Comments on WaterSense® Notice of Intent (NOI) to Develop a Draft Specification for Point-of-Use Reverse Osmosis (RO) Systems

May 24, 2022

Table of Contents

Commenter: Baruch Ziser
Affiliation: TipaTech
Comment Date: January 16, 2022

Email Text:

Hello everyone
Thank you for the opportunity you give us to state the worldview of Tipa Tech
I assume domestic RO technologies will evolve and reach higher water flows and less water thrown into the Sewage water
There are several methods for achieving the goal
- Recycling water thrown into the sewer - an existing and cumbersome method with relatively low results relative to the price of the financial investment
- Use of water emitted from the process in favor of watering the garden - a cumbersome and expensive method that requires a water pump, a reservoir tank for water storage, water treatment so that they do not become contaminated
- Increasing the output of the membrane to 800 GPD and more - a great idea with little water released into the sewer and can be obtained at a reasonable price
- Using UF MEMBRANE- At a filtration level of 0.01 micron the level of the smallest pollutants which are heavy metals and viruses is 0.014 micron so we will always know to give clean water
This is our contribution first and foremost to humanity and only then to our loyal customer all over the world
In our case we produced a faucet with two pouring options one from the first filter water with a cleaning of 0.01 micron and the second faucet in favor of boiling in a kettle an espresso machine and a water iron without calcium and magnesium
You can see our product above
Thank you very much
Baruch Ziser

TipaTech
LOTUS - The most advanced home water purifier
Baruch Ziser
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Fax: +972(0)77-4448057
E-mail: ziser@tipatech.co.il
Website: www.tipatech.co.il

Email Attachments:

Attachment 1: lotus must softener.jpg

Attachment 2: LOTUS MSUT WATER FILTER NEW1.jpg

Attachment 3.

Commenter: Dave Fowler
Affiliation: Liquos
Comment Date: February 5, 2022

Email Text:

Hi,

Thanks for creating this program.

Liquos has been building high efficiency POU RO systems for a number of years.

What strikes me first is the relative inefficiency of RO systems in general. Walk the aisle at WQA and we see the same systems, with conventional auto-shut off valves we've seen for over 30 years.

I've always understood that net psi was key to building an efficient RO - thus, we've always used one or more permeate pumps in our applications. I believe greater emphasis should be placed on the definition of performance as a function of real world operation. Manufacturers label their systems at 100 GPD, when in fact taking into consideration compensation variables: Water Temp. / Feed PSI - Back PSI = Net psi, one quickly understands conventional shutoff systems are always operating (with air capture tanks) at their most inefficient zone.

I think it important consumers understand the relationship of net operating psi (delta) and where an RO system is generally operating as being a key informative visual / graphic / icon or Silver / Gold / Platinum standard. Also, I think it important to require publishing a number folks can relate to, of an actual amount of water dumped to drain over a 5 year period —> if you drink 1 gallon of water per day // 2 gallons per day etc, this is how much water will be dumped to drain — so folks have an idea of just how much water is wasted. When I show customers the huge difference a permeate pump makes, they realize very quickly a conventional RO system is a "gas guzzler" and do not want anything to do with them.

We want to reward companies to innovate with new technologies, such as water on water systems or high flux systems as well as the very reliable and performance enhancing permeate pump — which we have used to help create high production POU systems at offices serving 100 - 200 people daily, for both hydration and beverage dispensing needs.

Liquos provides the drinking water for companies such as Google, Ebay, PayPal, Netflix...

Regards,

Dave

Dave Fowler, CEO

650-280-9003 m
650.964.4200 o

Commenter: Eric Yeggy
Affiliation: Water Quality Association (WQA)
Comment Date: March 5, 2019

Email Text:

I am submitting the attached comments on behalf of the Water Quality Association. Please contact me if you have any questions, or if you do not receive the attachment.

Eric Yeggy | Director of Technical Affairs | Water Quality Association
2375 Cabot Drive | Lisle, Illinois 60532 | ☎ 630-929-2539 or 630-505-0160, ext. 539

Click here to learn more about the value of being a WQA member.

Email Attachment:

See pages 8 through 15.

WQA Comments submitted to EPA on 2/11/2022

This document contains comments from the Water Quality Association (WQA) regarding the EPA's Notice of Intent (NOI) to publish WaterSense specifications for Point-of-Use (POU) Reverse Osmosis (RO) drinking water treatment systems.

The Water Quality Association is a not-for-profit association for the residential commercial, and industrial water treatment industry; representing more than 2,500 member companies around the globe. Our membership is comprised of equipment manufacturers, suppliers, dealers and distributors of water quality improvement products and services.

Copied from the EPA's NOI: NSF/ANSI 330 does not provide definitions specific to RO systems. However, EPA has modified
the NSF/ANSI 330 definitions above to define the following terms:

- RO system: A system that incorporates a water treatment process that removes undesirable materials from water by using pressure to force the water molecules through a semipermeable membrane.
- POU RO system: A plumbed-in or faucet-mounted RO system used to treat the drinking and/or cooking water at a single tap or multiple taps, but not used to treat the majority of water used for washing and flushing or other non-consumption purposes at a building or facility. Any batch RO system or device not connected to the plumbing system is considered a point-of-use RO system.
- POE RO system: An RO system used to treat the water supply at the entry of a building or facility for drinking and for washing, flushing, or other non-consumption use. A POE RO system has a minimum initial clean-system flow rate of not less than 15 liters per minute at 103 kilopascals pressure drop and 18 ± 5 °C water temperature (not less than four gallons per minute at 15 psig pressure drop and 65 ± 10 °F water temperature).

These definitions will be used for the purposes of this NOI and to inform future specification development related to this product category. EPA does not intend to differentiate between commercial and residential RO systems in its specification and therefore did not propose definitions for these terms. **EPA is seeking input on these definitions and would also be interested in other accepted industry definitions. [Page 7 – 8]**

WQA Comment: We agree that these definitions are acceptable for use in this specification.

Copied from the EPA's NOI: Based on research and conversations with stakeholders, EPA intends to exclude POE RO systems from the scope of a potential WaterSense specification. Not all end uses of water require or even benefit from the quality of water generated from an RO system (e.g., water used for toilet flushes, clothes washing, or bathing). While POE RO systems are generally more efficient due to their tendency to include electric booster pumps and/or recirculate some of the concentrate water, POE RO systems treat, and subsequently waste, more water on the whole than POU systems. WaterSense, therefore, does not want to encourage the use of oversized systems that subsequently generate significant water waste during the treatment process. **WaterSense is**

seeking input on the intended scope of a potential specification that includes POU RO systems, as defined above, and excludes POE systems. [Page 8]

WQA Comment: We agree that different specifications would be needed for POE versus POU RO systems. However, the proposed target rated efficiency level of 40% for POU RO systems would cause significant tradeoffs for the consumer. More on this aspect is included in our other comments.

Copied from the EPA's NOI: EPA intends to limit the scope of a potential WaterSense specification to POU RO systems, as defined above, consistent with the applicability of NSF/ANSI 58. NSF/ANSI 58 does not differentiate among POU RO systems that are intended for residential or commercial applications; therefore, its scope is slightly broader than the ASSE 1086 standard, which is limited to residential POU systems.

At this point in time, EPA does not see the need to limit a specification to residential POU RO systems and exclude POU products that may be used in commercial applications. Within the POU category, WaterSense also does not intend to distinguish among the different types of POU RO systems (e.g., countertop, undersink) in terms of the water efficiency or performance requirements.

WaterSense is considering whether to include high-efficiency RO membranes in the scope of its specification to help distinguish them from typical membranes. This would help consumers identify appropriate high-efficiency replacement membranes for their system to ensure it continues to perform at its rated water efficiency. Additionally, it may encourage consumers with less efficient systems to purchase compatible high-efficiency membranes to increase the efficiency. As discussed in more detail in Section V Performance and Product Testing, ASSE 1086 includes test procedures to evaluate a high-efficiency membrane separate from an RO system, at least with respect to life span and performance. **WaterSense is seeking feedback on whether labeling RO membranes would be beneficial to consumers and whether it is feasible to swap out the membrane in a typical RO system for a higher efficiency membrane to increase the system's water efficiency. [Page 8]**

WQA Comment: We would encourage the EPA to review the experience of the certification bodies in regards to manufacturers offering filter cartridges that "fit-in" other manufacturers filter housings. The EPA would encounter these same challenges if they were to embark on a WaterSense label that encourages manufacturers to sell RO membrane modules that "fit-in" other manufacturers RO systems.

While there is nothing unethical or illegal about this practice, it creates a great many challenges when a third-party attempts to apply a certification (such as a WaterSense label) to these replacement products which are marketed to "fit-in" other branded systems. WQA would be happy to engage in a discussion with the EPA to highlight challenges we faced when attempting to implement a certification for "fits-in" products.

Beyond the operational challenges which must be overcome when attempting to implement a certification scheme that covers "fits-in" replacement modules, the practice has historically created confusion with consumers and other end users who are seeking to understand if the "fits-in" replacement module will provide the same level of performance and protection. This can be especially concerning in cases where the treatment system is being used to protect consumers from health-related contaminants (e.g., lead release from premise plumbing or service lines, private well owners, high-risk individuals who are using a certified in-home water treatment system, etc.)

Copied from the EPA's NOI: WaterSense is considering whether to include high-efficiency RO membranes in the scope of its specification to help distinguish them from typical membranes. This would help consumers identify appropriate high-efficiency replacement membranes for their system to ensure it continues to perform at its rated water efficiency. Additionally, it may encourage consumers with less efficient systems to purchase compatible high-efficiency membranes to increase the efficiency.

Beyond potential consideration for labeling RO membranes, WaterSense does not intend for the specification to apply to other accessories or "add-on" devices intended to improve product efficiency, production rate, or otherwise impact the operation of an RO system. These products include a permeate pump, which is a non-electric device that can be used to retrofit a POU RO system to reduce the back pressure from the storage tank and therefore improve the system's water efficiency and performance. Other companion products include retrofit recirculation kits (used to recirculate the concentrate water as feed water) and any systems that divert RO reject water for other uses. If a POU RO system requires the use of a companion product to meet the requirements of a future specification, then WaterSense intends to require the companion product to be tested, packaged, and sold along with the system in order for the system to bear the WaterSense label. **WaterSense is seeking feedback on its intent to exclude addon/ aftermarket companion products from the scope of the specification. [Page 9]**

WQA Comment: We agree that where companion products are required to meet the proposed WaterSense specification, it would be best to require that those system components be packaged and sold with the certified system. Applying the WaterSense label to those companion system components when they are sold separately could create confusion.

Copied from the EPA's NOI: There are also a variety of hybrid RO systems within the marketplace that combine various methods of water treatment, including filtration and even ultraviolet (UV) disinfection. The additional treatment technologies may fall within the scope of other NSF/ANSI standards. For example, filters are tested and certified according to NSF/ANSI 42 Drinking Water Treatment Units—Aesthetic Effects and/or NSF/ANSI 53 Drinking Water Treatment Units—Health Effects. UV systems are tested and certified according to NSF/ANSI 55 Ultraviolet Microbiological Water Treatment Systems. The scope of NSF/ANSI 58 requires that systems with manufacturer claims that include components or functions covered under other NSF or NSF/ANSI standards must conform to those applicable requirements; therefore, EPA's understanding is that any RO system certified to NSF/ANSI 58 would also be required to have filters and other components certified to applicable standards. WaterSense intends to permit hybrid systems to earn the WaterSense label, provided the RO portion of the system meets the scope and all water efficiency and performance requirements of a future specification. **WaterSense is seeking input on its intent to include hybrid systems within the scope of a specification. Further, WaterSense seeks feedback on whether it should require that components of hybrid systems be tested and certified to other applicable standards (e.g., NSF/ANSI 42 for filtration, NSF/ANSI 55 for UV).**

WQA Comment: We agree that this approach seems consistent with the approach suggested for companion system components and a good strategy to avoid confusion.

Copied from the EPA's NOI: WaterSense intends to adopt the NSF/ANSI 58 testing procedures for recovery rating and efficiency rating. **WaterSense is seeking feedback from stakeholders regarding the viability of using the NSF/ANSI 58 recovery rating and efficiency rating test methods to evaluate RO system water efficiency. [Page 9 – 11]**

WQA Comment: We agree that it makes sense to reference the long-established test procedures in NSF/ANSI 58 for rated recovery and rated efficiency.

Copied from the EPA's NOI: WaterSense is also considering adopting criteria to require RO systems to achieve a recovery rating of at least 40 percent and an efficiency rating (as applicable) of at least 40 percent. These criteria align with the requirements of ASSE 1086. **WaterSense is seeking feedback from stakeholders on this proposed water efficiency criteria for POU RO systems. [Page 11]**

WQA Comment: We agree that different specifications would be needed for POE versus POU RO Systems. However, the proposed rated efficiency target of 40% seems unachievable for many of the current manufacturers and would cause significant tradeoffs for the consumer. A better strategy would be to broadly engage the entire industry by setting a rated efficiency goal that can be achieved by a broad section of the industry as demonstrated through existing third-party testing and certifications of RO systems that remove health-related contaminants. In general the EPA strives to ensure that WaterSense labeled products use 20% less water than average products in the same category. The EPA should investigate the proposed rated efficiency target in more detail and the relationship between this rating and the overall water usage of a product. For example, let's assume that the average certified POU RO system with health-related claims has a rated efficiency of 15%, and that the average household needs to obtain about 1000 gallons of treated drinking water per year from their POU RO system (based on the 1000 gallon challenge in the membrane life test from standard 1086). An average POU RO system operating with a 15% rated efficiency will require 6667 gallons of total water to generate that 1000 gallons of treated water. Were the EPA to establish a rated efficiency target of 20% for WaterSense labeled POU RO systems, the WaterSense labeled systems would require only 5000 gallons of total water to generate that 1000 gallons of treated water. This is a reduction of 1667 gallons of water use per year, per household, or at least a 25% reduction in overall water usage for the WaterSense labeled systems.

The potential tradeoffs of meeting a 40% rated efficiency target should also be considered. These could include the life span of the membrane, contaminant removal, and price to the consumer.

Copied from the EPA's NOI: Automatic shutoff devices are an important water-saving component applicable to RO systems. This device shuts off the flow of incoming water when the storage tank fills to a certain capacity, thereby stopping the treatment process, preventing the tank from overflowing, and preventing reject water when the system is not actively treating. This is a requirement included within ASSE 1086. Similarly, WaterSense intends to require that all RO systems be equipped with an automatic shutoff device. **WaterSense is seeking input on whether requiring an automatic shutoff valve is a reasonable expectation for a water-efficient RO system. [Page 12]**

WQA Comment: We agree that it is reasonable to expect an RO system which is carrying the WaterSense label to have an automatic shutoff device. And this technology is readily available to all RO manufacturers through a variety of sources. WQA would encourage the EPA to seek input from the industry to establish guidelines that allow the use of a broad variety of shut-off devices (e.g., automatic shut-off valves, on/off solenoids, floats for non-pressurized tanks, etc.)

Copied from the EPA's NOI: During discussions with stakeholders, some indicated that it may be possible for consumers to make modifications or changes to the system after purchase that would decrease product efficiency. For example, a customer could replace the RO membrane within a high-efficiency RO system with a less efficient membrane, either by accident or to save on

maintenance costs. It is also possible that the consumer could replace the storage tank with a different size. **WaterSense is seeking feedback on the likelihood of these post-purchase modifications and the magnitude of their effect on the RO system's water efficiency. WaterSense is also seeking suggestions on how to encourage and inform consumers to purchase appropriate replacement parts to maintain their system's water efficiency. [Page 12]**

WQA Comment: We agree that strategies utilized to meet the very aggressive goal of 40% rated efficiency target might result in significant tradeoffs from a consumer perspective. Establishing a less aggressive rated efficiency target might go a long way towards preventing these types of tradeoffs which could undermine consumer confidence in the WaterSense label, and encourage these types of post-purchase modifications. It is also important for the EPA to consider that a program structure which encourages these types of post-purchase modifications might compromise system performance (in addition to the rated efficiency) and consumers may no longer be receiving the same level of protection from health-related contaminants in their drinking water. This could result in unintended consequences where systems were being used to protect private well owners, high-risk individuals, and other members of the general public.

Copied from the EPA's NOI: WaterSense has not identified field studies to date that assess actual water savings associated with more efficient RO systems compared to inefficient systems. Further, while EPA has anecdotally heard that an estimated one million POU RO systems are sold annually, the exact product market is unknown. **WaterSense is seeking RO system market data and usage data to assess the impact of a potential WaterSense specification on potential water savings. [Page 12]**

WQA Comment: While we do not have data that directly answers the question of potential water savings, some general conclusions can be made based on existing certifications. The proposed specification is based on a 40% rated efficiency target. None of the POU RO systems which we have currently certified meet this proposed rated efficiency target. This suggests that the EPA would make a larger impact on overall water usage by setting a rated efficiency target that most manufacturers would be capable of achieving with existing technology, and without utilizing design tradeoffs that would be undesirable from a consumer and public health perspective.

Copied from the EPA's NOI: WaterSense is considering requiring that all labeled products conform to the applicable requirements of NSF/ANSI 58 to ensure adequate contaminant reduction performance criteria are met. NSF/ANSI 58 only requires the system to meet a minimum of 75 percent TDS reduction. Beyond this, any contaminant reduction claims made by the manufacturer must be verified by test data generated under the requirements of NSF/ANSI 58. **WaterSense is seeking feedback from stakeholders regarding the viability of requiring that WaterSense labeled RO systems meet all of the requirements of NSF/ANSI 58, including the 75 percent TDS reduction requirement. [Page 13]**

WQA Comment: We agree that it would be reasonable to expect POU RO systems with the WaterSense label be required to meet all of the requirements in NSF/ANSI 58. It is important to note that as the EPA has pointed out, the health-based reduction claims in NSF/ANSI 58 are optional (not required). Only the TDS claim is a required claim. If the rated efficiency target is set too high, the tradeoffs necessary for many manufacturers to achieve that target might result in a large number of WaterSense labeled RO systems that only remove TDS. WQA encourages the EPA to explore a less aggressive rated efficiency target that can be achieved by a broad range of manufacturers using existing technology and without these types of undesirable tradeoffs for the consumer.

Copied from the EPA's NOI: WaterSense is considering incorporating the ASSE 1086 membrane life test procedures and criteria into a potential specification to ensure the RO membrane will have adequate resistance to fouling and maintain its water efficiency and performance over time. **WaterSense is seeking feedback from stakeholders regarding the viability of using the ASSE 1086 membrane life test methods to evaluate membrane lifespan and RO system performance. [Page 14]**

WQA Comment: The membrane life test in 1086 is intended to ensure that the RO membrane will last for approximately one year (i.e., based on 1000 gallons). WQA would encourage the EPA to further investigate their assertion that "in most cases an RO system will require… RO membrane replacement every one to three years." During the 2018 WQA convention and exposition there was a presentation from three different manufacturers on the topic of "Innovations in Residential RO Recovery". The consensus of the presenters at that time was that membranes are typically replaced every 5-10 years. This appears to be a tradeoff which might be undesirable to consumers.

Copied from the EPA's NOI: WaterSense is considering whether to require that the efficiency rating (for systems with a storage tank) or recovery rating (for systems without a storage tank) be displayed on the product, product packaging, and associated specification sheet. Because efficiency rating and recovery rating are technical terms with detailed testing procedures and somewhat similar definitions, the distinction between the two values may not be clear to consumers. WaterSense is also concerned that presenting the efficiency/recovery rating as a percentage may be confusing to consumers and may not effectively convey the water efficiency of the device. As discussed earlier, many manufacturers advertise a "pure-to-waste" ratio in addition to or instead of efficiency/recovery rating, which may be more comprehensible but does not appear to be a standardized metric. There are no specific testing procedures for determining pure-to-waste ratio, and the term is sometimes used synonymously with recovery rating, efficiency rating, or neither. For this reason, WaterSense is considering defining the term "treated-to-waste ratio" as the ratio equivalent of the efficiency rating (for systems with a storage tank) or recovery rating (for systems without a storage tank), as applicable, of a given RO system. For example, using Equation 1 on page 10, an RO system with an efficiency rating of 40 percent would have a 1:1.5 treated-to-waste ratio. WaterSense is considering requiring the treated-to-waste ratio on product packaging and documentation to more easily convey the RO system water efficiency to consumers. **WaterSense is seeking input on the proposed "treated-to-waste ratio" definition and any other reasonable ways to mark products, product packaging, and specification sheets that would be easy for the consumer to understand. [Page 14 – 15]**

WQA Comment: We have no objection to this approach.

Copied from the EPA's NOI: How should WaterSense incorporate packaging/labeling requirements that clarify what is certified under the WaterSense label, especially in the case of hybrid systems? For hybrid systems that use additional treatment technologies (e.g., UV), product marking should specify that the WaterSense label and criteria apply solely to the RO portion of the treatment process. If WaterSense decides not to require certifications or criteria pertaining to the additional treatment technology(ies), **WaterSense is seeking input on how to incorporate packaging/labeling requirements that clarify which treatment technology is certified under the WaterSense label. [Page 15]**

WQA Comment: Since the proposal on page 9 implies that hybrid systems would only be evaluated and labeled as a complete system, and the hybrid components or "companion products" could not carry the WaterSense label by themselves, the problem would seem to take care of itself. In

summary, to avoid consumer confusion, we would encourage the EPA to follow the same convention they are proposing for system components or "companion products".

Copied from the EPA's NOI: WaterSense's goal is to promote the adoption of water-efficient products. In many cases, RO systems are not the most water-efficient drinking water treatment solution for a given application. EPA intends to use careful and considerate messaging so as not to promote the use of RO systems over other water treatment technologies that may be equally or more appropriate. Instead, the intent of the WaterSense POU RO system specification is to help consumers who already intend to purchase an RO system identify the most water-efficient options. **WaterSense is seeking input on messaging that can be used so as not to promote the purchase of RO systems when they are not necessary. [Page 15]**

WQA Comment: We would be amenable to a conversation on this aspect but would need more detail regarding the EPA's intent in order to provide input or suggestions.

Copied from the EPA's NOI: Anecdotally, EPA has observed that more efficient RO systems tend to be more expensive than average systems. Similarly, based on a review of available products online, higher efficiency RO systems sometimes have more expensive membranes than average systems, with relatively similar lifespans. However, during conversations with EPA, some manufacturers have stated that it is possible to produce and sell high-efficiency systems, filters, and membranes at similar costs to standard systems and components. WaterSense is unclear whether some high-efficiency membranes require more frequent replacement, which would increase maintenance costs. **WaterSense is seeking input on the impact of high-efficiency systems on product and maintenance costs. [Page 15]**

WQA Comment: We cannot comment on specific pricing due to anti-trust concerns. In general, the membrane life test in 1086 is intended to ensure that the RO membrane will last for approximately one year, or more accurately 1000 gallons. On many systems RO membrane replacement is currently recommended at longer frequency. This would suggest a tradeoff related to maintenance cost. And WQA would encourage the EPA to further explore with the industry any cost tradeoffs that would be necessary to achieve the proposed 40% rated efficiency target. One way to minimize cost tradeoffs for the consumer would be to establish a less aggressive rated efficiency target that could be achieved using current technology by a broad range of manufacturers, thereby promoting healthy competition for WaterSense labeled products in order to keep pricing down.

Copied from the EPA's NOI: Most POU RO systems (particularly under-sink models) do not use energy. However, some more efficient RO systems use electric pumps to achieve greater efficiency/recovery ratings. These systems may have an energy tradeoff to consider. WaterSense is interested in understanding the current market for RO systems that use energy, particularly as it relates to improving efficiency; whether a WaterSense specification would increase the use of electric pumps to achieve greater efficiencies; and how much energy these types of systems typically consume. This information will help the program assess and convey the potential water/energy tradeoffs to consumers. **WaterSense is seeking input on the efficiency gains possible from incorporating an electric pump in a system and how much energy these systems tend to use. [Page 16]**

WQA Comment: We recognize that there would be a tradeoff here given the currently proposed 40% rated efficiency target, but would refer the EPA to the manufacturers to obtain accurate figures on energy usage and rated efficiency gains.

Copied from the EPA's NOI: EPA has not identified any data suggesting there are potential impacts of concern with respect to the discharge of a concentrated waste stream from RO systems. High-efficiency RO systems will produce more concentrated reject water; however, this reject water is blended with other wastewater from a residence or business, and any resulting increase in contaminants is expected to be negligible.

EPA does not have data on specific impacts to onsite septic systems. The amount of wastewater generated from a POU RO system is minimal when compared to other typical residential water uses, such as from toilets, bathing, and clothes washing. Further, an RO system does not add any additional minerals or contaminants to the wastewater (but rather concentrates contaminants from the incoming water supply). If anything, WaterSense expects a potential specification will promote RO systems that reduce the wastewater being directed to the septic system compared to typical RO systems. However, it is possible a septic system could be impacted depending on a variety of factors.

WaterSense is seeking input on whether RO systems contribute any negative impacts to wastewater and wastewater treatment systems, including septic systems, and whether those impacts are exacerbated with high-efficiency systems. [Page 16]

WQA Comment: We agree that RO Systems do not add any chemicals to the overall waste stream which would not be present were the system removed. And we are not aware of any scientific studies suggesting that discharge to septic systems would cause any concerns.

Commenter: Shannon Murphy
Affiliation: Aquamor
Comment Date: February 14, 2022

Email Text:

Please find attached comments pertaining to the Water Sense RO initiative.

Sincerely,

AQUAMOR

Shannon Murphy
VP Business Development & Compliance
Aquamor, LLC.
Cell: 951-587-5287
42188 Rio Nedo | Temecula, Ca. 92590

Email Attachment:

WaterSense NOI for POU RO Systems

Color Key
Black font – Text copied directly from the EPA WaterSense NOI
Bold Black font – Highlights specific aspects from the NOI that the EPA is seeking comments on
Blue font – Comments

NSF/ANSI 330 does not provide definitions specific to RO systems. However, EPA has modified
the NSF/ANSI 330 definitions above to define the following terms:

- **RO system: A system that incorporates a water treatment process that removes undesirable materials from water by using pressure to force the water molecules through a semipermeable membrane.**
- **POU RO system: A plumbed-in or faucet-mounted RO system used to treat the drinking and/or cooking water at a single tap or multiple taps, but not used to treat the majority of water used for washing and flushing or other non-consumption purposes at a building or facility. Any batch RO system or device not connected to the plumbing system is considered a point-of-use RO system.**
- **POE RO system: An RO system used to treat the water supply at the entry of a building or facility for drinking and for washing, flushing, or other non-consumption use. A POE RO system has a minimum initial clean-system flow rate of not less than 15 liters per minute at 103 kilopascals pressure drop and**

18 ± 5 °C water temperature (not less than four gallons per minute at 15 psig pressure drop and 65 ± 10 °F water temperature).

These definitions will be used for the purposes of this NOI and to inform future specification development related to this product category. EPA does not intend to differentiate between commercial and residential RO systems in its specification and therefore did not propose definitions for these terms. **EPA is seeking input on these definitions and would also be interested in other accepted industry definitions. [Page 7 – 8]**

These definitions appear to be accurate and acceptable.

Based on research and conversations with stakeholders, EPA intends to exclude POE RO systems from the scope of a potential WaterSense specification. Not all end uses of water require or even benefit from the quality of water generated from an RO system (e.g., water used for toilet flushes, clothes washing, or bathing). While POE RO systems are generally more efficient due to their tendency to include electric booster pumps and/or recirculate some of the concentrate water, POE RO systems treat, and subsequently waste, more water on the whole than POU systems. WaterSense, therefore, does not want to encourage the use of oversized systems that subsequently generate significant water waste during the treatment process. **WaterSense is seeking input on the intended scope of a potential specification that includes POU RO systems, as defined above, and excludes POE systems. [Page 8]**

Agree that POE RO Systems should initially be excluded.

EPA intends to limit the scope of a potential WaterSense specification to POU RO systems, as defined above, consistent with the applicability of NSF/ANSI 58. NSF/ANSI 58 does not differentiate among POU RO systems that are intended for residential or commercial applications; therefore, its scope is slightly broader than the ASSE 1086 standard, which is limited to residential POU systems.

At this point in time, EPA does not see the need to limit a specification to residential POU RO systems and exclude POU products that may be used in commercial applications. Within the POU category, WaterSense also does not intend to distinguish among the different types of POU RO systems (e.g., countertop, undersink) in terms of the water efficiency or performance requirements.

WaterSense is considering whether to include high-efficiency RO membranes in the scope of its specification to help distinguish them from typical membranes. This would help consumers identify appropriate high-efficiency replacement membranes for their system to ensure it continues to perform at its rated water efficiency. Additionally, it may encourage consumers with less efficient systems to purchase compatible high-efficiency membranes to increase the efficiency. As discussed in more detail in Section V Performance and Product Testing, ASSE 1086 includes test procedures to evaluate a high-efficiency membrane separate from an RO system, at least with respect to life span and performance. **WaterSense is seeking feedback on whether labeling RO membranes would be beneficial to consumers and whether it is feasible to swap out the membrane in a typical RO system for a higher efficiency membrane to increase the system's water efficiency. [Page 8]**

We agree that there is a benefit to labeling membranes and systems under a Water Sense program

We believe that the WaterSense labeling should focus on POU RO Systems. Much like NSF 58, the program should focus on the complete RO System and the replacement membrane. Agree that it should not concern itself with distinction of various types of POU RO systems, just that it should address POU RO as a whole and complete unit. A complete system will include evaluation of the RO Membrane as used within the system. As such the RO Membrane would be advertised as being a WaterSense high efficiency replacement RO Membrane, however this would only be for use in the WaterSense certified system(s).

RO Systems are dependent upon the entire system and not just the RO Membrane to achieve proper performance. As such, an RO Membrane in one system may be able to achieve high efficiency, if used in a different, evaluated or unevaluated system may not be able to achieve the same performance due to the design of the complete system. As such EPA should stick to the guidelines of a specific RO Membrane being certified within a complete system as a water sense device. The standard should not evaluate nor promote a mix and match approach for rather complicated and variable in design POU RO systems. For example some manufacturers include/install check valves into the replacement membrane and some do not. If a consumer were to simply use one within the other the system would not function properly and in fact would be less efficient. Additionally many engineered systems today encapsulate the membrane within an engineered housing which is not simply interchangeable. Therefore we suggest it is NOT feasible to simply swap membranes in today's marketplace.

WaterSense is considering whether to include high-efficiency RO membranes in the scope of its
specification to help distinguish them from typical membranes. This would help consumers identify appropriate high-efficiency replacement membranes for their system to ensure it continues to perform at its rated water efficiency. Additionally, it may encourage consumers with
less efficient systems to purchase compatible high-efficiency membranes to increase the efficiency.

Beyond potential consideration for labeling RO membranes, WaterSense does not intend for the specification to apply to other accessories or "add-on" devices intended to improve product efficiency, production rate, or otherwise impact the operation of an RO system. These products include a permeate pump, which is a non-electric device that can be used to retrofit a POU RO system to reduce the back pressure from the storage tank and therefore improve the system's water efficiency and performance. Other companion products include retrofit recirculation kits (used to recirculate the concentrate water as feed water) and any systems that divert RO reject water for other uses. If a POU RO system requires the use of a companion product to meet the requirements of a future specification, then WaterSense intends to require the companion product to be tested, packaged, and sold along with the system in order for the system to bear the WaterSense label. **WaterSense is seeking feedback on its intent to exclude addon/ aftermarket companion products from the scope of the specification. [Page 9]**

As stated above, the scope should be limited to only evaluation on complete POU RO Systems. Additional appurtenances or parts which can be added on to existing RO's where

they may provide benefit will ultimately need to be evaluated/certified as a complete system to validate that it meets defined requirements.

There are also a variety of hybrid RO systems within the marketplace that combine various methods of water treatment, including filtration and even ultraviolet (UV) disinfection. The additional treatment technologies may fall within the scope of other NSF/ANSI standards. For example, filters are tested and certified according to NSF/ANSI 42 Drinking Water Treatment Units—Aesthetic Effects and/or NSF/ANSI 53 Drinking Water Treatment Units—Health Effects. UV systems are tested and certified according to NSF/ANSI 55 Ultraviolet Microbiological Water Treatment Systems. The scope of NSF/ANSI 58 requires that systems with manufacturer claims that include components or functions covered under other NSF or NSF/ANSI standards must conform to those applicable requirements; therefore, EPA's understanding is that any RO system certified to NSF/ANSI 58 would also be required to have filters and other components certified to applicable standards. WaterSense intends to permit hybrid systems to earn the WaterSense label, provided the RO portion of the system meets the scope and all water efficiency and performance requirements of a future specification. **WaterSense is seeking input on its intent to include hybrid systems within the scope of a specification. Further, WaterSense seeks feedback on whether it should require that components of hybrid systems be tested and certified to other applicable standards (e.g., NSF/ANSI 42 for filtration, NSF/ANSI 55 for UV).**

Current Certification agencies have policies pertaining to this issue. If the manufacturer is making claims associated with the additional hybrid systems, then those claims would need to be certified. If however the manufacturer IS NOT making additional claims covered under the scope of the affiliated standards, then the device would not require additional certification.

For example, if a POU RO system has a UV attached to it, the manufacturer may clam that it has a UV Module, however if it is not making any reduction claims associated with the UV, then they would be exempt from requiring formal certification to NSF 55. If however they are making either NSF 55 class A or Class B reduction claims for the system, then they would be required to have these claims substantiated through formal certification of this add on device. Current requirements within the relevant standards provide guidance on labeling and differentiation as to what is specifically certified in cases like these – we would recommend a similar approach.

WaterSense intends to adopt the NSF/ANSI 58 testing procedures for recovery rating and efficiency rating. **WaterSense is seeking feedback from stakeholders regarding the viability of using the NSF/ANSI 58 recovery rating and efficiency rating test methods to evaluate RO system water efficiency. [Page 9 – 11]**

This is understood to be a recognized long terms industry standard.

WaterSense is also considering adopting criteria to require RO systems to achieve a recovery rating of at least 40 percent and an efficiency rating (as applicable) of at least 40 percent. These criteria align with the requirements of ASSE 1086. **WaterSense is seeking**

feedback from stakeholders on this proposed water efficiency criteria for POU RO systems. [Page 11]

Rather than use ASSE 1086 as the benchmark, it would be more prudent to start out with a program where there is a high but manageable efficiency rating developed. A review of all certified RO systems should be conducted (NSF, IAPMO, WQA) and obtain a total list of all certified product and their efficiency rating. From there set some bar where a group of products currently certified demonstrably meet the Water Sense standard. We believe you are looking for incremental improvements and obtainable goals.

In regards to ASSE 1086, Definition of a valuable standard is the response from the industry to obtain certification to this standard to provide definable value add differentiation to a product line. Through this certification the intent is to market a product to this new value add standards requirements which in turn provides market value and increased sales to offset heavy burden costs to obtain the certification.

One example of this is NSF Standard 401. Upon completion of the development of NSF 401, there was immediate response from the industry to obtain certification to this standard. Today there are hundreds if not thousands of products currently certified at the different agencies which carry these claims.

Looking at ASSE 1086; launched in 2019 and to date upon review of the various listing agencies no products are certified to this standard. There is no benefit to the industry nor the public if a standard is developed and no products are certified to the standard.

In reviewing with RO Industry experts, the standard was developed with a small number of participants without broader oversight and input from the manufacturing and RO industry. A critical part of Standards development is to have proper depth and breadth of individuals to work with, develop and validate through testing the standard as it is being developed.

Care must also be taken where creation of a monopoly is created within a market through the development of a very narrow standard. Agencies must be aware of the market and make sure that through regulation a monopoly situation does not occur with obvious ramifications for the consumer.

Automatic shutoff devices are an important water-saving component applicable to RO systems. This device shuts off the flow of incoming water when the storage tank fills to a certain capacity, thereby stopping the treatment process, preventing the tank from overflowing, and preventing reject water when the system is not actively treating. This is a requirement included within ASSE 1086. Similarly, WaterSense intends to require that all RO systems be equipped with an automatic shutoff device. **WaterSense is seeking input on whether requiring an automatic shutoff valve is a reasonable expectation for a water-efficient RO system. [Page 12]**

Automatic shutoff devices are installed on all POU RO devices that we are aware of so we are in agreement with this requirement, however if a standard is set to a specific efficiency rating, then the design of the product is irrelevant provided it meets the requirements of the standard. We would caution against making the standard too complex with small details like requiring an ASOV and look at overall system efficiency ratings as the benchmark.

During discussions with stakeholders, some indicated that it may be possible for consumers to make modifications or changes to the system after purchase that would decrease product efficiency. For example, a customer could replace the RO membrane within a high-efficiency RO system with a less efficient membrane, either by accident or to save on maintenance costs. It is also possible that the consumer could replace the storage tank with a different size. **WaterSense is seeking feedback on the likelihood of these post-purchase modifications and the magnitude of their effect on the RO system's water efficiency. WaterSense is also seeking suggestions on how to encourage and inform consumers to purchase appropriate replacement parts to maintain their system's water efficiency. [Page 12]**

This is related to our previous comments regarding membrane swapping. We recommend certifying a system and the components of the system as a system and following guidelines set within standard 58. It is not possible to Certify post installation options to meet the standard. Best to keep it simple and have a list of WaterSense certified products. Overall the goal of increased efficiency will drive the industry and will benefit the consumer and the environment. Some consumers may indeed swap components or otherwise modify the system after purchase however that will be the exception not the norm in our opinion.

WaterSense has not identified field studies to date that assess actual water savings associated with more efficient RO systems compared to inefficient systems. Further, while EPA has anecdotally heard that an estimated one million POU RO systems are sold annually, the exact product market is unknown. **WaterSense is seeking RO system market data and usage data to assess the impact of a potential WaterSense specification on potential water savings. [Page 12]**

It would be difficult to obtain true and useful data for statistically accurate information to properly develop end conclusions as to a national water savings hypothesis.

WaterSense is considering requiring that all labeled products conform to the applicable requirements of NSF/ANSI 58 to ensure adequate contaminant reduction performance criteria are met. NSF/ANSI 58 only requires the system to meet a minimum of 75 percent TDS reduction. Beyond this, any contaminant reduction claims made by the manufacturer must be verified by test data generated under the requirements of NSF/ANSI 58. **WaterSense is seeking feedback from stakeholders regarding the viability of requiring that WaterSense labeled RO systems meet all of the requirements of NSF/ANSI 58, including the 75 percent TDS reduction requirement. [Page 13]**

Agreed –

WaterSense is considering incorporating the ASSE 1086 membrane life test procedures and criteria into a potential specification to ensure the RO membrane will have adequate resistance to fouling and maintain its water efficiency and performance over time. **WaterSense is seeking feedback from stakeholders regarding the viability of using the ASSE 1086 membrane life test methods to evaluate membrane lifespan and RO system performance. [Page 14]**

Success of a system in the marketplace is driven by consumers looking at initial as well as long term maintenance costs. Preference would be to keep the requirements simple and

focus on the efficiency aspect of the standard. Products will be successful or fail based upon consumer awareness.

WaterSense is considering whether to require that the efficiency rating (for systems with a storage tank) or recovery rating (for systems without a storage tank) be displayed on the product, product packaging, and associated specification sheet. Because efficiency rate and recovery rating are technical terms with detailed testing procedures and somewhat similar definitions, the distinction between the two values may not be clear to consumers. WaterSense is also concerned that presenting the efficiency/recovery rating as a percentage may be confusing to consumers and may not effectively convey the water efficiency of the device. As discussed earlier, many manufacturers advertise a "pure-to-waste" ratio in addition to or instead of efficiency/recovery rating, which may be more comprehensible but does not appear to be a standardized metric. There are no specific testing procedures for determining pure-to-waste ratio, and the term is sometimes used synonymously with recovery rating, efficiency rating, or neither. For this reason, WaterSense is considering defining the term "treated-to-waste ratio" as the ratio equivalent of the efficiency rating (for systems with a storage tank) or recovery rating (for systems without a storage tank), as applicable, of a given RO system. For example, using Equation 1 on page 10, an RO system with an efficiency rating of 40 percent would have a 1:1.5 treated-to-waste ratio. WaterSense is considering requiring the treated-to-waste ratio on product packaging and documentation to more easily convey the RO system water efficiency to consumers. **WaterSense is seeking input on the proposed "treated-to-waste ratio" definition and any other reasonable ways to mark products, product packaging, and specification sheets that would be easy for the consumer to understand. [Page 14 – 15]**

Efficiency and Recovery ratings are already on the Performance Data Sheet. Adding more marketing / literature requirements to the product packaging is over burdensome and for the most part confusing to the consumer.

More to point – We would suggest that you require certification agencies to have efficiency and recovery ratings displayed on the online listings. This will allow consumers when they are researching products to be able to quickly see within the online listings of a product what the recovery and efficiency ratings are for all certified RO System.

How should WaterSense incorporate packaging/labeling requirements that clarify what is certified under the WaterSense label, especially in the case of hybrid systems? For hybrid systems that use additional treatment technologies (e.g., UV), product marking should specify that the WaterSense label and criteria apply solely to the RO portion of the treatment process. If WaterSense decides not to require certifications or criteria pertaining to the additional treatment technology(ies), **WaterSense is seeking input on how to incorporate packaging/labeling requirements that clarify which treatment technology is certified under the WaterSense label. [Page 15]**

In the thread of keeping things simple, WaterSense should develop a logo for the POU RO market specifically. All POU RO systems meeting the requirements water sense program for RO systems can bear the WaterSense mark regardless of whether it is a hybrid or non-hubris system as long as the entire system is certified to the appropriate standard. The

additional costs of these systems will allow the market place to determine if these additional technologies are required or valuable.

WaterSense's goal is to promote the adoption of water-efficient products. In many cases, RO systems are not the most water-efficient drinking water treatment solution for a given application. EPA intends to use careful and considerate messaging so as not to promote the use of RO systems over other water treatment technologies that may be equally or more appropriate. Instead, the intent of the WaterSense POU RO system specification is to help consumers who already intend to purchase an RO system identify the most water-efficient options. **WaterSense is seeking input on messaging that can be used so as not to promote the purchase of RO systems when they are not necessary. [Page 15]**

Again, in keeping things simple, develop a logo and allow products to bear that logo when they are certified or meet the "efficiency" requirements of WaterSense. This does not promote the use of RO, just that it meets an "efficiency" standard.

Anecdotally, EPA has observed that more efficient RO systems tend to be more expensive than average systems. Similarly, based on a review of available products online, higher efficiency RO systems sometimes have more expensive membranes than average systems, with relatively similar lifespans. However, during conversations with EPA, some manufacturers have stated that it is possible to produce and sell high-efficiency systems, filters, and membranes at similar costs to standard systems and components. WaterSense is unclear whether some high-efficiency membranes require more frequent replacement, which would increase maintenance costs. **WaterSense is seeking input on the impact of high-efficiency systems on product and maintenance costs. [Page 15]**

The market will balance this out on its own, so would not include cost evaluations within the standard. The ability to meet a standard does not dictate success in selling the product. A simple approach of product to standard should be maintained and from there allow the market to balance itself out pertaining to costs through competition.

Most POU RO systems (particularly under-sink models) do not use energy. However, some more efficient RO systems use electric pumps to achieve greater efficiency/recovery ratings. These systems may have an energy tradeoff to consider. WaterSense is interested in understanding the current market for RO systems that use energy, particularly as it relates to improving efficiency; whether a WaterSense specification would increase the use of electric pumps to achieve greater efficiencies; and how much energy these types of systems typically consume. This information will help the program assess and convey the potential water/energy tradeoffs to consumers. **WaterSense is seeking input on the efficiency gains possible from incorporating an electric pump in a system and how much energy these systems tend to use. [Page 16]**

Again, any data developed pertaining to this will mostly be theoretical. If the intent is to develop a WaterSense initiative, better to keep on point with Water Savings. If broad reaching evaluations of waste, energy, lifecycle evaluations, etc are part of the program, then anticipation would be that this would take extensive research, time and money to develop accurate and meaningful data. In my history, I have experienced some standards taking well over 10 years when the scope of the standard starts to become too broad. Additionally as stated above these components add costs – let competition and the market drive these

issues. If two systems meets the standard the consumer will chose based on price. This is also why it is important not to set an "efficiency" standard too high such that it drives unusual system designs and expense and means that few if any systems or only very expensive systems will be able meet this standard.

EPA has not identified any data suggesting there are potential impacts of concern with respect to the discharge of a concentrated waste stream from RO systems. High-efficiency RO systems will produce more concentrated reject water; however, this reject water is blended with other wastewater from a residence or business, and any resulting increase in contaminants is expected to be negligible.

EPA does not have data on specific impacts to onsite septic systems. The amount of wastewater generated from a POU RO system is minimal when compared to other typical residential water uses, such as from toilets, bathing, and clothes washing. Further, an RO system does not add any additional minerals or contaminants to the wastewater (but rather concentrates contaminants from the incoming water supply). If anything, WaterSense expects a potential specification will promote RO systems that reduce the wastewater being directed to the septic system compared to typical RO systems. However, it is possible a septic system could be impacted depending on a variety of factors.

WaterSense is seeking input on whether RO systems contribute any negative impacts to
wastewater and wastewater treatment systems, including septic systems, and whether those impacts are exacerbated with high-efficiency systems. [Page 16]

There have been several papers / studies which show that RO Systems do not negatively or meaningfully impact the overall waste stream. We agree that there is no meaningful impact.

Commenter: Ilan J Aberman
Affiliation: E.A.M Benelux B.V.
Comment Date: February 16, 2022

Email Text:

Dear Jessica,

Thank you very much for the presentation,
Let me introduce myself. My name is Ilan J Aberman from The Netherlands.
I have been in the business of water filtration since 2008. we are a manufacturer of POU anti-bacteria filters (mainly for the showers)

Is RO system WaterSense is your product? are you making it? One of the main issues is the systems also can generate a significant amount of water waste during operation.
I saw that your high-efficiency RO system with a 40 percent efficiency rating would send approximately 1,430 gallons of water down the drain per year. What if it can be "0" zero? Above this, the RO system will reduce much more than it needs, such as minerals the body needs; any attempt to return the minerals artificially is less effective to the body and can cause long-term damage.

In The Netherlands, we have excellent water quality. However, we will need a high-quality anti-bacteria system. In addition, we will need a sentiment scale filter in some places.
I know a company that gives you better results than an RO system with zero wastewater. It is a local U.S product. It has an EPA registration, and IAPMO checks it.

Do you think this can interest you or ERG company?

I will see you on the call,

Kind regards,
Ilan J Aberman
E.A.M Benelux B.V
+31614190490

Commenter: Eugene Leung
Affiliation: California State Water Resource Control Board
Comment Date: February 16, 2022

Email Text:

Good Afternoon:

I am the person that made the suggestion to separate the POU RO into two subgroups – pump assisted and system pressure. I am the primary technical person working on POU devices, implementation of POU devices at PWS and the voting member on NSF/ANSI DWTU standard. I want to touch base with your team and let you know what we are working on and I believe the Watersense RO rating idea is great – and important – given the severe drought here in California.

Also, I want to provide a little back story for the need for the two categories- the reason being that RO systems working off of distribution system feed pressure have limited capability in reducing nitrate concentration. A pump assisted unit may use tighter membranes and can have higher nitrate rejection. I feel it will be extremely important to allow the two separate groups and clearly discuss the need for the pump assisted category as the pump allows for the use of tighter RO membranes and may be needed to achieve the needed contaminant reduction to use a POU device as a compliance treatment technology.

Finally, we are working on a white paper on the use of POU/POE. We will be having stakeholder groups from WQA in our call and will touch of many these topics. Would you like to be a participant of our stakeholder meeting that is coming up next month?

Please let me know if we can have a follow-up Teams or Zoom meeting.

Thanks,
Eugene

Eugene H. Leung, P.E.
Drinking Water Treatment Technical Specialist
Technical Operations Section, Division of Drinking Water
California State Water Resources Control Board
(510) 620-3460
eugene.leung@waterboards.ca.gov

Commenter: Christoph Lohr
Affiliation: IAPMO
Comment Date: March 25, 2022

Email Text:

To Whom It May Concern:

Please see IAPMO's comments to EPA's NOI for WaterSense Draft Specification for POU RO Systems, attached. Please let us know if you have any questions.

Respectfully,

Christoph Lohr, P.E., CPD, ASSE 12080
Vice President of Strategic Initiatives
Phoenix, Arizona | www.iapmo.org
D: 909-731-0219 |M: 248-736-4940
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LICENSED IN AZ, CA, FL, GA, NV, TX

Email Attachment:

See pages 28 through 31.

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1. ***WaterSense NOI Comment (Slide 43):*** *WaterSense is considering whether to include high efficiency RO membranes (in addition to entire systems) in the scope of its specification to help distinguish them from typical membranes.*
    a. **IAPMO Response:** IAPMO does not support this option for WaterSense because a high efficiency membrane put into a system that is not set up to be efficient would not pass the testing requirements for the system it is put into. We feel this would cause a lot of consumer frustration and lack of trust in the WaterSense program. A high efficiency membrane is not the only component needed to make a system consequently efficient. The lab / certification agency would need to review flow restrictor and shut off valve in addition to swapping out the membrane to make this work. We recommend a systems-based evaluation process.

2. ***WaterSense NOI Comment (Slide 43):*** *Help consumers identify appropriate replacement parts for their high-efficiency system*
    a. **IAPMO Response:** Certified systems are required to provide a list of replacement components along with the suggested frequency for changing the pre and post filters and RO membrane. Even for non-efficient systems, when an RO membrane is changed in a system, it is tested to establish continued compliance.

3. ***WaterSense NOI Questions and Data Gaps (Slide 45):*** *WaterSense is seeking feedback on whether labeling high-efficiency RO membranes would be beneficial to consumers.*
    a. **IAPMO Response:** No, there are a variety of sizes of high efficiency membranes, proper care must be taken for the RO to function properly when changing the membrane If the program requires certification to ASSE 1086 and not just compliance, the membranes could be marked as efficient when there is accompanying language specifying the system it is certified in. A membrane manufacturer should not be able to mark a membrane as EPA Water Sense efficient.

4. ***WaterSense NOI Questions and Data Gaps (Slide 45):*** *Is it feasible to swap out the membrane in a typical RO system for a higher efficiency membrane to increase the system's water efficiency?*
    a. **IAPMO Response:** No, the membrane is one component that will need to be changed but the system will also need modifications to the shut off valve and flow restrictor.

5. ***WaterSense NOI Questions and Data Gaps (Slide 45):*** *WaterSense is seeking feedback on its intent to exclude other add-on/aftermarket companion products from the scope of the specification.*
    a. **IAPMO Response:** We do not feel that any individual components should be allowed to use the WaterSense mark as standalone components. It needs to be a systems-based approach. RO Systems are not the same as a faucet where you can swap out the aerator. Membrane, flow restrictor, back-pressure prevention, (permeate pump) positive pressure increase, automatic shut-off valve, etc. will affect system efficiency. We would need the device to be a packaged system to evaluate efficiency. Example: Toilet is certified as a system, no separate WaterSense labeling for tank and bowl.

6. ***WaterSense NOI Questions and Data Gaps (Slide 47):*** *WaterSense is seeking input on its intent to include hybrid systems within the scope of a specification. Further, WaterSense seeks feedback on whether it should require that components of hybrid systems be tested and certified to other applicable standards (e.g., NSF/ANSI 42 for filtration, NSF/ANSI 55 for UV).*
    a. **IAPMO Response:** Treatment train type products (or hybrid as EPA calls them) should be allowed to be included in the scope of the specification as they will not change the efficiency of the system. We do not believe that certification for those other applicable standards should be a required part of the specification for the same reason, they will not have an impact on the efficiency. When testing and certifying a complete system all the components will be evaluated for material safety and structural integrity.

7. ***WaterSense NOI Questions and Data Gaps (Slide 55):*** *WaterSense is seeking feedback from stakeholders regarding the viability of using the NSF/ANSI 58 recovery rating and efficiency rating test methods to evaluate RO system water efficiency*
    a. **IAPMO Response:** We agree that the testing methods in NSF/ANSI 58 are acceptable for water efficiency and recovery rating.

8. ***WaterSense NOI Questions and Data Gaps (Slide 55):*** *WaterSense is seeking feedback from stakeholders on this proposed water efficiency criteria for POU RO systems*
    a. **IAPMO Response:** Requiring ASSE 1086 is critical because the NSF/ANSI 58 standard will not take into account membrane fouling. The challenge water and duration of the test in NSF/ANSI 58 are not designed to evaluate the system's ability to operate at the efficiency rating for an extended period of time. ASSE 1086 includes the membrane fouling test that ensures the efficiency is sustainable for approximately one years' worth of use. We believe 40% efficient is both difficult enough to ensure that not all systems would qualify but not too difficult that no systems could qualify. We would recommend referencing ASSE 1086 in lieu of NSF/ANSI 58 as ASSE 1086 encompasses and requires compliance with NSF/ANSI 58. Example: Like ASME A112.18.1 references NSF/ANSI 61.

9. ***WaterSense NOI Questions and Data Gaps (Slide 56):*** *WaterSense is seeking input on whether requiring an automatic shutoff valve is a reasonable expectation for a water-efficient RO system*
    a. **IAPMO Response:** Yes, we agree with this.

10. ***WaterSense NOI Questions and Data Gaps (Slide 57):*** *WaterSense is seeking feedback on the likelihood of these post-purchase modifications and the magnitude of their effect on the RO system's water efficiency.*
    a. **IAPMO Response:** We definitely believe that this is possible. But it is no different than other products that are within the WaterSense program. For example, a kitchen faucet that was WaterSense labeled but the owner removed the flow restrictor no longer meets WaterSense requirements. WaterSense should consider requiring – manufacturers to specify replacement components in the manual as part of certification requirement.

11. ***WaterSense NOI Questions and Data Gaps (Slide 57):*** *WaterSense is also seeking suggestions on how to encourage and inform consumers to purchase appropriate replacement parts to maintain their system's water efficiency*
    a. **IAPMO Response:** The ASSE 1086 and NSF/ANSI 58 standard requires certified companies to provide a list of replacement components.

12. ***WaterSense NOI Questions and Data Gaps (Slide 60):*** *WaterSense is seeking feedback from stakeholders regarding the viability of requiring that WaterSense labeled RO systems meet all of the requirements of NSF/ANSI 58, including the 75 percent TDS reduction requirement*
    a. **IAPMO Response:** We recommend requiring products to be certified to ASSE 1086. The ASSE 1086 standard requires compliance with NSF/ANSI 58 including the 75% reduction TDS requirement.

13. ***WaterSense NOI Questions and Data Gaps (Slide 63):*** *WaterSense is seeking feedback from stakeholders regarding the viability of using the ASSE 1086 membrane life test methods to evaluate membrane lifespan and RO system performance*
    a. **IAPMO Response:** We believe ASSE 1086 shall be the fundamental requirement of this WaterSense specification. NSF/ANSI 58 is not an applicable protocol to determine efficiency and life of a product as it only validates short term efficiency of the product.

14. ***WaterSense NOI Questions and Data Gaps (Slide 65):*** *WaterSense is seeking input on the proposed "treated-to-waste ratio" definition and any other reasonable ways to mark products, product packaging, and specification sheets that would be easy for the consumer to understand*
    a. **IAPMO Response:** ASSE 1086 requires specification sheets to indicate efficiency. For example, in lieu of saying "40% efficient", indicate "4 liters of water produced and 6 liters water to the drain."

15. ***WaterSense NOI Questions and Data Gaps (Slide 66):*** *If WaterSense decides not to require certifications or criteria pertaining to the additional treatment technology(ies), WaterSense is seeking input on how to incorporate packaging/labeling requirements that clarify which treatment technology is certified under the WaterSense label*
    a. **IAPMO Response:** Recommend certifying to ASSE 1086 as it certifies the entire system and includes all the packaging, labeling and instruction requirements of both ASSE 1086 and NSF/ANSI 58.

16. ***WaterSense NOI Questions and Data Gaps (Slide 67):*** *WaterSense is seeking input on messaging that can be used so as not to promote the purchase of RO systems when they are not necessary*
    a. **IAPMO Response:** Most water treatment purchases are based on personal choice as opposed to necessity. This is a similar situation as other WaterSense specifications, like weather-based irrigation controllers. We recommend a similar approach of messaging.

17. ***WaterSense NOI Questions and Data Gaps (Slide 68):*** *WaterSense is seeking input on the impact of high-efficiency systems on product and maintenance costs*
    a. **IAPMO Response:** High efficiency membranes are more expensive but the additional cost is only a couple dollars so it should not affect the total cost of the complete system.

18. ***WaterSense NOI Questions and Data Gaps (Slide 70):*** *WaterSense is seeking input on the efficiency gains possible from incorporating an electric pump in a system and how much energy these systems tend to use. Should WaterSense consider including a maximum energy or minimum pump efficiency requirement for electric RO systems in its specification? If so, are there data available that could help establish these criteria?*
    a. **IAPMO Response:** A typical POU booster pump uses 24V (output), input of 120 V, uses 0.29 mA = 6.96 Watts. The amount of energy savings would be miniscule. Therefore, we do not think it's necessary to include this as requirement.

19. ***WaterSense NOI Questions and Data Gaps (Slide 71):*** *WaterSense is seeking input on whether RO systems contribute any negative impacts to wastewater and wastewater treatment systems, including septic systems, and whether those impacts are exacerbated with high-efficiency systems. If there are negative impacts, what best practices can be used to mitigate those impacts?*
    a. **IAPMO Response:** We do not feel this is an issue because the RO is simply splitting the stream it is not adding/removing contaminants.

Commenter: John Smith
Affiliation: Kinetico, Inc.
Comment Date: April 18, 2022

Email Text:

Emma,

I hope all is well. Attached please find comments from Kinetico regarding the WaterSense NOI for POU RO systems.

If you have questions or need additional information please feel free to reach out.

Regards,

Kinetico water systems
kinetico.com

John Smith
VP Product Development
Kinetico Incorporated
jsmith@kinetico.com
Direct (440) 564-4235
Mobile (704) 453-1910

Email Attachment:

WaterSense® Notice of Intent (NOI) to Develop a Draft Specification for Point-of-Use Reverse Osmosis (RO) Systems – Kinetico Response – April 18, 2022

NSF/ANSI 330 does not provide definitions specific to RO systems. However, EPA has modified the NSF/ANSI 330 definitions to define the following terms:

- **RO system**: A system that incorporates a water treatment process that removes undesirable materials from water by using pressure to force the water molecules through a semipermeable membrane.
- **POU RO system**: A plumbed-in or faucet-mounted RO system used to treat the drinking and/or cooking water at a single tap or multiple taps, but not used to treat the majority of water used for washing and flushing or other non-consumption purposes at a building or facility. Any batch RO system or device not connected to the plumbing system is considered a point-of-use RO system.
- **POE RO system:** An RO system used to treat the water supply at the entry of a building or facility for drinking and for washing, flushing, or other non-consumption use. A POE RO system has a minimum initial clean-system flow rate of not less than 15 liters per minute at 103 kilopascals pressure drop and 18

± 5 °C water temperature (not less than four gallons per minute at 15 psig pressure drop and 65 ± 10 °F water temperature).

These definitions will be used for the purposes of this **NOI** and to inform future specification development related to this product category. EPA does not intend to differentiate between commercial and residential RO systems in its specification and therefore did not propose definitions for these terms. **EPA is seeking input on these definitions and would also be interested in other accepted industry definitions.**

KINETICO COMMENTS: These definitions are fine. We have no issue or comments with these definitions at this time.

EPA intends to limit the scope of a potential WaterSense specification to POU RO systems, as defined above, consistent with the applicability of NSF/ANSI 58. NSF/ANSI 58 does not differentiate among POU RO systems that are intended for residential or commercial applications; therefore, its scope is slightly broader than the ASSE 1086 standard, which is limited to residential POU systems. Further ASSE 1086 specifies compliance with NSF/ANSI 58, including the test method for system efficiency, thus it does not appear that the application of the product (residential or commercial) has a bearing on its ability to be tested to the efficiency or performance requirements of either standard. At this point in time, EPA does not see the need to limit a specification to residential POU RO systems and exclude POU products that may be used in commercial applications. Within the POU category, WaterSense also does not intend to distinguish among the different types of POU RO systems (e.g., countertop, under-sink) in terms of the water efficiency or performance requirements. Overall, WaterSense's goal is to reduce water wasted by POU RO systems by decreasing the amount of concentrate produced for every gallon of water treated, which can be achieved across a wide range of available technologies.

Based on research and conversations with stakeholders, EPA intends to exclude POE RO systems from the scope of a potential WaterSense specification. Not all end uses of water require or even benefit from the quality of water generated from an RO system (e.g., water used for toilet flushes, clothes washing, or bathing). While POE RO systems are generally more efficient due to their tendency to include electric booster pumps and/or recirculate some of the concentrate water, POE RO systems treat, and subsequently waste, more water on the whole than POU systems. WaterSense, therefore, does not want to encourage the use of oversized systems that subsequently generate significant water waste during the treatment process. **WaterSense is seeking input on the intended scope of a potential specification that includes POU RO systems, as defined above, and excludes POE systems.**

KINETICO COMMENTS: We agree the program focus should be around POU systems at this time.

WaterSense is considering whether to include high-efficiency RO membranes in the scope of its specification to help distinguish them from typical membranes. This would

help consumers identify appropriate high-efficiency replacement membranes for their system to ensure it continues to perform at its rated water efficiency. Additionally, it may encourage consumers with less efficient systems to purchase compatible high-efficiency membranes to increase the efficiency. As discussed in more detail in Section V Performance and Product Testing, ASSE 1086 includes test procedures to evaluate a high-efficiency membrane separate from an RO system, at least with respect to life span and performance. **WaterSense is seeking feedback on whether labeling RO membranes would be beneficial to consumers and whether it is feasible to swap out the membrane in a typical RO system for a higher efficiency membrane to increase the system's water efficiency.**

KINETICO COMMENTS: The components used to build RO systems are specifically designed to work in conjunction with each other to create a unique system. Many critical design considerations and features cannot be perceived by the casual observer. The consumer could be easily misled if they thought they could simply swap out a standard membrane in a system with a different membrane rated as "high-efficiency" and get the performance of a "high-efficiency" system. Performance issues might include not only system efficiency but contaminant reduction, membrane life, and others.

Beyond potential consideration for labeling RO membranes, WaterSense does not intend for the specification to apply to other accessories or "add-on" devices intended to improve product efficiency, production rate, or otherwise impact the operation of an RO system. These products include a permeate pump, which is a non-electric device that can be used to retrofit a POU RO system to reduce the back pressure from the storage tank and therefore improve the system's water efficiency and performance. Other companion products include retrofit recirculation kits (used to recirculate the concentrate water as feed water) and any systems that divert RO reject water for other uses. If a POU RO system requires the use of a companion product to meet the requirements of a future specification, then WaterSense intends to require the companion product to be tested, packaged, and sold along with the system in order for the system to bear the WaterSense label. **WaterSense is seeking feedback on its intent to exclude add-on/aftermarket companion products from the scope of the specification.**

KINETICO COMMENTS: Kinetico agrees that it is reasonable that the components needed to certify to the WaterSense mark should be part of the system that is sold, and only certified replacement parts should be offered to service the unit. Creating add-on accessories with the implication that they will improve the performance or efficiency should not be in the scope.

There are also a variety of hybrid RO systems within the marketplace that combine various methods of water treatment, including filtration and even ultraviolet (UV) disinfection. The additional treatment technologies may fall within the scope of other NSF/ANSI standards. For example, filters are tested and certified according to NSF/ANSI 42 *Drinking Water Treatment Units—Aesthetic Effects* and/or NSF/ANSI 53 *Drinking Water Treatment Units—Health Effects.* UV systems are tested and certified

according to NSF/ANSI 55 *Ultraviolet Microbiological Water Treatment Systems.* The scope of NSF/ANSI 58 requires that systems with manufacturer claims that include components or functions covered under other NSF or NSF/ANSI standards must conform to those applicable requirements; therefore, EPA's understanding is that any RO system certified to NSF/ANSI 58 would also be required to have filters and other components certified to applicable standards. WaterSense intends to permit hybrid systems to earn the WaterSense label, provided the RO portion of the system meets the scope and all water efficiency and performance requirements of a future specification. **WaterSense is seeking input on its intent to include hybrid systems within the scope of a specification. Further, WaterSense seeks feedback on whether it should require that components of hybrid systems be tested and certified to other applicable standards (e.g., NSF/ANSI 42 for filtration, NSF/ANSI 55 for UV).**

KINETICO COMMENTS: We see no reason not to include hybrid systems into the WaterSense specification. Indeed, every RO system is likely to include sediment and carbon prefiltration as well as a post membrane polishing filter anyway. However, how do you sell the hybrid and certify it as a complete system? EPA should follow the lead of NSF/ANSI 58, which already has language about the requirement that components of hybrid systems be tested and certified to other applicable standards.

WaterSense intends to adopt the NSF/ANSI 58 testing procedures for recovery rating and efficiency rating. **WaterSense is seeking feedback from stakeholders regarding the viability of using the NSF/ANSI 58 recovery rating and efficiency rating test methods to evaluate RO system water efficiency.** WaterSense is also considering adopting criteria to require RO systems to achieve a recovery rating of at least 40 percent and an efficiency rating (as applicable) of at least 40 percent. These criteria align with the requirements of ASSE 1086. **WaterSense is seeking feedback from stakeholders on this proposed water efficiency criteria for POU RO systems.**

KINETICO COMMENTS: The 40% efficiency rating is something new to the industry and something manufacturers are still trying to work to understand. As an industry, we are working to understand what it would take to get to that threshold, but more importantly, what tradeoffs would be necessary to achieve 40%.

Designing a system to meet the efficiency standard raises multiple issues, including:

- Pumping:
  - Is it achieved by the addition of a pump or designing in a larger pump?
  - How big a pump is needed?
  - What is the added cost?
  - How long does it last?
  - What are the electrical certification implications of adding a pump?

- Membrane:
  - Is there a need for a different membrane element?
  - Is it more surface area which in turn generates additional cost?
  - If the sheet surface area is bigger, will it still fit in the same filter housing and if not, does the entire product need to be redesigned?

  - Critically, does the membrane sheet need to allow more contaminants through and thus it cannot achieve the safety previously delivered to the consumer?

- Internal controls:
  - Do we need to reduce the size of the reject flow control?
  - What are the implications of reject flow control changes on membrane life and contaminant reduction?

We strongly oppose the 40% efficiency target as there are more questions than answers. Our proposal would be to aim for a more realistic number that gets manufacturers working toward a more achievable water savings goal.

Automatic shutoff devices are an important water-saving component applicable to RO systems. This device shuts off the flow of incoming water when the storage tank fills to a certain capacity, thereby stopping the treatment process, preventing the tank from overflowing, and preventing reject water when the system is not actively treating. This is a requirement included within ASSE 1086. Similarly, WaterSense intends to require that all RO systems be equipped with an automatic shutoff device. **WaterSense is seeking input on whether requiring an automatic shutoff valve is a reasonable expectation for a water-efficient RO system.**

KINETICO COMMENTS: Kinetico supports this as a reasonable expectation.

During discussions with stakeholders, some indicated that it may be possible for consumers to make modifications or changes to the system after purchase that would decrease product efficiency. For example, a customer could replace the RO membrane within a high-efficiency RO system with a less efficient membrane, either by accident or to save on maintenance costs. It is also possible that the consumer could replace the storage tank with a different size. **WaterSense is seeking feedback on the likelihood of these post-purchase modifications and the magnitude of their effect on the RO system's water efficiency. WaterSense is also seeking suggestions on how to encourage and inform consumers to purchase appropriate replacement parts to maintain their system's water efficiency.**

KINETICO COMMENTS: If membrane life suffers as a result of trying to bump the efficiency up to 40%, or if contaminant reduction is negatively impacted with a WaterSense product, customers might change out the membrane for one that has improved life or better reduction. As an example, today we sell a system with a membrane warrantied for 10 years. That membrane will produce about 10,000 gallons of permeate over the life of the membrane. If the new WaterSense membrane fails after 1,000 gallons, the consumer will now need to buy 10 RO membranes as opposed to 1 today. That does not seem sustainable, either from the consumer's financial perspective or in terms of adding to landfill waste burden and the higher carbon footprint required to manufacture and transport that many more membranes.

WaterSense has not identified field studies to date that assess actual water savings associated with more efficient RO systems compared to inefficient systems. Further, while EPA has anecdotally heard that an estimated one million POU RO systems are sold annually, the exact product market is unknown. **WaterSense is seeking RO system market data and usage data to assess the impact of a potential WaterSense specification on potential water savings.**

KINETICO COMMENTS: We do not have anything to offer regarding this request.

WaterSense is considering requiring that all labeled products conform to the applicable requirements of NSF/ANSI 58 to ensure adequate contaminant reduction performance criteria are met. NSF/ANSI 58 only requires the system to meet a minimum of 75 percent TDS reduction. Beyond this, any contaminant reduction claims made by the manufacturer must be verified by test data generated under the requirements of NSF/ANSI 58. **WaterSense is seeking feedback from stakeholders regarding the viability of requiring that WaterSense labeled RO systems meet all of the requirements of NSF/ANSI 58, including the 75 percent TDS reduction requirement.**

KINETICO COMMENTS: Kinetico has never considered 75% reduction in TDS as a useful threshold. Kinetico recognizes that an RO is a piece of equipment installed to protect a consumer from contaminants that are in, may be in, or could eventually get into their water. Compared to a generic TDS threshold, reduction rates of specific contaminants in at least the mid 90% range provide realistic, achievable treatment goals that are better suited to protecting human health. For Kinetico, the purpose of an RO is to reduce drinking water contaminants as low as possible, so the consumer does not consume them.

By requiring a 40% efficiency, our concern is that several contaminant claims will no longer be achievable. At the very least, it would appear nitrate/nitrite claims would be off the table but much more work would need to be done to understand what tradeoffs would be needed to achieve the efficiency goal and then understand the ramifications for contaminant reduction.

Membrane and filter life is an important performance attribute for consumers. Based on a review of products on the market, in most cases an RO system will require pre-filter replacement every six months and RO membrane replacement every one to three years. Consumers may find it costly, burdensome, or difficult to keep up with regular maintenance if the filters and membrane need to be replaced more frequently. However, filter replacement is important to ensure that the membrane and filters will perform adequately and maintain efficiency throughout their prescribed lifespan.

ASSE 1086 includes testing procedures and requirements for the membrane life of high efficiency membranes and systems. The procedure calls for the membrane or system to

be evaluated under specific testing conditions for a minimum of 20 days to produce a total product volume of at least 1,000 gallons. This test is meant to be representative of a year of treatment under challenge conditions.[1] To satisfy the requirements of the standard, the following criteria must be met:

- **The percent TDS reduction shall be a minimum of 75 percent each day.**
- **The flow rate shall not decrease by more than 50 percent of the Day 1 reading throughout the test.**
- **The system recovery shall be on average a minimum of 40 percent. One tenth of the sample readings may be less than 40 percent but no less than 30 percent. The final recovery measurement shall be a minimum of 40 percent.**

WaterSense is considering incorporating the ASSE 1086 membrane life test procedures and criteria into a potential specification to ensure the RO membrane will have adequate resistance to fouling and maintain its water efficiency and performance over time. **WaterSense is seeking feedback from stakeholders regarding the viability of using the ASSE 1086 membrane life test methods to evaluate membrane lifespan and RO system performance.**

KINETICO COMMENTS: We cannot comment whether 1,000 gallons is an appropriate challenge, if the flow rate requirement can be met as membrane fouling increases, or if a 40% efficiency is achievable over the full life of the product.

WaterSense specifications typically include requirements for marking and product documentation to aid consumers in understanding the efficiency and performance of WaterSense labeled products.

NSF/ANSI 58 prescribes requirements pertaining to product instructions and performance data sheets, which include communication of the efficiency rating (or recovery rating as applicable), model numbers for replacement membranes and filters, and daily production rate. However, based on EPA's review of products, this information is not always readily available.

ASSE 1086 requires that certified products be packaged with installation instructions that adhere to the NSF/ANSI 58 requirements. The product must also have a specification sheet that includes the system recovery and efficiency rating. In addition, the system itself must be marked with the rated water efficiency in a place that is visible after installation. Further, ASSE 1086 specifies that detailed instructions on how to change pre-filters, post-filters, and membranes and the recommended frequency of changing these components be provided.

WaterSense is considering whether to require that the efficiency rating (for systems with a storage tank) or recovery rating (for systems without a storage tank) be displayed on the product, product packaging, and associated specification sheet. Because efficiency

[1] ASSE 1086-2020. *op. cit.*

rating and recovery rating are technical terms with detailed testing procedures and somewhat similar definitions, the distinction between the two values may not be clear to consumers. WaterSense is also concerned that presenting the efficiency/recovery rating as a percentage may be confusing to consumers and may not effectively convey the water efficiency of the device. As discussed earlier, many manufacturers advertise a "pure-to-waste" ratio in addition to or instead of efficiency/recovery rating, which may be more comprehensible but does not appear to be a standardized metric. There are no specific testing procedures for determining pure-to-waste ratio, and the term is sometimes used synonymously with recovery rating, efficiency rating, or neither. For this reason, WaterSense is considering defining the term "treated-to-waste ratio" as the ratio equivalent of the efficiency rating (for systems with a storage tank) or recovery rating (for systems without a storage tank), as applicable, of a given RO system. For example, using Equation 1 on page 10, an RO system with an efficiency rating of 40 percent would have a 1:1.5 treated-to-waste ratio. WaterSense is considering requiring the treated-to-waste ratio on product packaging and documentation to more easily convey the RO system water efficiency to consumers. **WaterSense is seeking input on the proposed "treated-to-waste ratio" definition and any other reasonable ways to mark products, product packaging, and specification sheets that would be easy for the consumer to understand.**

KINETICO COMMENTS: We agree there needs to be a clear definition of what "treated-to-waste ratio" means. If it cannot be used interchangeably between systems with and without a storage tank, there needs to be more added to the term to gain clarity. As an example, if a system has a 1:1.5 treated-to-waste ratio without the use of a storage tank (recovery rating), that needs to be described in detail and then a permanent label should be added stating that use with a storage tank will result in a ratio which is outside the requirements of the WaterSense program.

Also, if there is a WaterSense-labeled system which includes a storage tank, the descriptor/model number of that tank should be clearly specified on a permanent label.

For hybrid systems that use additional treatment technologies (e.g., UV), product marking should specify that the WaterSense label and criteria apply solely to the RO portion of the treatment process. If WaterSense decides not to require certifications or criteria pertaining to the additional treatment technology(ies), **WaterSense is seeking input on how to incorporate packaging/labeling requirements that clarify which treatment technology is certified under the WaterSense label.**

KINETICO COMMENTS: With the introduction of a hybrid system, it does get very difficult to educate the user on what is included in the certification of a certified WaterSense system. Maybe there is a picture of the approved system components showing what is included or a list of system components needed.

WaterSense's goal is to promote the adoption of water-efficient products. In many cases, RO systems are not the most water-efficient drinking water treatment solution for a given application. EPA intends to use careful and considerate messaging so as not to promote the use of RO systems over other water treatment technologies that may be equally or more appropriate. Instead, the intent of the WaterSense POU RO system specification is to help consumers who already intend to purchase an RO system identify the most water-efficient options. **WaterSense is seeking input on messaging that can be used so as not to promote the purchase of RO systems when they are not necessary.**

KINETICO COMMENTS: Reverse osmosis technology is truly a final barrier, a last chance to protect the consumer from contaminants that might have made their way into a consumer's water. The end user may already know all the contaminants they need to address, or they may not, and there is no guarantee that the water coming into the home today won't have additional contaminants tomorrow. For example, a contaminant which RO excels at addressing is dissolved and particulate Lead (Pb) – this may be consistently present, or it can arrive sporadically in very high amounts due to disturbances in the service lines. For many of our customers, POU RO is a chance to protect them and their families against things that might make their way into the water periodically as well as persistently over time. It is a great technology for a host of contaminants.

It should also be noted that if a consumer is buying a product because they want and/or need the extra contaminant reduction protection, the WaterSense program certification should never be able to confuse the consumer into thinking that they are necessarily getting that contaminant protection in addition to using less water.

Anecdotally, EPA has observed that more efficient RO systems tend to be more expensive than average systems. Similarly, based on a review of available products online, higher efficiency RO systems sometimes have more expensive membranes than average systems, with relatively similar lifespans. However, during conversations with EPA, some manufacturers have stated that it is possible to produce and sell high-efficiency systems, filters, and membranes at similar costs to standard systems and components. WaterSense is unclear whether some high-efficiency membranes require more frequent replacement, which would increase maintenance costs. **WaterSense is seeking input on the impact of high-efficiency systems on product and maintenance costs.**

KINETICO COMMENTS: High efficiency membranes typically have a shortened lifetime due to the brine restriction and reduced cross flow. This will lead to higher cartridge change out frequency, increased cost for the consumer, and additional waste sent to landfills.

Most POU RO systems (particularly under-sink models) do not use energy. However, some more efficient RO systems use electric pumps to achieve greater efficiency/recovery ratings. These systems may have an energy tradeoff to consider.

WaterSense is interested in understanding the current market for RO systems that use energy, particularly as it relates to improving efficiency; whether a WaterSense specification would increase the use of electric pumps to achieve greater efficiencies; and how much energy these types of systems typically consume. This information will help the program assess and convey the potential water/energy tradeoffs to consumers. **WaterSense is seeking input on the efficiency gains possible from incorporating an electric pump in a system and how much energy these systems tend to use. Should WaterSense consider including a maximum energy or minimum pump efficiency requirement for electric RO systems in its specification? If so, are there data available that could help establish these criteria?**

KINETICO COMMENTS: These high-efficiency products will likely require a pump where one was not previously needed. This will lead to higher production costs, higher consumer prices, and either a new need for electricity or more electricity to drive a larger pump. The actual amount of energy needed is not something Kinetico has studied.

EPA has not identified any data suggesting there are potential impacts of concern with respect to the discharge of a concentrated waste stream from RO systems. High-efficiency RO systems will produce more concentrated reject water; however, this reject water is blended with other wastewater from a residence or business, and any resulting increase in contaminants is expected to be negligible.

EPA does not have data on specific impacts to onsite septic systems. The amount of wastewater generated from a POU RO system is minimal when compared to other typical residential water uses, such as from toilets, bathing, and clothes washing. Further, an RO system does not add any additional minerals or contaminants to the wastewater (but rather concentrates contaminants from the incoming water supply). If anything, WaterSense expects a potential specification will promote RO systems that reduce the wastewater being directed to the septic system compared to typical RO systems. However, it is possible a septic system could be impacted depending on a variety of factors.

WaterSense is seeking input on whether RO systems contribute any negative impacts to wastewater and wastewater treatment systems, including septic systems, and whether those impacts are exacerbated with high-efficiency systems. If there are negative impacts, what best practices can be used to mitigate those impacts?

KINETICO COMMENTS: This seems unlikely due to the quantity of POU RO water used relative to the total volume of household wastewater. Changing the total quantity of household water by a few gallons per day by using an efficiency rated POU RO system should not have any relevant impact either way.

Commenter: Steve Scheer
Affiliation: Brondell
Comment Date: May 11, 2022

Email Text:

Thank you for allowing comments regarding the draft specification for point-of-use reverse osmosis (RO) systems to earn the WaterSense® label.

As an industry leader in sustainability with a core focus on water savings and products already certified by WaterSense, Brondell is an true advocate for any initiatives that support industry leadership in water savings. The market for RO systems today is clouded with dubious claims on water efficiencies – especially for those systems that are not certified by any regulatory or certification agency such as NSF or WQA. We are huge proponents of transparency and data driven certification for these products to eliminate and clear up any deceptive marketing practices or consumer confusion – especially as it relates to "Real Life Use" of RO systems and the typical "Topping Off" that occurs in the tank when consumers dispense small amounts of water at a time and the tank inevitably refills each time at the highest pressures and lowest efficiencies in the system. Having proper documentation and test methods to account for real life use of the product would go a long way to improve the water efficiencies of the systems being sold in the market today.

As an industry leader, Brondell already has 2 Reverse Osmosis systems in the market with a 2:1 (Brondell Circle RO System) and 1:1 (Brondell Capella RO System) Wastewater Ratios – even in real life usage. Both systems are tested and certified by the WQA under their Gold Seal Certified program and we would be thrilled to add an additional water sense labeling on these innovative and beneficial products for consumer education.

Thank you again for allowing us to comment and we hope to see this program roll out in the near future.

Best,
-Steven Scheer

Brondell

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President
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www.brondell.com

Commenter: Danielle Gallo
Affiliation: Pentair
Comment Date: May 12, 2022

Email Text:

To the WaterSense Team,

Attached please find commentary from Pentair's Residential Water Treatment business on the WaterSense RO Systems NOI Comment Request. We appreciate the opportunity to be involved in this potential new program and hope that our commentary is useful in shaping the final program.

If there are any questions or clarifications as a result of these comments, please feel free to reach out to myself and Ken Sieth (copied).

Best Regards,

Danielle Gallo
Category Manager – Filtration Components & Systems

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Email Attachment:

See pages 44 through 46.

Pentair Comments Submitted to EPA

The below questions in black font were directly taken from the WaterSense RO System Notice of Intent, and Pentair's responses to each question can be found in blue font.

Scope

• Are the RO system, POU RO system, and POE RO system definitions acceptable, or are there any other accepted industry definitions for these terms?

Pentair Comment: The definitions are acceptable – no concerns.

• Should the scope of the specification be restricted to POU systems only and exclude POE systems?

Pentair Comment: The scope could (and should) include both POE and POU systems, however the efficiency ratings should be different for each based on the factors that were provided in the NOI (booster pump, recirculation pump, and tank size all impact system efficiencies, and it is to be expected that POE systems due to the higher volume of water used should have higher efficiencies than POU systems).

• Should WaterSense label high-efficiency RO membranes to encourage consumers to purchase these as replacement membranes? Is it reasonable to expect these membranes to improve the efficiency of a typical RO system?

Pentair Comment: The RO system and the membrane work together to create the overall system efficiency rating. Simply swapping out a membrane on a system that is not optimized to that membrane will not automatically improve the efficiency of the system. It is fair to call out and promote high efficiency RO membranes, but to most consumers they would not understand that buying a high-efficiency RO membrane may not equate to improving their existing RO system to a high-efficiency system.

• Is it appropriate to exclude add-on/aftermarket companion products from the scope of the specification?

Pentair Comment: We have no concerns with this limitation and agree, if additional devices (such as recirculation kits, permeate pumps or other) are needed to achieve an efficiency level, they should be kitted and sold with the system in whole.

• Should hybrid/enhanced systems be included in the scope of the specification? Should WaterSense require that they be tested to applicable standards (e.g., NSF/ANSI 55 for UV systems)?

Pentair Comment: Within the scope of POU systems, we do not object to including hybrid systems within scope. For POU systems, hybrid typically would include UV or other carbon-based filtration systems, none of which backwash or have a drain line which would change the RO efficiency. The addition of those other parts to the system should not impact overall efficiency.
However, with POE, there are more opportunities for backwashing systems to be added in addition to RO (softening, carbon tank systems and other). In these scenarios, overall system efficiencies can be drastically altered by utilizing these additional bolt-on systems to the RO, therefore we do not feel it would be appropriate to include hybrid/enhanced systems within the scope of POE systems.

Water Efficiency

• Would it be viable to use the NSF/ANSI 58 efficiency rating and recovery rating test methods to evaluate RO system water efficiency?

Pentair Comment: The current NSF 58 standard for calculating efficiency and recover were based on tank-based systems, and newer tankless RO systems are currently being tested in the same manner. However, typically these tankless RO systems have extra wastewater due to membrane flushing which is not currently captured under NSF 58. It is unclear to Pentair if WaterSense intends to include that additional membrane flushing wastewater as well as the standard concentrate during operation, and we would recommend that WaterSense reviews these nuances amongst RO systems to determine final efficiency rating and recovery ratings for their program.
Regarding tank-based RO systems, Pentair does not object to using NSF 58 as this is a standard and industry acceptable way of calculating efficiency and recovery.

• Are the proposed criteria for efficiency rating and recovery rating (≥ 40 percent), consistent with ASSE 1086, reasonable?

Pentair Comment: Regarding Tankless POU RO systems, if the criteria do not include flush/TDS creep water, this is reasonable. However, this point needs to be more fully defined in the scope of the criteria for clarity.
Regarding Tank-Based POU RO systems, most systems on the market today which do not include a pump would not achieve this efficiency rating (most today are in the 10-15% efficiency range). Systems which include a pump generally should not have any issues with reaching this efficiency rating. Systems sold with a pump represent a small percentage of overall RO sales, therefore most current systems on the market and systems sold would likely not achieve this efficiency rating. We would recommend that WaterSense reviews the current efficiency ratings of certified products through NSF, WQA and IAPMO to better understand the current state of efficiency ratings.
Regarding POE RO Systems, many today are above the 40% rating, but they were designed for that application.
We again recommend that efficiency ratings for POU and POE systems are separated.

• Is it reasonable to require all RO systems that earn the WaterSense label to have an automatic shutoff device?

Pentair Comment: No, should not be required. The WaterSense label should be awarded based on if the system as a whole meets the criteria or not (automatic shutoff may be used but should not be required). Manufacturers should be provided flexibility in designing systems that can meet efficiency ratings, using whatever methods are viable.

• How likely are consumers to modify their system after purchasing in a way that would decrease the system's water efficiency, and what is the potential magnitude of these effects?

Pentair Comment: To our knowledge, generic membrane replacements would be the only "modification" typically made by a consumer post purchase. The system and the membrane work together to create the overall system efficiency rating, therefore if a consumer has a "low efficiency" system simply ordering a higher-efficiency membrane will most likely not improve the overall efficiency of their system. Pentair would not recommend focusing on post-purchase modifications for WaterSense efficiency, as it will be very difficult to manage and qualify.

Are there any RO system market data and usage data that could be used to estimate potential water savings?

Pentair Comment: The WQA produces a Reverse Osmosis Market Trends report which tracks quarterly RO volume sales and can give a good starting point of how many RO units are in the market today. Utilizing this report in addition to estimating the average RO water consumption per household can provide a starting point to estimate potential water savings for households. It appears that WaterSense already has some good data on the usage of water in American households, so there may be a way to estimate RO water/drinking water from that overall water usage statistics.

Performance and Product Testing

• Is it appropriate and viable to require that all WaterSense labeled RO systems meet the requirements of NSF/ANSI 58?

Pentair Comment: Yes, this would be appropriate.

• Would it be viable to use the ASSE 1086 membrane life test methods to evaluate RO system performance?

Pentair Comment: The test method itself is not a concern, however when we examine how a manufacturer may end up submitting for WaterSense labeling, this may pose a problem. To date, no residential RO manufacturers have been certified to the ASSE 1086 standard, likely due to limited awareness of it as well as the significant confidence in the industry (both from a manufacturer and end user perspective) of the NSF 58 standard. The ASSE standard is unknown, so there will be a significant financial barrier to manufacturers starting to certify to that standard. Utilizing the test method is not a concern, but if WaterSense will require those manufacturers to get ASSE certification to get the WaterSense label, that will cause a significant hurdle in the industry and will likely be a barrier to manufacturers interest in the WaterSense program.

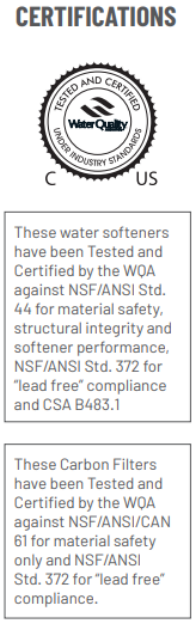
Marking and Product Documentation

• Is the definition for "treated-to-waste ratio" sufficient, and are there any other reasonable ways to mark products, product packaging, and specification sheets that would be easy for the consumer to understand?

Pentair Comment: Consumers typically understand that higher percentages (50%, 60%) is easier to understand than the efficiency ratios, therefore we would have a concern with standardizing on just a ratio number (like 1:1.5) instead of showing an efficiency percentage (like 40% efficiency). Potentially including both methods may serve as a better overall way to communicate system efficiency to the consumer.

• How should WaterSense incorporate packaging/labeling requirements that clarify what is certified under the WaterSense label, especially in the case of hybrid systems?

Pentair Comment: In other hybrid/bundled systems that we currently see in the market, if only a portion of the product carries a certification claim that is typically noted in a sub point on the packaging, spec or sell sheets. See example below, we would recommend that a similar approach be taken regarding WaterSense labeling for hybrid systems.



• How should WaterSense market the POU RO system specification to avoid promoting the adoption of RO systems when they are not necessary or when alternative, more water-efficient treatment technologies would be sufficient?

Pentair Comment: Pentair's recommendation would be to stay neutral – if someone has already chosen that an RO is the right product for them, then provide guidance on water efficiency. However, WaterSense should take care to ensure they are not promoting RO as the absolute solution, only giving guidance toward selecting models of RO systems which have higher efficiencies.

System Impacts and Other Considerations

• What is the impact of more efficient RO systems on product and maintenance costs to the consumer? What is the impact of producing more efficient RO systems on the cost to the manufacturer?

Pentair Comment: For the Consumer: Membranes will foul (degrade) more quickly over time the more efficient they are, meaning the consumer will need to replace it more often therefore making the overall cost of ownership higher. Some companies have looked at anti-scalant polyphosphate cartridges pre-membrane to assist with membrane life, however there are environmental concerns with putting phosphates to drain.

For the Manufacturer: it is typically more costly to develop highly efficient systems (likely need bigger systems – increase ratio of treated water meaning larger tank, potentially a pump). Dialing up the recovery can directly lower the membrane life, and has a higher potential for higher TDS in permeate water, which leads to potential points of dissatisfaction (will consumers accept this? If they are using TDS as a measurement of water quality, this would be a disadvantage).

Regarding POU Tankless RO systems: this may impact needing a larger pump or a larger membrane (overall making the system physically larger and more expensive)

Regarding POU Tank-based system: meeting these efficiency ratings will likely start requiring a pump (overall making the system physically larger and more expensive)

• What efficiency gains are possible from incorporating an electric pump in a system, and how much energy do these systems tend to use? Should WaterSense consider including a maximum energy or minimum pump efficiency requirement for electric RO systems in its specification?

Pentair Comment: A pump would typically be needed to get to the 40% rating for POU systems. Most tank based POU RO systems today do not require any energy, and some systems are offered with booster pumps as optional. Including a pump with the system would generally boost your water efficiency. Energy usage is relatively low compared to other kitchen appliances and generally should not be a major factor.

WaterSense should not include maximum energy/minimum pump efficiency requirement for RO systems and should focus on water efficiency only. There are a few ways to calculate pump efficiency depending on type of pump used within the system, some require electricity, and some do not. It would be complicated to develop an electricity efficiency requirement within this specification for water efficiency, so the recommendation would be to utilize EnergyStar ratings still for electrical components within the system.

• Do RO systems contribute any negative impacts to wastewater and wastewater treatment systems, including septic systems, and are those impacts exacerbated with high-efficiency systems? If there are negative impacts, what best practices can be used to mitigate those impacts?

Pentair Comment: We are unaware of any validated research that exists which indicates negative impacts from RO systems on wastewater treatment systems and septic systems.