

Summary of Private Residential Water Treatment System Use In Maine

Prepared by

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Disposal Rules

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Introduction

The purpose of this report / presentation is to review systems used to treat private well water in order for the task force to assess the impact of these systems on septic systems.

Background

Air & Water Quality Inc. has been in business since 1989 and has installation base of over 4,000 water treatment systems. Jeff Twitchell, co-owner/founder and chief technical officer of the company has a dual chemistry / physics degree from the University of Maine and has nearly 20 years of experience in designing, installing and maintaining residential well water treatment systems. Jonathan Dawson, has a degree in Biology from Brown University and has been with Air & Water Quality since 2005.

Summary

Table 1 summarizes the types of water treatment components installed and the frequency of installation based on the experience of Air & Water Quality Inc. Note that approximately 40% of water treatment systems include 2 or more of the components listed in table 1.

Table 1

Problem	Equipment Type / functionality	% of Systems Using this Equipment	waste / backwash volume & rate	waste water chemical content	Industry standard for handling discharge
Hard water (high Ca, Mg) and /or dissolved Fe and /or dissolved Mn	Softener (a.k.a. conditioner) / Remove + ions from the water (Fe, Mg, Mn, Ca) by exchanging them for Na ions. They require the owner to add salt to the brine tank & periodically re-saturate the resin media w/ brine to wash the mineral out and refresh the media. Backwash cycle is based on time or volume (demand initiated regeneration - DIR).	50%	35 to 100 gallons every 4 to 7 days. Backwash cycle takes 2 hours	uses approx. 2.6 to 7 lbs. salt per backwash cycle	Direct to septic. Based on scientific research, backwash volume and chemical content pose no risk to septic systems when system is properly maintained.
High ferric iron, other small particles	Backwashing Filter / Removes small particles from water. Often used with oxidation systems to remove oxidized compounds (sulphur and iron). Backwashed periodically to remove filtered particles and start over. Backwash is based on time. Uses carbon or other media.	33%	100 to 140 gallons every 4 to 7 days. Backwash cycle takes 2 hours.	Waste water can contain a higher concentration of iron or sulphur compounds than the well water.	Direct to septic. (Note that in a very small minority of wells with extremely high sediment content, backwash discharge may be directed to floor drain or other non septic system location).
High arsenic, uranium or other dissolved toxins	POU (Point of Use) RO (Reverse Osmosis) / Low volume reverse osmosis systems used to treat a small amount of water for drinking & cooking purposes.	30%	1 gallon of waste water / 1 gallon of treated water. Generally this amounts to 1 to 3 gallons per day.	waste water will have 2x concentration of TDS and trace elements of input well water	Direct to septic.
pH adjustment, high H ₂ S, disinfection	Solution feed system / Adds chemicals to water to adjust pH (potassium carbonate / citric acid), oxidize or disinfect (chlorine or potassium permanganate). When used for oxidation, systems generally include backwashing filter to remove oxidized material and residual disinfectant.)	25%	no waste water	Changes pH or adds chlorine to all water entering the home. Use of carbon filter after chlorine injection traps residual chlorine which then changes to inert form (primarily chlorides).	Direct to septic.

Problem	Equipment Type / functionality	% of Systems Using this Equipment	waste / backwash volume & rate	waste water chemical content	Industry standard for handling discharge
High arsenic, uranium or slightly salty water	POE (Point of Entry) RO (Reverse Osmosis) / Treats all of the water entering the home via reverse osmosis. Used for treating moderate salt issues, uranium, arsenic.	<2%	1 gal. waste water / 1 gal. treated water. Generally 50 - 75 gal./ day / person.	Waste water will have 2x concentration of TDS and trace elements of input well water	Directed away from septic whenever possible. Full sign off from owner when directed to septic system.
Disinfection, H ₂ S	Well chlorinator / Drops chlorine pellets into well for oxidation or disinfection.	<1%	No waste water	Adds chlorine to the water. Often installed in conjunction with carbon backwashing filter.	Direct to septic.
High TDS / salty water	POE Sea Water RO / Treats sea water or high TDS water (>3000 ppm) via reverse osmosis. Treats salt water intrusion from pollution or proximity to ocean.	< 1%	4 gal. waste water / 1 gal. treated water. Generally 50 to 75 gallons per day per person.	Waste water will have 1.2 x concentration of TDS and trace elements of input well water	Directed away from septic.
Organic tannins	Anion resin / Used to remove negative ions from the water. Often used to treat water for tannins in residential setting.	< 1%	Uses salt to regenerate. Volumes similar to water softeners @ 3 x frequ.	Uses approximately 2.6 to 7 lbs. salt per backwash cycle	Directed to septic system upon review of septic capacity.
High arsenic	Arsenic media filtration / Removes arsenic from the water by absorbing it. Media must be replaced periodically.	< 1%	No waste water	None	
Gasoline, oil or other volatile organic contamination	VOC removal / Utilizes aeration or carbon filtration.	< 1%	No waste water	None	
Particles too big for reverse osmosis & too small for backwashing filter	Ultrafiltration / Membrane technology similar in function to reverse osmosis.	< 1%	.25 gallon waste / gal. treated water	Will have higher concentration of particulate than incoming well water	Direct to septic.
Radon gas	Aeration / removes radon gas by pushing air through the water and then ventilate the radon / air mixture. For low concentrations of radon gas, granular activated carbon filtration can be used.	3%	No discharge	None	

Additional Comments

- 1. Water Softeners.** Much research has been done relating to the effect of water softener discharge on septic system function. See attached “Executive Summary: Water Softeners Pose No Problems for Septic Tanks” and “EPA: Onsite Wastewater Treatment Systems Special Issues Fact Sheet 3.”
- 2. General practice in Maine.**
 - a. Water treatment companies in Maine are accustomed to discharging waste water into septic systems as outlined in table 1.
 - b. Most municipalities do require permits to install water treatment systems.
 - c. The active local code enforcement officers generally defer to the opinion of the septic system designer when deciding whether to allow discharge into the septic system.
 - d. Septic system designers are divided when asked to sign off on discharging this waste water into septic systems.
 - e. In general, insurers of water treatment system installation companies allow for discharge into septic systems.
- 3. Anecdotal experience.** In 17 years of business, Air & Water Quality Inc. has not had a single incident in which water treatment system discharge was responsible for a septic system failure.

Conclusion

A large percentage of Maine households utilize well water and of these a significant percentage utilize some type of water treatment system that produces waste water. The water treatment systems installed in these homes provide the owners with clean, potable water and are essential to quality of life AND re-sale value. The overwhelming majority of water treatment systems installed in Maine have chemical and water volume / flow rate discharges that are not detrimental to properly designed and maintained septic systems as currently regulated in Maine. Residential systems that produce an exceptional amount of waste water (most notably POE reverse osmosis systems) have discharges that are designed to avoid discharge into septic systems and, when necessary, are designed in consultation with septic system evaluators / designers.