
Conservation Manager  
Southern Nevada Water Authority





## SOUTHERN NEVADA WATER AUTHORITY

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MAILING ADDRESS: P.O. Box 99956 • Las Vegas, NV 89193-9956  
(702) 862-3400 • snwa.com

EPA WaterSense Program  
c/o ERG

26 January 2012

Dear WaterSense,

The Southern Nevada Water Authority (SNWA) appreciates the opportunity to comment on the Notification of Intent to Modify the WaterSense Final Specification for Single Family New Homes.

### **Section 3.6: Showerheads and Shower Compartments**

SNWA supports inclusion of a requirement that only WaterSense labeled showerheads may be used in WaterSense labeled new homes.

### **Section 4.1.1: Landscape Design**

Option 1 (water budget), and Option 2 (turfgrass allowance), both have strengths and weaknesses. Ideally, the landscape component should be governed by an approach that is:

1. Effective at managing landscape water demand
2. Based upon principles supported by research
3. Equitable among users
4. Regionally flexible
5. Understandable
6. Simple and affordable to implement

SNWA suggests that WaterSense consider a completely new approach based upon estimated supplemental irrigation demands (ESID). We believe the ESID approach captures many of the strengths of both Option 1 and 2, while diminishing many of the weaknesses. More detail on the ESID concept accompanies this letter.

Additionally, we suggest WaterSense postpone revision of this section until completion of a formal standard for water budget development, which is currently being developed by the ASABE. SNWA intends to submit the ESID concept for consideration in ASABE's standard development process, as well.

### **Section 4.2.7: Irrigation Controllers**

SNWA supports revision of the standard to require Water Sense labeled irrigation controllers.

### **Section 3.2: Service Pressure**

The specification should be clarified such that no water-emitting indoor plumbing fixture is subjected to pressure in excess of 60 psi. There should also be content explaining the benefit of pressure management.

### **Section 3.3: Hot Water Delivery System**

Since there is already a defined compliance test, the language should be modified to eliminate the words “stored” and “source.” For example, “the plumbing system shall be designed so that not more than one-half gallon of water must be drawn from a fixture before hot water is discharged.” The builder would have the option to achieve compliance through any available method, whether it is structured plumbing design or on-demand circulation.

### **Applicability to large, multi-dwelling buildings**

SNWA supports development of a program or program component that applies to larger, multi-dwelling buildings. However, such an expansion of scope should be accommodated through a stakeholder development process.

As always, we are eager to support and collaborate with EPA WaterSense. Please feel free to contact me if I may provide additional information regarding these topics.

Sincerely,

Doug Bennett  
Conservation Manager  
Southern Nevada Water Authority

## Estimated Supplemental Irrigation Demand (ESID) Overview

Estimated Supplement Irrigation Demand (ESID) estimates how much water will need to be applied to a landscape to supplement natural precipitation. In short, ESID allows homes in high-precipitation regions to have bigger lawns and water features than homes in arid regions. In regions where rainfall is frequent and plentiful, there would be little demand for supplemental water, thus high water use plants and water features have less impact on water supplies than in arid climates.

Effective precipitation relates to both the amount and frequency of rainfall. ESID proposes utilizing historic rainfall and ET on a monthly basis. Historic precipitation that exceeded historic ET in any given month would not be banked for use in subsequent months. The attached proposal suggests using ESID to determine what percentage of the landscape can be allocated to high use water features such as irrigated turfgrass, swimming pools and water features.

There are several advantages to the ESID Proposal, all of which help assure the efficacy and protect the integrity of WaterSense:

- 1. ESID provides a more comprehensive assessment of annual water demands.** The current water budget tool assesses weather and precipitation only in the peak demand month. While evapotranspiration (demand) typically follows a relatively symmetrical demand profile that may support this approach, the same cannot be said for rainfall. ESID uses historic ET and rainfall data from all twelve months and is similar in approach to methodologies used and supported by the Irrigation Association for developing irrigation schedules.
- 2. ESID does not require users to make subjective determinations of plant water use.** The ESID approach essentially assumes that irrigated turfgrasses and open bodies of water are high water use landscape types and provides a maximum percentage of the landscape that may be developed with these treatments. Currently, the lack of a crop coefficient library that can be referenced for purposes of water budget calculations means each applicant is allowed to make subjective determinations about whether a plant has low, moderate or high water demands. The potential for users to apply subjective judgment to accidentally or intentionally misuse the water budget tool and compromise water efficiency is largely eliminated by ESID, vastly improving the equity and reliability of the water budget option.
- 3. ESID is equitable and simple to administer.** The current Water Budget requires a unique assessment for every single landscape in the WaterSense New Homes program. While that may be achievable where the necessary expertise is readily available, it creates difficulty and expense for new users who do not have access to appropriately trained professionals. This dynamic presents itself as a barrier to use of the specification in many areas. ESID

calculations, however, need only be done once for a given location, greatly simplifying compliance and potentially making WaterSense more attainable in regions with limited professional talent to implement the water budget. Having just one result per region eliminates the differences in allocation to high water uses that results from subjective judgments of individual users. Under ESID, the potential of vastly different water use outcomes between competing builders is largely eliminated.

4. **ESID provides for the regionalism WaterSense seeks, without risking the integrity of the New Homes program.** The ESID approach accommodates regional differences in a pattern similar to those that would be obtained by honest, professional and judicial use of the Water Budget Tool, but without jeopardizing the integrity of the program as a result of users who grossly underestimate the water demands of certain landscape styles. Relative to the Water Budget Tool, the ESID proposal does broadly allocate less area to high uses in the drier West and more to such uses in the wetter East (see attachment). Far from being a disadvantage, this seems appropriate and desirable.
5. **ESID-derived water budgets have a more defensible foundation than the current approach.** There is currently no research data that demonstrate a relationship between water demand projections derived from the Water Budget Tool and actual water demand in the landscape, nor does WaterSense expect to have the resources to conduct such research in the foreseeable future. Currently, WaterSense runs a very real risk that labeled homes will use as much or more water than unlabeled homes in the same region. Such outcomes eventually become publicized and undermine the credibility of the program. More than 20 years of research have correlated the use of irrigated turfgrass with increasing irrigation water demand. Creating an allowance for such high water use areas is a well-accepted conservation technique and numerous jurisdictions use similar principles in their code. Furthermore, the widespread availability of aerial imagery will allow remote review of WaterSense certified homes to assess compliance since areas of lawn and open water are easily discernable and can be remotely measured. Using ESID as a baseline, WaterSense will have ample ability to make modifications to the thresholds over time to achieve desired water savings.

### Calculating Estimated Supplemental Irrigation Demand Option

**Option 2: Estimated Supplemental Irrigation Demand.** High Demand Areas<sup>1</sup> allowance shall be based upon the Estimated Supplemental Irrigation Demand (ESID) percentage. ESID is the net difference between historic monthly evapotranspiration (ET) rates in the region and historic average precipitation and shall be calculated using the High Demand Areas<sup>1</sup> Allowance Table. Where ESID percentage is 60 or more, the property shall be allowed to have up to 40 percent of the installed landscape areas as High Demand Areas<sup>1</sup>. In no cases shall the property have more than 80 percent of the installed landscape areas as High Demand Areas<sup>1</sup>.

**HIGH DEMAN AREAS ALLOWANCE TABLE**

MONTH	HISTORIC EVAPOTRANSPIRATION RATE (HET <sub>o</sub> )  OR  (INCHES/MONTH OR MM/MONTH)	NORMAL PRECIPITATION (NP)  (INCHES/MONTH OR MM/MONTH)	ESTIMATED SUPPLEMENTAL IRRIGATION DEMAND (ESID=( HET <sub>o</sub> ) (INCHES/MONTH OR MM/MONTH)
January	0		
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Sum Columns			
ESID Percentage = (Sum ESID / Sum HET <sub>o</sub> OR NPE)			
High Demand Areas <sup>1</sup> Allowance (1-ESID Percentage)			

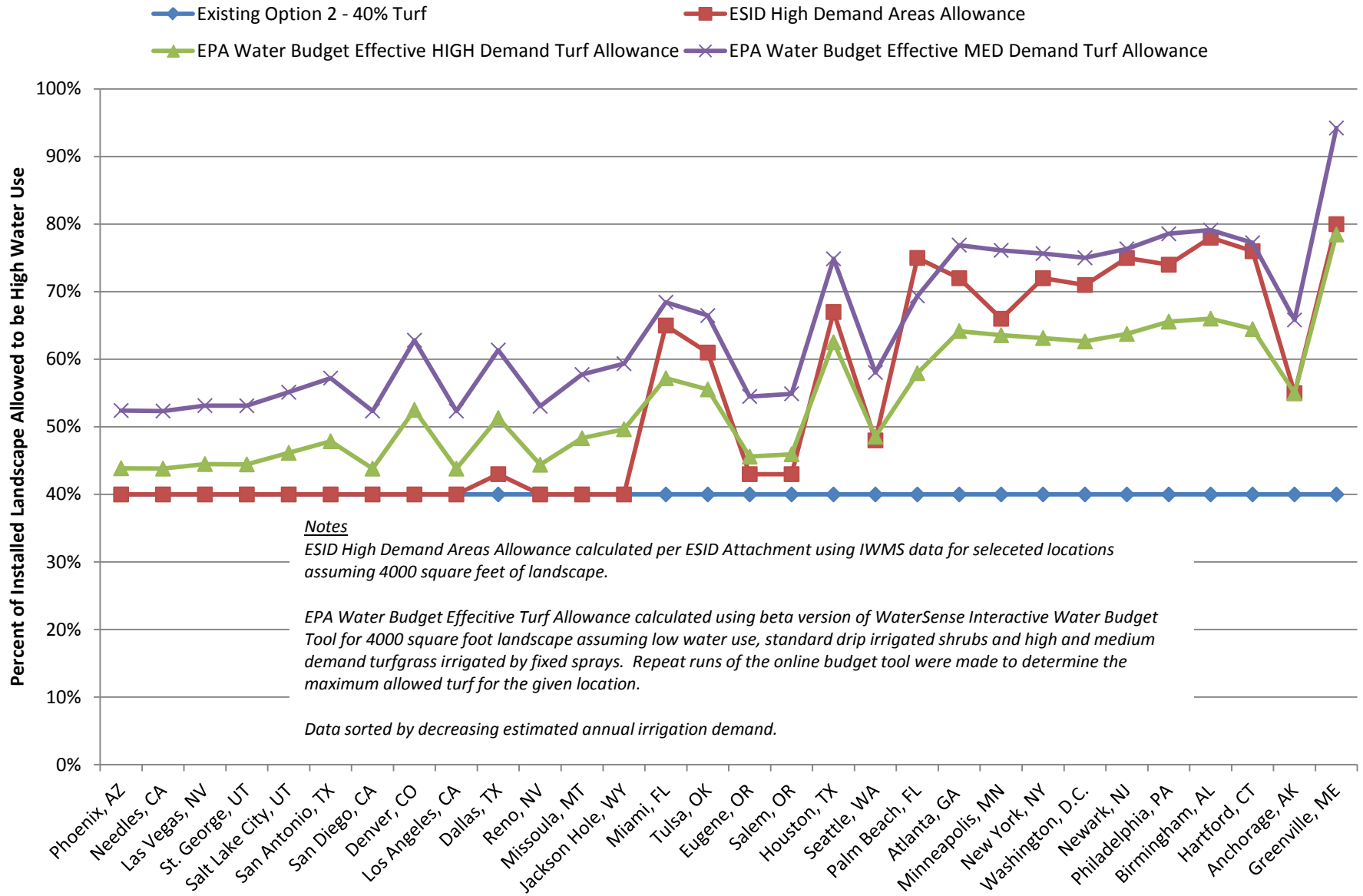
High Demand Areas<sup>1</sup> include areas with irrigated turfgrass, pools, spas, and other water features.

EXAMPLE

Though the calculation of Method 1 is straightforward, an example with real data is included below for the aid of the reviewer:

MONTH	HISTORIC EVAPOTRANSPIRATION RATE (HET <sub>o</sub> )  OR NORMAL PAN EVAPORATION (NPE)  (INCHES/MONTH OR MM/MONTH)	NORMAL PRECIPITATION <sup>1</sup> (NP)  (INCHES/MONTH OR MM/MONTH)	ESTIMATED SUPPLEMENTAL IRRIGATION DEMAND (ESID=(HET <sub>o</sub> OR NPE)- NP)  (INCHES/MONTH OR MM/MONTH)
January	0.63	0.59	0.04
February	0.84	0.60	0.24
March	1.84	1.51	0.34
April	3.60	2.28	1.32
May	5.63	3.45	2.19
June	6.50	4.03	2.46
July	6.96	3.96	3.00
August	5.79	3.70	2.10
September	3.78	2.75	1.04
October	2.61	1.87	0.74
November	1.20	1.35	0
December	0.63	0.84	0
Sum Columns	40.04	26.92	13.47
ESID Percentage = (Sum ESID / Sum HET <sub>o</sub> OR NPE)			34%
<b>High Demand Areas Allowance (1-ESID Percentage)</b>			<b>66%%</b>

## Comparison of Estimated Supplemental Irrigation Demand Approach and Existing WaterSense Water Budget



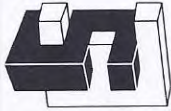
**Commenter:** Ed Saltzberg  
**Affiliation:** General Public  
**Comment Date:** February 29, 2012

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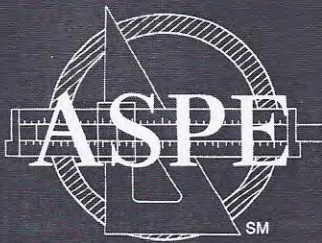
Dear Ms thornton here is the data concerning the waste of water due to having a bad hot water circulation system. Please call me at 818-9942613 so I can explain the various sheets. Hope these are of some use to you.



**Edward Saltzberg & Associates  
Forensic Mechanical Engineers**  
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# Domestic Water Heating Design Manual

What are reasonable delays in obtaining hot water at a fixture? For anything beside very infrequently used fixtures (such as those in industrial facilities or certain fixtures in office buildings), a delay of 0 to 10 seconds is normally considered acceptable for most residential occupancies and public fixtures in office buildings. A delay of 11 to 30 seconds is marginal but possibly acceptable, and a time delay longer than 31 seconds is normally considered unacceptable and a significant waste of water and energy. Therefore, when designing hot water systems, it is prudent for the designer to provide some means of getting hot water to the fixtures within these acceptable time limits. Normally this means that there should be a maximum distance of approximately 25 feet (7.6 meters) between the hot water maintenance system and each of the plumbing fixtures requiring hot water, the distance depending on the water flow rate of the plumbing fixture at the end of the line and the size of the line.

## ASPE Domestic Water Heating Design Manual

## Table 10.2 Approximate Fixture and Appliance Water Flow Rates

Fittings	Maximum Flow Rates <sup>a</sup>	
	GPM	L/Sec
Lavatory faucet	2.0	1.3
Public non-metering	0.5	0.03
Public metering	0.25 gal/cycle	0.946 L/cycle
Sink faucet	2.5	0.16
Shower head	2.5	0.16
Bath tub faucets		
Single-handle	2.4 minimum	0.15 minimum
Two-handle	4.0 minimum	0.25 minimum
Service sink faucet	4.0 minimum	0.25 minimum
Laundry tray faucet	4.0 minimum	0.25 minimum
Residential dishwasher	1.87 aver	0.12 aver
Residential washing machine	7.5 aver	0.47 aver

<sup>a</sup>Unless otherwise noted.

**Table 10.3 Approximate Time Required to Get Hot Water to a Fixture**

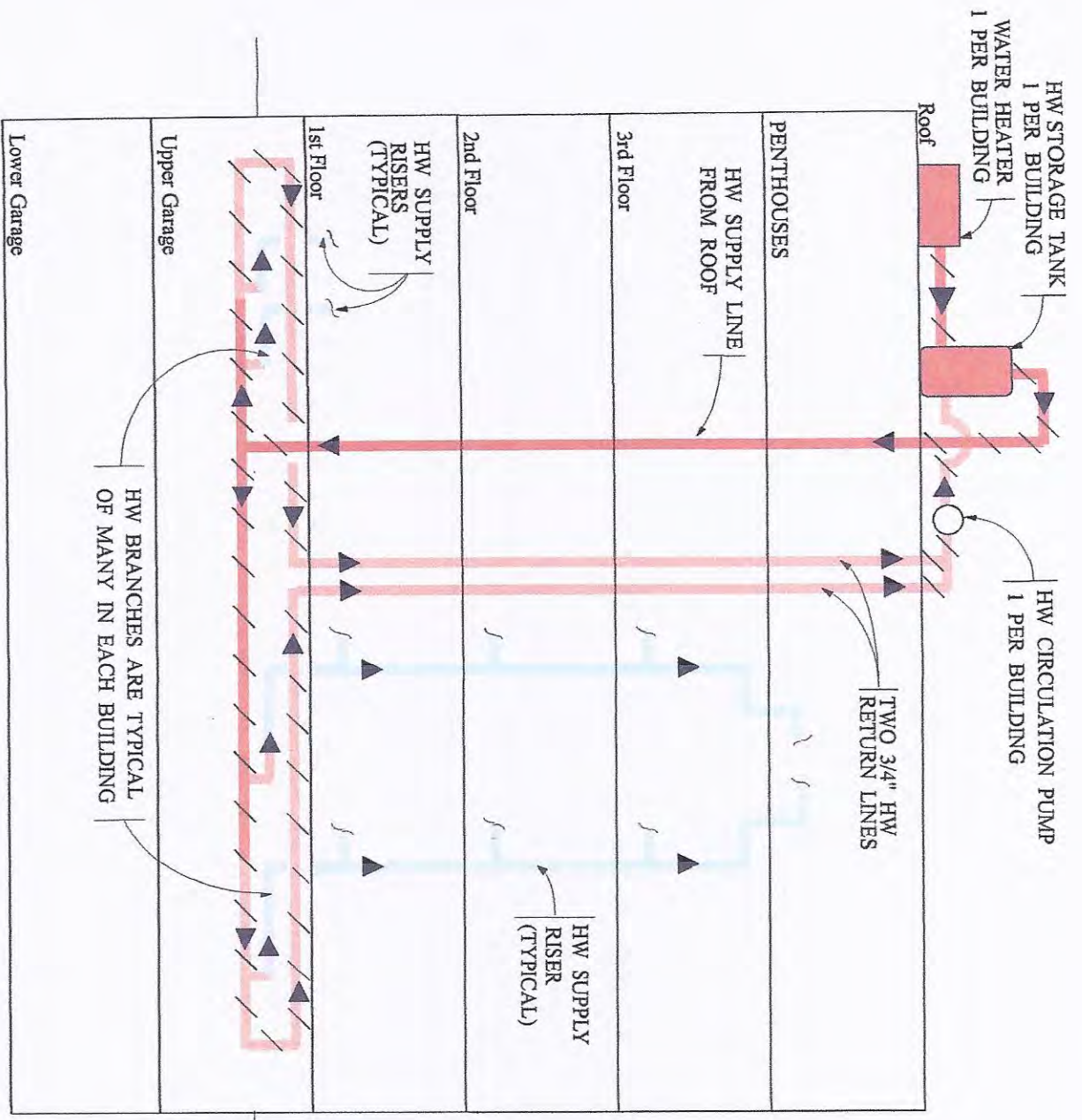
Fixture Flow Rate (gpm)	Delivery Time (sec)									
	0.5		1.5		2.5		4.0			
	10	25	10	25	10	25	10	25	10	25
Piping Length (ft)										
Copper Pipe	1/2 in.	3/4 in.	25	63a	8	21	5	13	3	8
	1/2 in.	3/4 in.	48a	119a	16	40a	10	24	6	15
Steel Pipe	1/2 in.	3/4 in.	63a	157a	21	52a	13	31a	8	20
	1/2 in.	3/4 in.	91a	228a	30	76a	18	46a	11	28
CPVC Pipe	1/2 in.	3/4 in.	64a	159a	21	53a	13	32a	8	20
	1/2 in.	3/4 in.	95a	238a	32	79a	19	48a	12	30

Note: Table based on various fixture flow rates, piping materials, and dead-end branch lengths. Calculations are based on the amount of heat required to heat the piping, the water in the piping, and the heat loss from the piping.



<sup>a</sup>Delays longer than 30 seconds are not acceptable.

**ASPE Domestic Water Heating Design Manual**



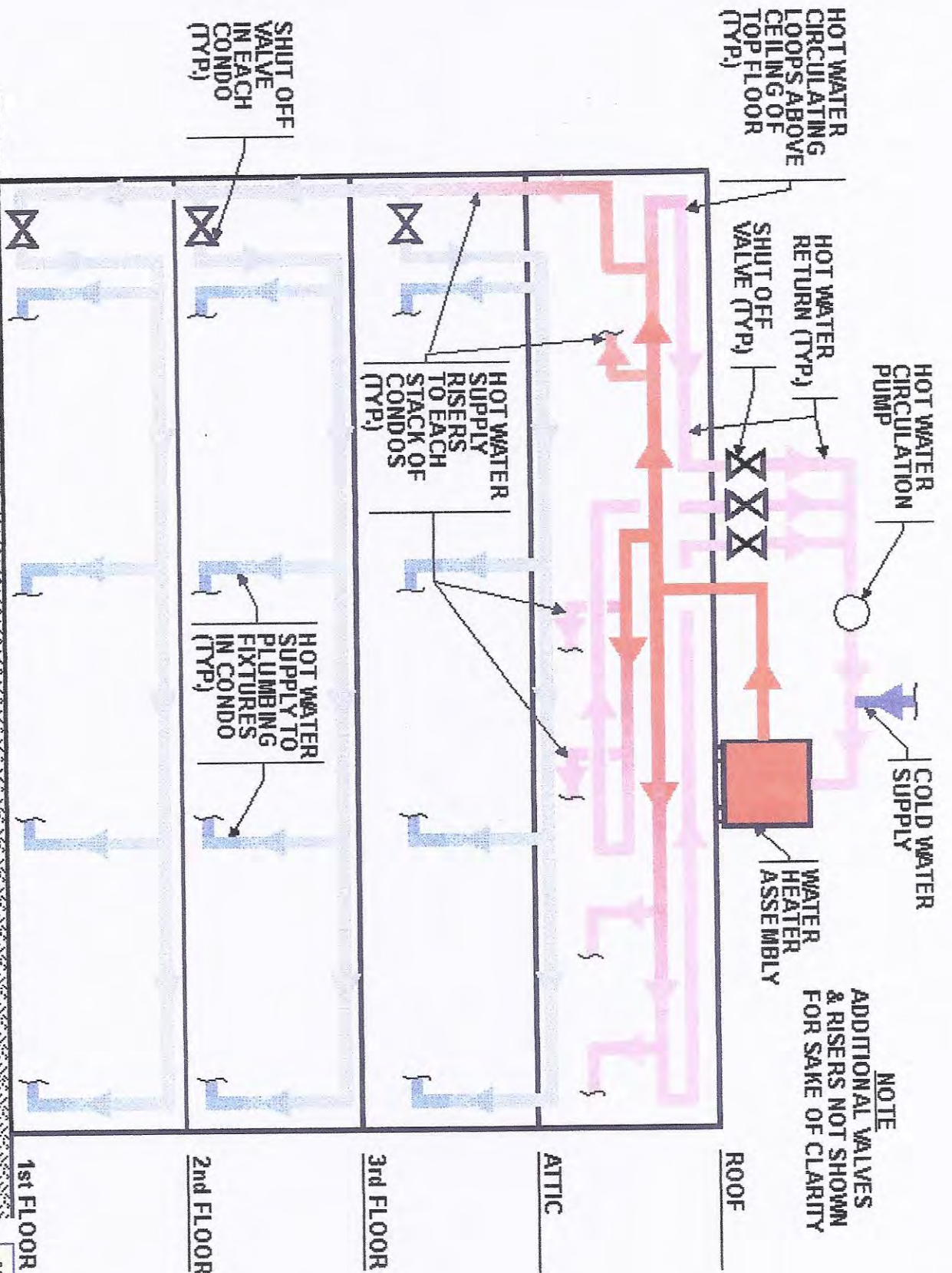


**HOT WATER DISTRIBUTION SYSTEM WITH STORAGE TANK**  
**NOT TO SCALE**

- LEGEND**
-  INSULATED PIPING
  -  UNINSULATED PIPING

**NOTE**  
 VALVES AND ADDITIONAL RISERS  
 NOT SHOWN FOR SAKE OF CLARITY.

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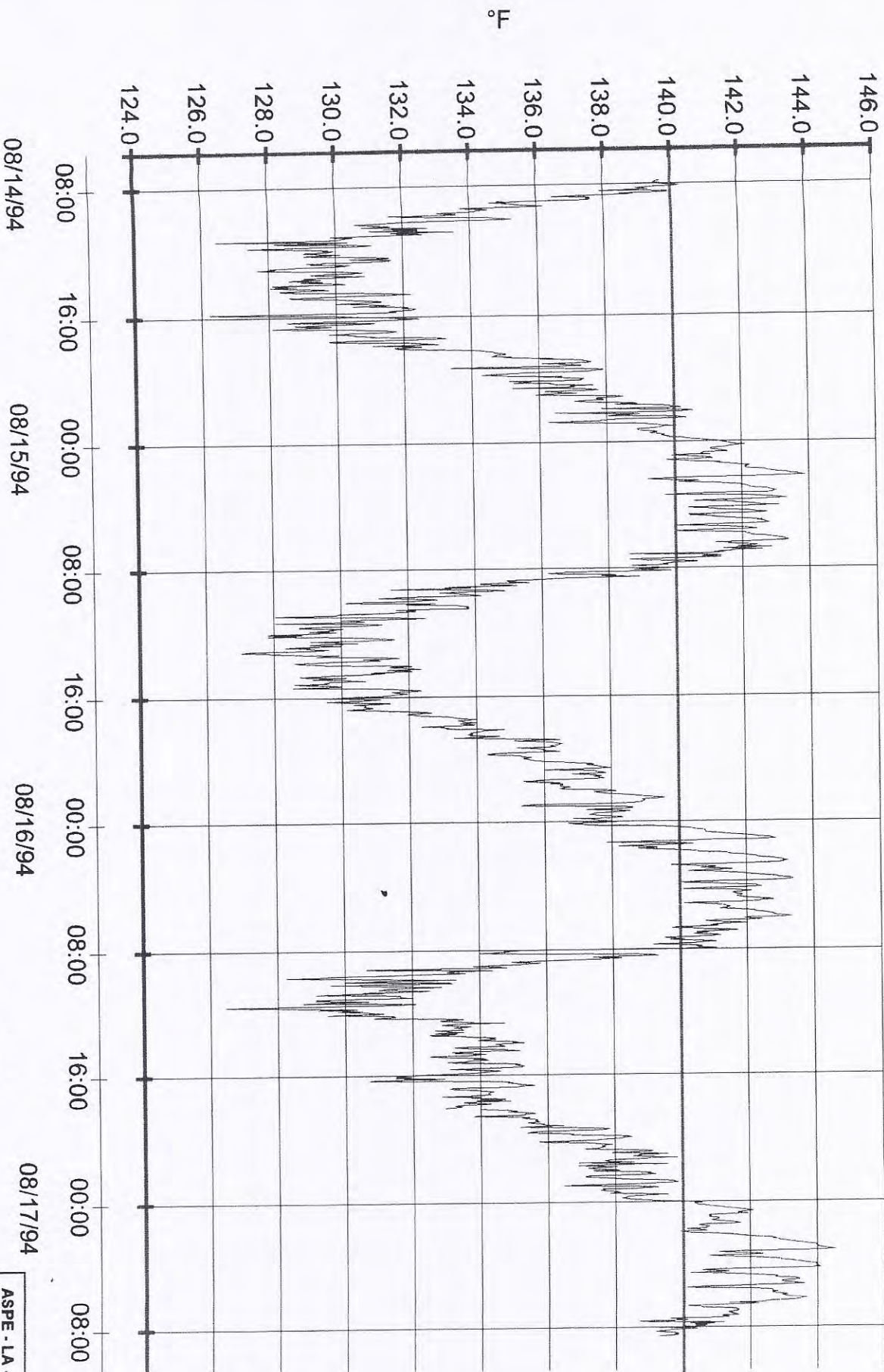
NOTE  
 ADDITIONAL VALVES  
 & RISERS NOT SHOWN  
 FOR SAKE OF CLARITY

**SCHEMATIC FLOW DIAGRAM OF DOMESTIC HOT WATER  
 DISTRIBUTION SYSTEM WITHOUT HOT WATER STORAGE TANK**

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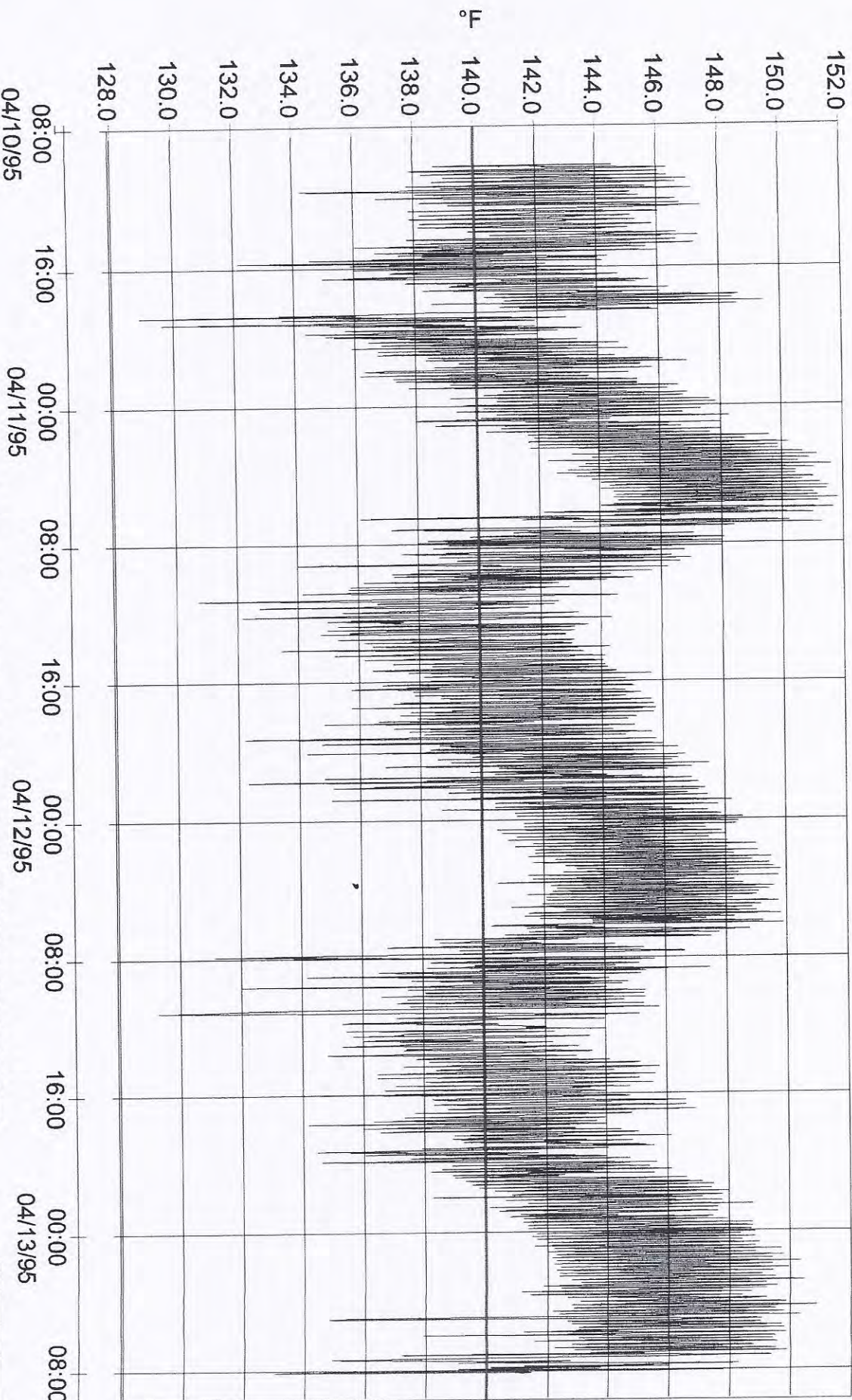
channel 2



**ENLARGED SCALE PLOT OF TEMPERATURE  
RECORDINGS FOR CHANNEL 2  
(BUILDING HOT WATER SUPPLY WITH STORAGE TANK)**

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Channel 1



**ENLARGED SCALE PLOT OF TEMPERATURE RECORDINGS FOR CHANNEL 1 (BUILDING HOT WATER SUPPLY WITHOUT STORAGE TANK)**

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SHOWER CONDITIONS	TIME DELAY TO GET HOT WATER	FLOW VOLUME DURING TIME WAITING FOR HOT WATER			FLOW VOLUME DURING FIVE-MINUTE SHOWER			TOTAL WATER VOLUME			HW VOLUME EQUIVALENT NUMBER OF 5-MINUTE SHOWERS WITH 140° F. HOT WATER SUPPLY	HEAT EQUIVALENT NUMBER OF 5-MINUTE SHOWERS WITH 140° F. HOT WATER SUPPLY
		COLD WATER [GALS]	HOT WATER [GALS]	TOTAL WATER [GALS]	COLD WATER [GALS]	HOT WATER [GALS]	TOTAL WATER [GALS]	COLD WATER [GALS]	HOT WATER [GALS]	TOTAL [GALS]		
50° F. COLD WATER SUPPLY 2.5 GPM SHOWER FLOW RATE 105° F. SHOWER TEMPERATURE	0 MINUTES	--	--	--	--	--	--	7.64	12.5	1.00	1.00	
	5 MINUTES	--	12.5	12.5	4.86	7.64	12.5	20.14	25.0	2.64	2.64	
	10 MINUTES	--	25.0	25.0				32.64	37.5	4.27	4.27	
140° F. HOT WATER SUPPLY 61.1% HOT WATER 38.9% COLD WATER	15 MINUTES	--	37.5	37.5				45.14	50.0	5.91	5.91	
	0 MINUTES	--	--	--	3.91	8.59	12.5	8.59	12.5	1.12	1.04	
	5 MINUTES	--	12.5	12.5				21.09	25.0	2.76	2.56	
130° F. HOT WATER SUPPLY 68.7% HOT WATER 31.3% COLD WATER	10 MINUTES	--	25.0	25.0				33.59	37.5	4.40	4.08	
	15 MINUTES	--	37.5	37.5				46.09	50.0	6.03	5.60	
	0 MINUTES	--	--	--	2.68	9.82	12.5	9.82	12.5	1.29	1.10	
120° F. HOT WATER SUPPLY 78.6 % HOT WATER 21.4% COLD WATER	5 MINUTES	--	12.5	12.5				22.32	25.0	2.92	2.50	
	10 MINUTES	--	25.0	25.0				34.82	37.5	4.56	3.91	
	15 MINUTES	--	37.5	37.5				47.32	50.0	6.19	5.31	

## WATER AND HEAT CONSUMPTION FOR SHOWERS AT VARIOUS CONDITIONS

PERCENTAGE OF HOT WATER IN  
MIXTURE OF HOT AND COLD WATER

FORMULA

$$\% \text{ of hot water} = \frac{T^{\circ}\text{mixed water} - T^{\circ}\text{cold water}}{T^{\circ}\text{hot water} - T^{\circ}\text{cold water}} \times 100\%$$

MIXED WATER	COLD WATER	HOT WATER			
		110°	120°	130°	140°
95°	35°	80.0%	70.6%	63.2%	57.1%
	40°	78.6%	68.7%	61.1%	55.0%
	50°	75.0%	64.3%	56.2%	50.0%
	60°	70.0%	58.3%	50.0%	43.7%
100°	70°	62.5%	50.0%	41.7%	35.7%
	35°	86.7%	76.5%	68.4%	61.9%
	40°	85.7%	75.0%	66.7%	60.0%
	50°	83.3%	71.4%	62.5%	55.6%
105°	60°	80.0%	66.7%	57.1%	50.0%
	70°	75.0%	60.0%	50.0%	42.9%
	35°	93.3%	82.4%	73.7%	66.7%
	40°	92.9%	81.0%	72.2%	65.0%
110°	50°	91.7%	78.6%	68.7%	61.1%
	60°	90.0%	75.0%	64.3%	56.2%
	70°	87.5%	70.0%	58.3%	50.0%
	35°	100%	88.2%	78.9%	71.4%
110°	40°	100%	87.5%	77.8%	70.0%
	50°	100%	85.7%	75.0%	66.7%
	60°	100%	83.3%	71.4%	62.5%
	70°	100%	80.0%	66.7%	57.1%

WATER CONSUMPTION AND COMPARISON FOR 201 AND 682 UNIT CONDO PROJECTS									
NUMBER OF CONDO UNITS	NUMBER OF BEDROOMS	NUMBER OF TOILET ROOMS	NUMBER OF OCCUPANTS <sup>3</sup>	TOTAL WATER CONSUMPTION IN 100 CUBIC FT FOR PERIOD 6/19 THROUGH 7/19 1996					PER PERSON
				PER BUILDING	PER CONDO	PER BEDROOM	PER TOILET ROOM	PER PERSON	
20 <sup>1</sup>	43	41.5	65	300	15.0	7.0	7.2	4.6	
68 <sup>2</sup>	148	142	222	470	6.9	3.2	3.3	2.1	
PERCENT INCREASE IN USE <sup>4</sup>					217%	219%	218%	219%	
DIFFERENCE IN 100 CUBIC FT PER MONTH <sup>4</sup>				162	8.1	3.8	3.9	2.5	
EXTRA CONSUMPTION IN GALLONS PER MONTH <sup>4</sup>				121,184	6,059	2,842	2,917	1870	
EXTRA COST PER MONTH <sup>4</sup>				\$647.60	\$27.38	\$12.84	\$13.18	\$8.45	
FIGURED AT \$3.38 PER 100 CUBIC FT									

GAS CONSUMPTION AND COMPARISON FOR 201 AND 682 UNIT CONDO PROJECTS									
NUMBER OF CONDO UNITS	NUMBER OF BEDROOMS	NUMBER OF TOILET ROOMS	NUMBER OF OCCUPANTS <sup>3</sup>	TOTAL GAS CONSUMPTION IN THERMS FOR PERIOD 5/14 THROUGH 6/13 1996					PER PERSON
				PER BUILDING	PER CONDO	PER BEDROOM	PER TOILET ROOM	PER PERSON	
20 <sup>1</sup>	43	41.5	65	386	19.3	9.0	9.3	5.9	
68 <sup>2</sup>	148	142	222	861	12.7	6.8	6.1	3.9	
PERCENT INCREASE IN USE <sup>4</sup>					152%	155%	152%	151%	
EXTRA CONSUMPTION IN THERMS PER MONTH <sup>4</sup>				132	6.6	3.2	3.2	2.0	
EXTRA COST PER MONTH <sup>4</sup> AT \$0.65 PER THERM				\$85.80	\$4.29	\$2.08	\$2.08	\$1.30	

1. 20 UNIT BUILDING HAS VERY BAD HOT WATER TEMPERATURE MAINTENANCE SYSTEM.
2. 68 UNIT BUILDING HAS AN ADEQUATE HOT WATER TEMPERATURE MAINTENANCE SYSTEM AND ALSO HAS A SWIMMING POOL.
3. BASED ON 1.5 PERSONS PER BEDROOM.
4. 20 UNITS VERSUS 68 UNITS.

*Handwritten notes:*  
 1. 20 Unit Building  
 2. 68 Unit Building

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AutoCirc® is a complete retrofit solution for all homes and for light commercial applications. It is the most efficient system, turning on only when the system needs to be replenished with hot water. It does not require a return line and is suitable for installation in any existing home or building where hot and cold water pressure are evenly distributed. No additional piping is required in the installation.

**Technical Datas**

- |                        |   |
|------------------------|---|
| Motor Design           | Shaftless spherical motor                               |
| Horsepower             | 1/150   |
| Input Watts / Amps     | 33 Watts  |
| Max. fluid Temp. F / C | 230°F / 110°C   |
| Max. line pressure     | 150 PSI   |
| Noise Level            | 15 dB   |
| Compatible fluids      | Domestic water, heating water, water / Glycolmixtures*. |
- \*Please check pump performance for mixtures of 20% or more glycol.

roduced under one or more of the following patents:  
 941,275 / 5,944,221 / 5,983,922 / 6,026,844 /  
 059,965 / 6,149,407 / 5,072,717 / 6,227,235



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ITT, 3878 S. Willow, Suite 104  
 Fresno, CA 93725 Tel: (559) 265-4730 (800) 554-6853  
 Fax: (559) 265-4740 (800) 453-7523  
 Internet: www.autoCirc.com

# Instant hot water at every faucet



Retrofit instant hot water system for every application

- ◆ Saves Water
- ◆ Saves Money
- ◆ Saves Time



## How Autocirc® works



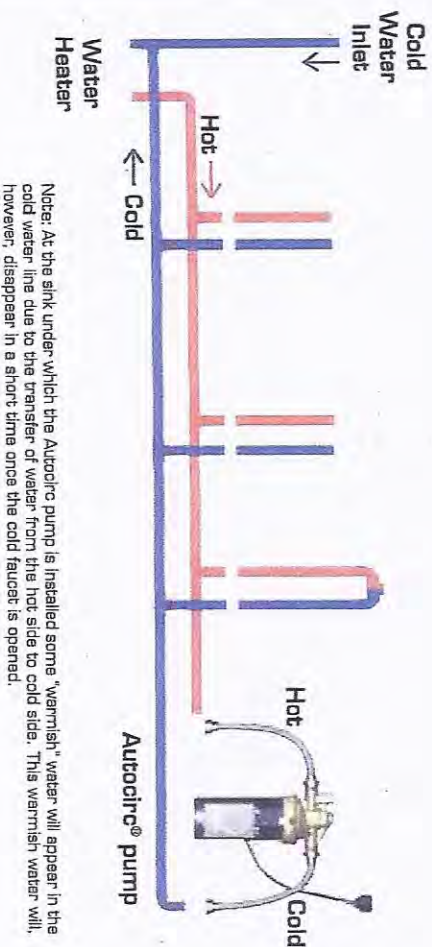
The Autocirc® is the most efficient system, turning on only when the system needs to be replenished with hot water. The Pump is installed under the sink farthest from the water heater where hot water takes the longest to arrive. No recirculation line is required.



A built-in temperature sensor automatically turns the pump on when water temperature in the hot water line cools down to 85°F. Water is then pumped from the hot to cold line. Hot water will also be instantly available at all other faucets located on the hot water supply line between the water heater and the faucet where the Autocirc® is installed.

The Autocirc® Pump turns off automatically when water temperature reaches 95°F, ensuring instant availability of shower warm water with maximum temperature hot water only seconds behind. When the pump is off, a built-in auto closure device prevents any other hot-to-cold line or cold-to-hot line mix.

## Typical Installation Scheme



Note: At the sink under which the Autocirc pump is installed some "warmish" water will appear in the cold water line due to the transfer of water from the hot side to cold side. This warmish water will, however, disappear in a short time once the cold faucet is opened.

## Frequently Asked Questions and Answers

- Q. When should I consider installing an Autocirc® system?
  - A. In an existing home whenever you must wait 30 seconds or more for hot water to arrive at the faucet or at a shower farthest from your water heater.
- Q. Where should the system be installed?
  - A. Under the sink (plumbed between or to the side of the hot and cold water faucet inlet riser) where it takes hot water the longest time to arrive at the hot water faucet - usually the sink/faucet farthest from the water heater.
- Q. Is there a limitation on the size of the home or length of water supply line for the Autocirc® system to be effective?
  - A. No. The longer the line, the longer the pumps operating cycles. However, this is of no consequence to the system's effectiveness or system's life expectancy.
- Q. When I open the cold water faucet at the sink under which the Autocirc® system is installed what prevents hot water from the hot water line from coming out of that faucet?
  - A. The pump housing has a patented, built-in auto closure device which prevents water from the hot water line coming through the cold water faucet and vice versa. The only exception is that when the cold water faucet is opened during one of the intervals when the pump is running, warm water will be directed from the hot water line through the cold water faucet. The warm water flow, however, will last only for a very short time and will end once the water temperature in the hot water line reaches 95°F thereby shutting off the pump.
- Q. What if I have a branched hot water piping system where one hot water supply line goes to one part of the home and another line goes to another part of the home?
  - A. Two Autocirc® systems would have to be installed, one under the farthest sink on each line.
- Q. Since water from the hot water line is being pumped into the cold water line, will there be any prolonged period of warm water coming out of the cold water line?
  - A. No. Once the cold water faucet is opened any "warmish" water in the cold water line takes only a very short time to dissipate before cold water arrives.
- Q. What is the temperature of the hot water at the hot water faucet when I first turn it on in the morning?
  - A. If the pump timer is set to allow the pump to go on before you turn on the faucet the temperature will be between 85°F and 95°F, which is basically shower warm water. However, full temperature hot water will arrive only seconds later.
- Q. Will the other faucets in my home have hot water instantly available?
  - A. With the Autocirc® system installed under the sink farthest from the water heater, all the hot water faucets directly on the main hot water supply line between the water heater and that farthest faucet will have instant hot water available. For those faucets located on branch lines off the main hot water supply line, availability of hot water will take slightly longer to arrive than for those faucets located on or just off the main water line.
- Q. My shower is a few feet downstream from the sink under which the Autocirc® system is installed. Will hot water be available instantly also at the shower?
  - A. Not Quite. Hot water will arrive once the few feet of cooled down water that is in the hot water line between the sink and shower flushes through the shower head - literally in seconds as compared to your previous wait.
- Q. Does the pump cycle on and off frequently during the day?
  - A. Yes. The pump will cycle on and off from 1-2 times per hour during the operating time period you set on the pump timer on/off operation. No matter how many cycles, it is in no way harmful to the pump or to its expected operating life, an additional advantage of the pump's spherical motor design.
- Q. Will I hear the pump during operation?
  - A. No. The pump system is virtually noiseless.
- Q. How much does the system cost to operate?
  - A. Actually an Autocirc® installation saves money - see the cost savings chart.

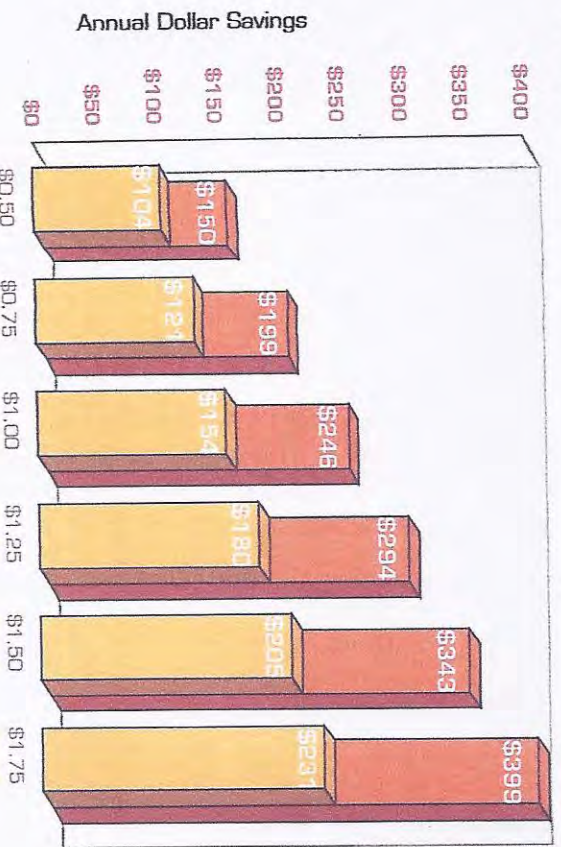
## Lairing - the leader in instant hot water circulation technology

The Autocirc® is the most efficient system turning on only when the system needs to be replenished with hot water:

- ◆ saves energy, money, water and pays for itself in a short period of time
- ◆ is silent during operation
- ◆ has a built-in 24-hour timer which allows the selection of system operating periods to suit family usage
- ◆ has a built-in fixed thermostat or an optional, adjustable thermostat
- ◆ requires only one pump and one installation for all fixtures on the hot water plumbing line
- ◆ does not require a return line
- ◆ comes complete with a 6 ft. long power cord
- ◆ requires only 33 Watts of power
- ◆ saves the average family of four up to 17,000 gallons of water annually

### Saves money and pays for itself

Annual dollar savings using Lairing Autocirc® System with gas or electrical water heater

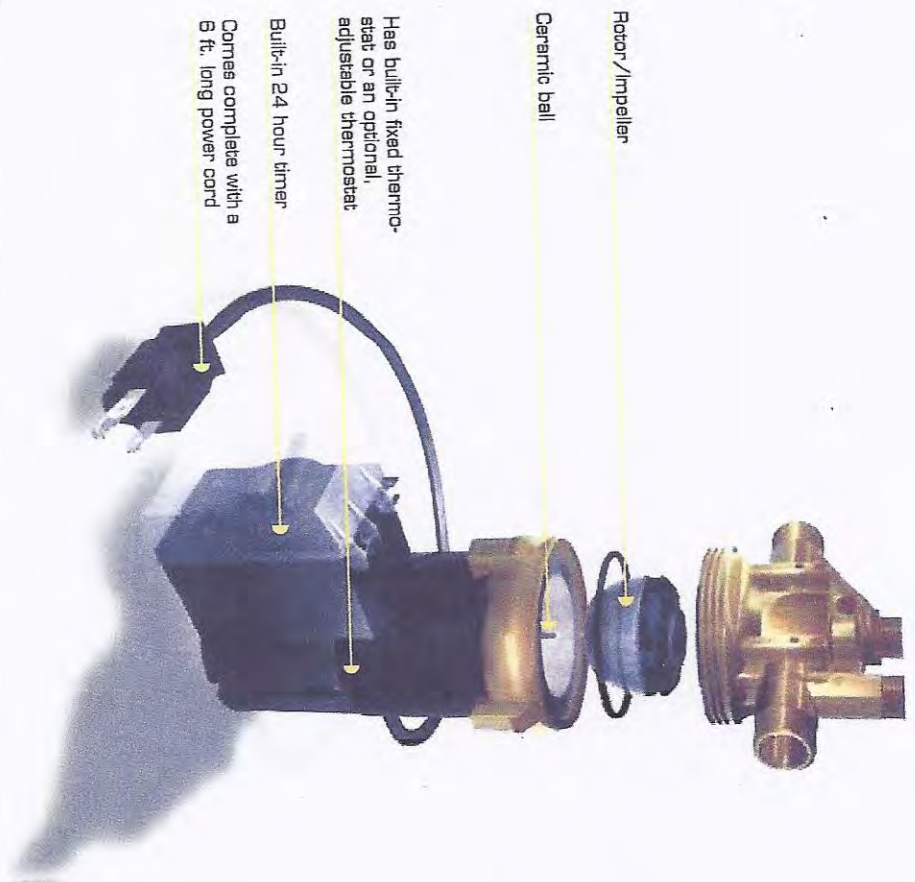


Calculations based on: Water cost - \$2.02/100gals; Sewer surcharge - \$1.35/100gals; Notes: Use of insulated copper supply line on Autocirc item would result in additional savings. Actual savings may differ from household to household depending on a variety of factors incl. water use rates, length of hot water supply line, number of home occupants, etc. Above summary based study and analysis prepared by Edward Sotzberg & Associates, Consulting Mechanical Engineers. Copies of this detailed analysis are available on request from Lairing Thermostech, Inc.

## Design

The Autocirc® has a spherical motor. The only moving part of the pump is a spherical impeller unit which is suspended on a wear resistant ceramic ball.

Lairing pumps are completely shaft-less. The patented, Lairing design eliminates pin shafts, seals and cylindrical bearings found on conventional, mechanically sealed pumps. Simply the best - by design.



Rotor/Impeller

Ceramic ball

Has built-in fixed thermostat or an optional, adjustable thermostat

Built-in 24 hour timer

Comes complete with a 6 ft. long power cord

**auto**circ®

Model	Description
ACT-303-BTW	Pump with fixed thermostat
ACT-303-BTFW	Pump with adjustable ON thermostat