

# Effect of Water Treatment on Septic Systems

Produced by



**AIR & WATER QUALITY INC.**

"Maine's Water Experts"

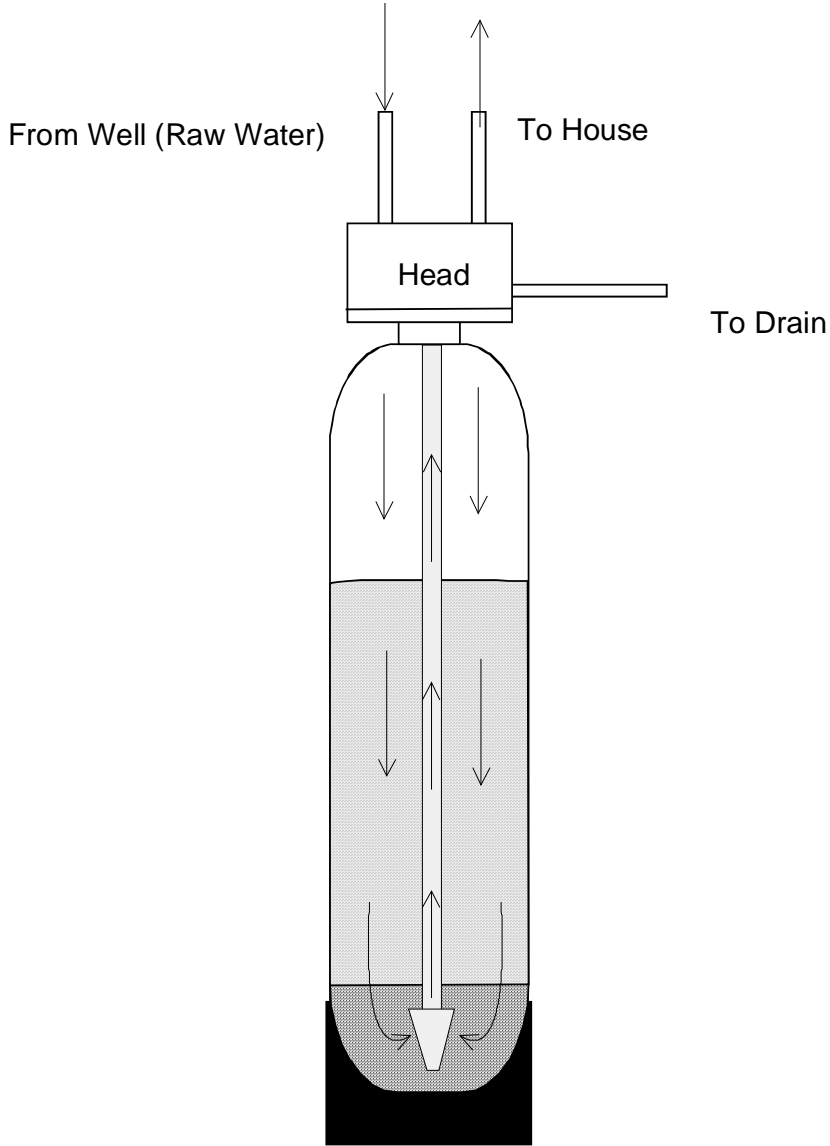


# Types of Systems

- Filtration
- Oxidation Filtration
- Adsorption
- Acid Neutralization
- Ion exchange
- Membrane technology
- Aeration
- Disinfection



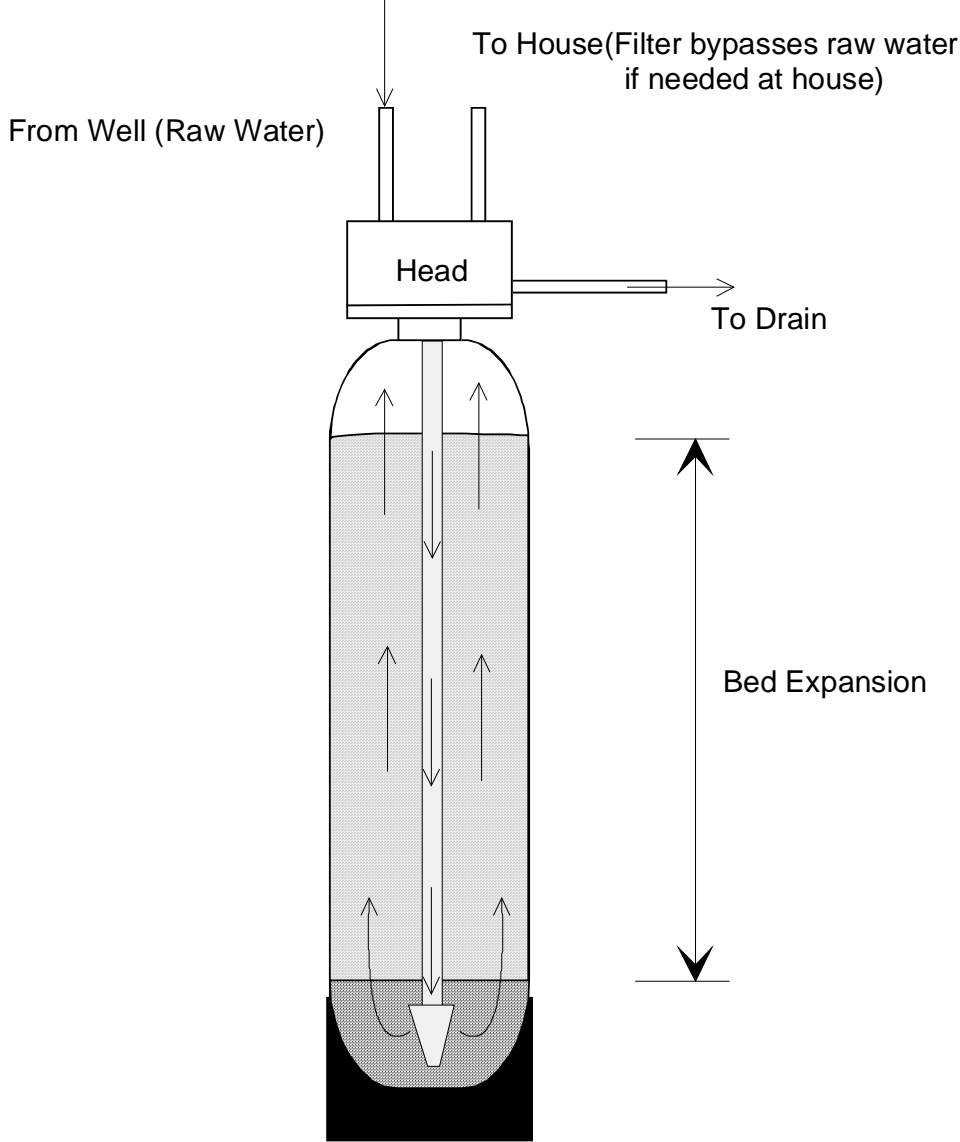
# Filter Operation



Service



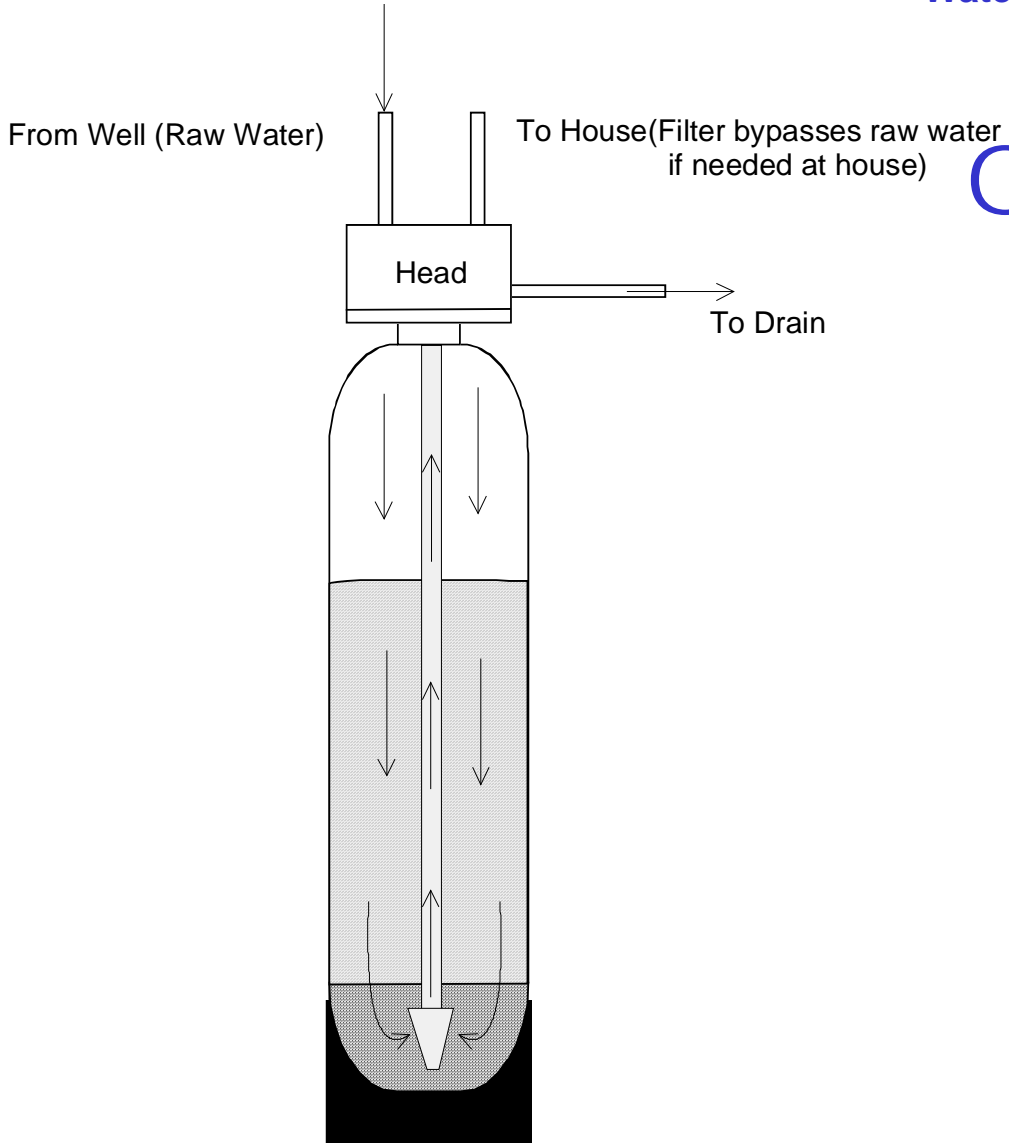
# Filter Operation



Backwash



# Filter Operation



# Filtration

- Filtration removes turbidity (particulate matter) from the water.
- The turbidity could be sand, fine pieces of bedrock, iron, or manganese



# Oxidation Filtration

- Oxidation of iron and/or manganese is caused by either oxygen from the air, chlorine or potassium permanganate (pot perm).
- The oxidized compound is a particle that is mechanically filtered.



# Adsorption

- Volatile organic compounds (VOC) and radon are adsorbed onto granular activated carbon (GAC).
- Arsenic and Uranium are adsorbed onto iron based sorbents (IBS) or anion resins





# Acid Neutralization

- Calcium Carbonate (Calcite) or Magnesium Oxide (Corrosex) are placed in the flow of water. The mineral is dissolved and raises the pH. The media needs to be replenished periodically
- Chemical injection uses a solution feed pump to inject either potassium carbonate or sodium carbonate to raise the pH.



# Ion Exchange

- Either water softeners or anion exchange systems
- They all use salt as a regenerate.
- They remove minerals from the water by exchanging either the sodium or chloride ion on the media with the mineral in the water.



# Water Softener



# Membrane Technology

- Either reverse osmosis(RO) or filtration
- Reverse osmosis passes water through membrane without passing dissolved minerals.
- Filtration – micro(MF), ultra(UF) or nano(NF) remove small particles like colloids and very large molecules. It works like a sieve would to separate sand from rocks.





# Aeration

- Forces air through water to provide a large surface area for dissolved gasses to pass through and be carried off by the air.
- Used to reduce radon and VOC's.



# Disinfection

- Chlorination- sodium hypochlorite is injected with a solution feed pump. The water is then held in a retention tank before delivery to the home.
- Ultraviolet Light(UV) – UV light passes through water and destroys DNA of pathogens.



# Types of Waste Streams

- Some systems do not create any waste
  - Acid neutralizing with solution feed
  - Non-backwashing adsorption systems
  - Aeration
  - Disinfection





# Filter Waste Streams

- Automatic backwashing filters-
  - Filtration
  - Some adsorption systems
  - Acid neutralization with calcite or corrosex
  - Oxidation filtration
- Concentrated stream of filtered material is created by all the backwashing systems
- Some add very low concentrations of chlorine
- Some add pot perm – 4 oz per regeneration



# Softener Waste Streams

- Ion exchange – softeners and anion exchange
  - concentrated stream of removed materials(iron, manganese, and hardness)
  - sodium chloride- High efficiency systems use as little as 2.5 lbs of salt and low efficiency systems use as much as 20 lbs of salt per regeneration



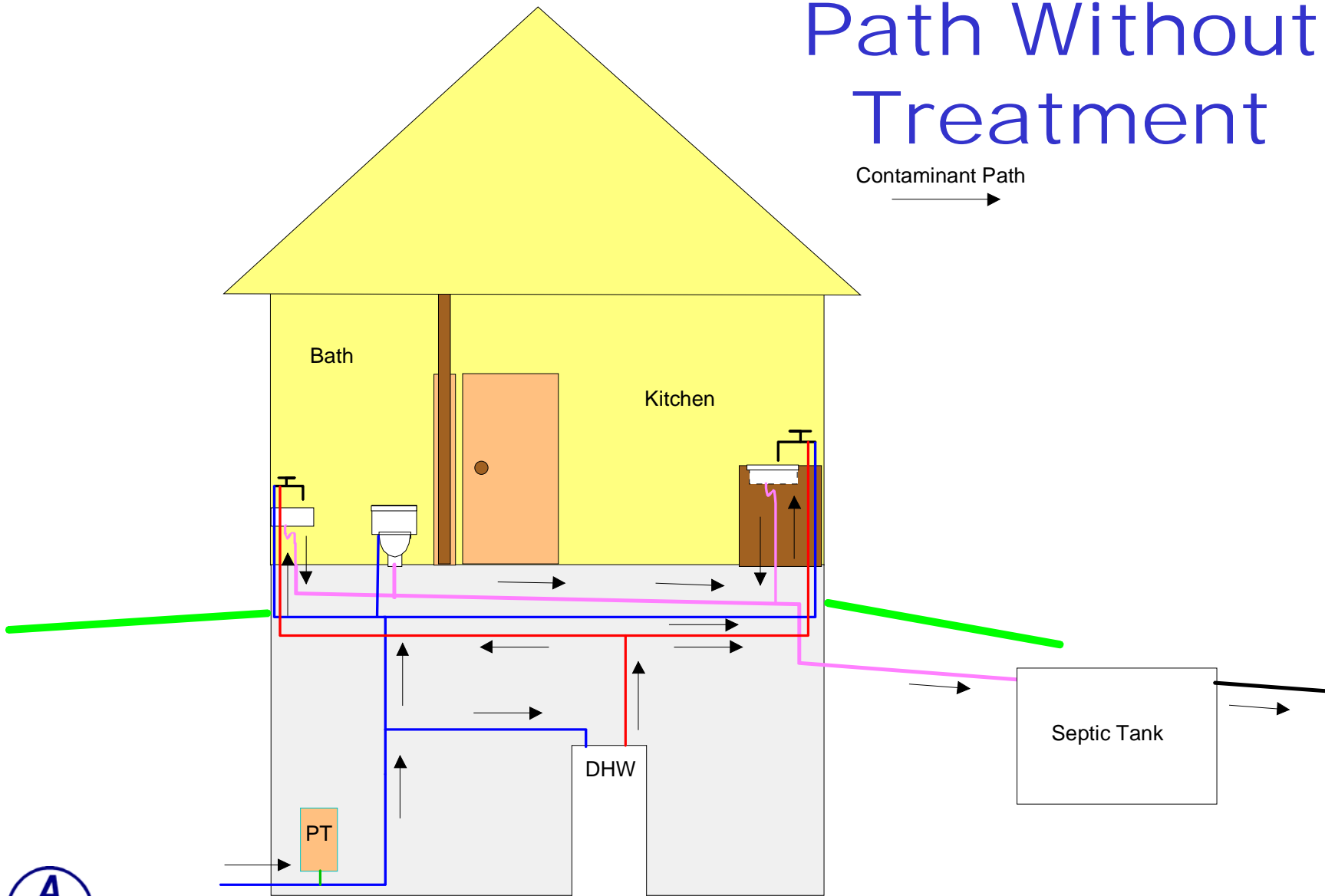
# Membrane Waste Stream

- Membrane Technology –
  - Whole House RO(WHRO)– large volume- 100% more volume- 2 times the concentration
  - Point of Use RO (POURO) - a few gallons
  - MF, UF, NF – 25% more water – 4 times the concentration



# Path Without Treatment

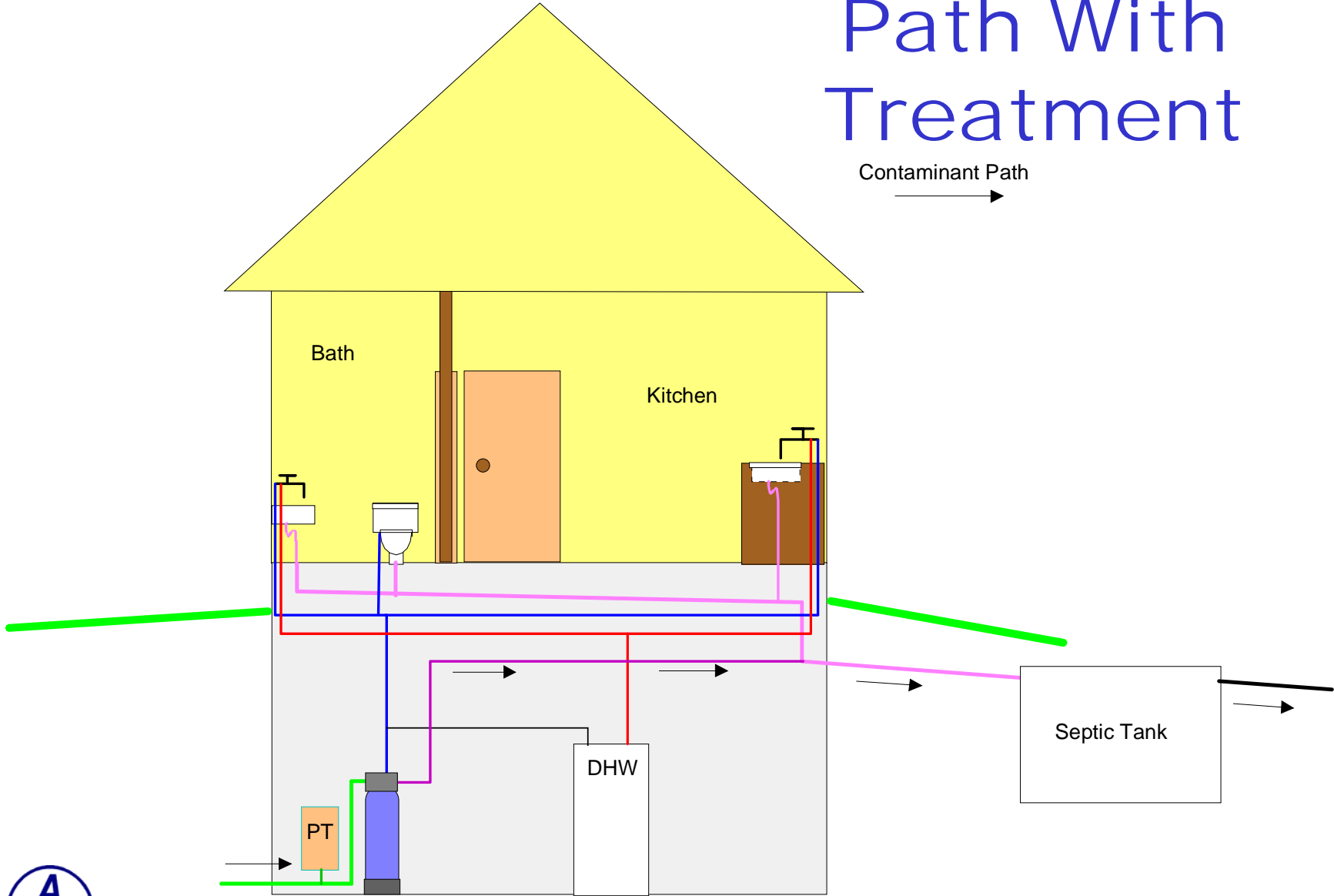
Contaminant Path  
→





# Path With Treatment

Contaminant Path  
→



# Misconception

- Treatment systems do not add more filtered material to the waste stream.
  - They only keep the materials from passing through the house to get to the waste treatment
  - These contaminants were going to the waste treatment system regardless of the treatment
  - Only a few types of systems add foreign chemical to the waste stream



# What about hydraulic shock?

- **Filters-**
  - The largest quantity of water that is added by filtration equipment is 140 gallons per regeneration.
  - This volume is typically added over a 1-2 hour period
  - 1-2 times per week





# What about hydraulic shock?

- Ion Exchange Systems
  - 70 gallons per regeneration for inefficient systems over a 1-2 hour period
  - 30 gallons per regeneration for efficient system over a 30 min period.
  - Typically 1-2 times per week



# What about hydraulic shock?

- WHRO
  - Doubles the hydraulic load – should never go to septic
- POURO
  - 2-3 gallons per day
- MF,UF, NF
  - Adds 25% more water to the waste stream spread over the day



# Other Hydraulic Loads

- **Top load washers**
  - These machines typically use 40 gallons per wash
  - 4 loads of wash in a day exceeds the largest residential water filter load
- **Leaking toilets, faucets or water treatment**
  - A drizzle of .1 gpm will be 140 gallons per day.
  - A stuck flapper valve(2gpm) will be 2,880 gallons per day



# What is the evidence?

- There have only been two studies done on water softener discharge on septic systems -University of Wisconsin and the National Sanitation Foundation (NSF). Both were done in the '70s.
- Anecdotal evidence from site evaluators and water treatment companies



# Studies

- Both studies concluded that water softeners did not have deleterious effects.
- The studies did not address backwashing filters.
- Filters can produce higher volumes of water.



# Anecdotal Information

- Site evaluators will sometimes conclude the water treatment caused a failure when they don't find any other obvious problem.
- Designers of aerobic systems have found hardness build up in their systems where there is water softening.
- We have not seen a single failure due to the water treatment with thousands of systems installed.



# What should we do?

- Educate consumer about septic systems
- Size systems to handle possible extra hydraulic load
- Strive to understand the problems and possible solutions using existing systems
- Let's document system failure
- Look for alternatives to using septic systems for waste discharge



# Educate Consumer

- Create understanding that the system does need to be maintained
- Leaking devices need to be fixed
- Identify what can or can not be flushed into the system
- Purchase or upgrade appliances to more efficient models





# Sizing System

- If there is an existing well, determine if it will or does have treatment and size system for the extra load



# Understanding Problems

- People need water treatment
- There are extra hydraulics (peak and total) loads exerted by treatment systems
- Aeration systems are more sensitive to hard water



# Document Failures

- Compare failures of systems with treatment to non failures with treatment
- Compare failures of systems without treatment to non failures without treatment



# Alternative Discharge Options

- Gray water systems
- Separate dry wells
- Water recycle systems

