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Residential Well and Septic System Report
June 23, 2019

Prepared for:
Henry Example

Inspection Property:
123 ECR 999
Exampleville, CO 81111
Mountain View Subdivision, Lot 9
Unincorporated Example County

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Contents

Well Production Rate Report

A. Permit and Record Information

1. The inspected well is permitted through the Colorado Department of Water Resources under Original permit #123-123-999.
2. Household permit allows for typical inhome use in one single family dwelling with no outside irrigation.
3. This well was drilled on 05-06-2007 and the permit is not subject to an Augmentation Plan.
4. The Well Construction and Test report indicate the well is drilled to 150 feet with an original production rate of 10 gallons per minute.
5. The report indicates that the aquifer material is composed of sandstone.
6. The report indicates that the plain casing consist of 7 inch steel from +1 to 59 feet, 4.5 inch PVC from 12 to 70 feet, and perforated casing of 4.5 inch PVC form 70 to 150 feet.
7. There is a Pump Installation and Test Report dated 05-10-2007.
8. The Pump Installation and Test report indicate the original 1/2 Hp pump was set at 135 feet on 05-06-2007.

B. Well Equipment Inventory

1. The wellhead is Acceptable with No Concerns.
2. The interior plumbing to the pressure tank is Acceptable.
3. The Bladder style pressure tank appears to maintain adequate air volume for delivering typical house pressure.
4. There is not a well switch within sight of the well equipment as recommended by the National Electric Code.
5. The well pump control function is Acceptable with No Concerns.
6. There is not an active cistern storage in the home.
7. There is a water softener on the system.
8. There is a whole house filter.
9. There is not a totalizing flow meter installed in the system. A totalizing flow meter is required by the permit.

C. Well Output and Performance

1. The observed pump rate (first 30 minutes of testing) is 8.9 gallons per minute. A typical home well pump should deliver a minimum of 3 gallons per minute to maintain adequate supply.
2. The final production rate (final 30 minutes of test or calculated production) is 8.4 gallons per minute. Wells with less than 1 gallon per minute of production are considered low production wells and homes with low production wells may require a

3. The total throughput for the duration of the test was 1008 gallons. Total throughput should be greater than 50 gallons per bedroom.

D. Summary

1. The well production rate is Acceptable with No Concerns.
2. The well pump and system is Acceptable with Concerns. *See B.9.*
3. The wellhead is Acceptable with No Concerns.
4. The Water Quality is Not Acceptable (see page 5).

E. Disclaimer

Based on what I was able to observe and my experience with well systems, I submit this Well Test Report based on the present condition of the well system. *Gatesman Environmental Consulting* has not been retained to warrant, guarantee, or certify the proper functioning of the system for any period of time in the future. Because of numerous factors (usage, aquifer characteristics, seasonal fluctuations, etc.) which may affect the production rates of a well system, this report shall not be construed as a warranty by our company that the system will function properly or produce water at the observed rate for any particular buyer in the future. *Gatesman Environmental Consulting* DISCLAIMS ANY WARRANTY, either expressed or implied, arising from the testing of the well system or this report. We are also not ascertaining the impact the system is having on the environment.

Water Quality Results

Location: 123 ECR 999
Aquifer Output: pressure tank tee
Sample Date: 6-23-19, 4:14 pm
Analysis Date: 6-23-19, 4:21 pm

Sampler: Tiffany Gatesman
Tap Water: kitchen
Sample Date: 6-23-19, 2:40 pm
Analysis Date: 6-23-19, 3:05 pm

Contaminant	Chemical	Concentration (ppm) Aquifer Output pressure tank tee	Concentration (ppm) Tap Water kitchen	MCL* (ppm) or Accepted Range	MCL Set by:
Alkalinity	total (as $CaCO_3$)	58.7	60.5	50-200	n/a
Bacteria	Total Coliform	positive		negative	EPA
Bacteria	*E-coli*	negative		negative	EPA
Chloride	Cl^-	<5	15.6	250	EPA
Total Chlorine**	Cl_2	<0.2		250	EPA
Copper	total Cu		0.8	1.3	EPA
Total Hardness	$Ca^{2+} + Mg^{2+}$ as $CaCO_3$	90.2	24.8	200-500	n/a
Total Iron	Fe total	12.4	5.2	0.3	EPA
Total Lead	Pb total		<0.011	0.015	EPA
Nitrate	NO_3^- (as N)	4.0		10.0	EPA
Nitrite	NO_2^- (as N)	0.6		1.0	EPA
pH	$[H^+]$	5.9	6.7	6.5-8.5	EPA
Salinity	calculation	8.4	25.7	400	n/a
Sodium	Na^+ calculation	<5	17.7	30	EPA
Na^+ Anticipated	calculation		20.2	n/a	n/a
Na^+ Excess	calculation		3.5	0	n/a
SAR	sodium adsorption ratio	<5	0.8	< 13	USDA
Sulfate	SO_4^{2-}	35.6	14.3	250-500	EPA
TDS	total ion calculation	123.4	116.8	500	EPA
Total Cation Charge	calculation	1.5	1.6	n/a	n/a
Total Anion Charge	calculation	1.5	1.6	n/a	n/a
CSMR	Cl^- / SO_4^{2-} ratio	0.1	0.6	< 0.5	n/a
Scaling	Langelier-Saturation	-2.2	-1.9	-2.0 - 2.0	n/a
Scaling	Puckorius Scaling	9.0	10.1	5 - 7	n/a
Scaling	Ryzner Stability Index	10.2	10.5	5 - 7	n/a
Corrosivity	Aggressive Index	9.6	9.8	>10	EPA

**Maximum Contaminant Level (MCL)* *ppm = parts per millions = mg/L*
Grey boxes indicate contaminant not tested for

Water Quality Report

**please see Appendix A for description of water quality parameters and mitigation*

A. Aquifer Output (well water) Aesthetics & Chemical Description

1. There is no odor, is no sediment, and the color is clear.
2. The water is soft (<120 ppm) at 90.2 ppm.
3. There is 12.4 ppm iron in the water.
4. There is 4 ppm nitrates and 0.6 ppm nitrites in the water (cannot exceed 10.0 ppm nitrate, 1.0 ppm nitrite).
5. Total Coliform bacteria results are positive and E-Coli bacteria results are negative.
6. The CSMR is 0.1 and indicates that the water has low potential for galvanic corrosion.
7. The LSI, PSI, and RStI values indicate that the water chemistry has a natural tendency to cause Heavy Corrosion (LSI) and Heavy Corrosion (PSI, RStI) on piping and plumbing fixtures.
8. The Aggressive Index value of 9.6 indicates that the water is potentially highly aggressive/corrosive to piping and plumbing fixtures.

B. Tap Water Aesthetics & Chemical Description

**Tap Water is influenced by home piping, plumbing fixtures, and any water treatment systems.*

1. There are no signs of iron and/or sulfur bacteria.
2. There is a water softener on the system.
3. There is a whole house filter.
4. The water is soft (<120 ppm) at 24.8 ppm.
5. There is 5.2 ppm iron, 0.8 ppm copper, and <0.011 ppm lead in the water (cannot exceed 0.3 ppm iron, 1.3 ppm copper, and 0.015 ppm lead).
6. The CSMR is 0.6 and indicates that the water has moderate potential for galvanic corrosion.
7. The LSI, PSI, and RStI values indicate that the water chemistry has a natural tendency to cause Corrosion (LSI) and Intolerable Corrosion (PSI, RStI) on piping and plumbing fixtures.
8. The Aggressive Index value of 9.8 indicates that the water is potentially highly aggressive/corrosive to piping and plumbing fixtures.

C. Comparison of Aquifer Water and Tap Water

1. There is nitrate, nitrite, and coliform bacteria found in aquifer water. This is most likely caused by contamination of an onsite septic system and the shallow well. See more information on these contaminant and EPA regulations in *Appendix A* .

2. There is a decrease in hardness and iron from aquifer to tap water.
3. There is an increase in chloride and sodium from aquifer to tap water. Source is most likely from water softener. People with low sodium diet should drink bottled water. See *Appendix A* for more information.
4. Both aquifer and tap water have high tendency to cause corrosion.
5. Tap water has a high tendency to cause galvanic corrosion. Galvanic corrosion leaches lead and copper into water.
6. There is copper detected in tap water. Copper source appears to be from home plumbing as the corrosion indices indicate water has high potential to corrode.
   It is suggested to replace copper piping with National Sanitation Foundation Drinking Water stamped and approved PVC piping (See Appendix A - Copper and Aggressive Index).

D. Summary

1. The Water Quality is Not Acceptable.
   See A.4., A.5., A.7., A.8., B.5., B.6., B.7., B.8. and Section C.

E. Disclaimer

Water quality parameters were analyzed in field via *RETEGO* © on-site chemical testing instrument. *Gatesman Environmental Consulting* has not been retained to warrant, guarantee, or certify these water quality results in the future because of numerous factors (usage, treatment systems, maintenance, aquifer characteristics, seasonal fluctuations, etc.) which may affect the water quality of the aquifer and tap water.

Septic System Inspection Report

A. Permit and Record Information

1. Grand County Building Department records (Permit #S11-000) indicate the system was permited on 03-12-2007 and installation completed and final approval on 06-23-2007.
2. The permit is for an onsite wastewater system with the capacity to serve a 3 bedroom home.
3. The permit indicates the system is comprised of a two compartment 1,000 gallon tank Gravity Dosing to an soil absorption with 72 infiltrator type 1,331 square foot absorption field.
4. There are no repair or replacement permits on record.
5. The system is designed for the added loading of only a washing machine and garbage disposal.
6. The permit indicates that the piping to and from tank are 5 foot Cast Iron pipe.
7. The system is required to have an Effluent Filter.
8. Last septic pump and service date is 2018.

B. System Inventory

1. The condition of the Lids is Acceptable with No Concerns and the lids appear secure under normal conditions.
2. The concrete tank function, structure, and installation is Acceptable with No Concerns and is not showing evidence of failure.
3. The Inlet Baffle is Not Acceptable, the Outlet Baffle is Acceptable with No Concerns, and there are no cleanouts installed in the sewer line.
   There is roughly 5 inches between inlet pipe and effluent causing turbulence from discharge (figure 6).
   The inlet tee-pipe or baffle must extend at least 5 inches above and a minimum of 8 inches below effluent surface per the State of Colorado Water Quality Control Commission Department of Public Health and Environment on-site wastewater treatment system regulation #43.9.B.4.c.
4. There is an Effluent Filter and the condition is Acceptable with Concerns.
   There is no handle on the Effluent Filter.
   The handle of the effluent filter must extend to within 12 inches of final grade per the Grand County on-site wastewater treatment system regulation #43.9.J.6.
5. The absorption field has no inspection ports.
6. The Distance from the Absorption Field to the well is Acceptable with No Concerns.

C. Performance Observations

1. The septic lids are accessible and secure under normal conditions and provide reliable access to the tank.
2. The tank is in good structural condition and sludge and scum levels are such that it does not require service.
3. The system is showing sign of past or present effluent back-up into the tank.
4. The Absorption Field is Not Acceptable.
   There are signs of back-up into septic tank (Figure 7). There is lush vegetation growing on absorption field suggesting that field is failing causing excess water and nutrients into soil. Nitrate, nitrite, and coliform bacteria was detected in Aquifer Water suggesting a failed septic system leaching waste water effluent into local aquifer.

D. Summary

1. The Pre-Treatment Tank is Acceptable with Concerns.
   See B.3. and B.4..
2. The Absorption Field is Not Acceptable.
   See C.4..
3. The Overall Performance is Not Acceptable.

E. Disclaimer

Based on what I was able to observe and my experience with septic systems, I submit this Septic System Inspection Report based on the present condition of the septic system. *Gatesman Environmental Consulting* . has not been retained to warrant, guarantee, or certify the proper functioning of the system for any period of time in the future. Because of numerous factors (usage, soil characteristics, previous failures, etc.) which may affect the proper operation of a septic system, this report shall not be construed as a warranty by our company that the system will function properly for ary particular buyer. *Gatesman Environmental Consulting* DISCLAIMS ANY WARRANTY, either expressed or implied, arising from the inspection of the septic system or this report. We are also not ascertaining the impact the system is having on the environment.

Figures

Figure 1. Aerial map of property with location of well head, septic tank, and absorption field.

Figure 2. Well head at east side of driveway.

Figure 3. Well equipment located in basement.

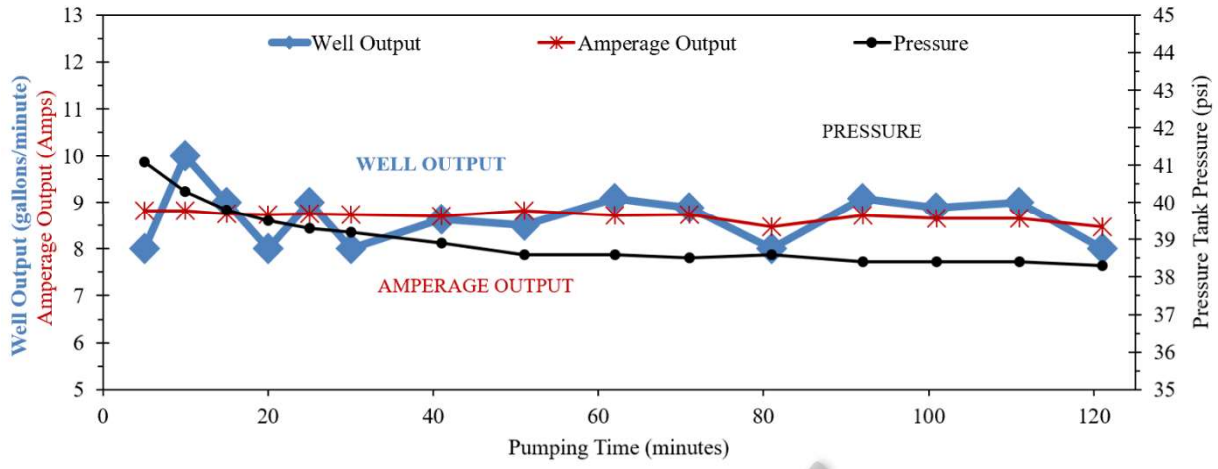

Figure 4. Well output (blue), amperage output (red), and pressure (black) of well equipment during production rate test.

Figure 5. Location of septic tank on north side of home.

Figure 6. First compartment of septic tank and inlet baffle. Note roughly 5 inches between pipe and effluent causing turbulence

Figure 7. Second compartment of septic tank and outlet baffle with effluent filter. Note there is no handle on effluent filter and solids

Figure 8. Location of absorption field (yellow polygon).

Appendix A

Water Quality Parameter Descriptions

Aggressive Index (AI)

Aggressive Index (AI) is a mathematical value that identifies the potential for water to corrode. See below for values of AI and what it means. Waters with lower pH, alkalinity, and hardness tend to be corrosive. Corrosive water causes corrosion of piping, soldering, and other metal surfaces in home plumbing and fixtures resulting in a dissolution of metals, such as copper and lead, into water. Soldering in copper piping prior to 1990 may contain high lead content and cause higher lead concentrations in water. Mitigation for corrosive water include treatment and replacement of metal piping to National Sanitation Foundation Drinking Water stamped and approved PVC piping. Water treatment and mitigation can consist of, but not limited to, acid neutralizing filters, Reverse Osmosis (RO), de-ionization, or phosphate filters. These treatments are typically a whole house treatment and placed at point of entry into home (i.e. near pressure tank) to prevent corrosion in home plumbing.

Aggressive Index	AI Classification
>12	nonaggressive (noncorrosive)
10-11.9	moderately aggressive water
<10	highly aggressive water

Alkalinity

Alkalinity is the capacity of water to buffer against change in pH. Alkalinity is a measurement of the amount of naturally occurring minerals in solution that aid in buffering solution from added acids or bases. A low alkalinity has a low buffering capacity, therefore, the water will not resist change in pH. Alkalinity values 50-150 ppm are sufficient at buffering the change in pH. High alkalinity is only an aesthetic problem and can result in the formation of mineral scaling in pipes and water heaters which can slowly shorten the age of appliances and fixtures.

Bacteria

Coliform . Coliform bacteria is a broad class of bacteria that strive in the digestive tracks of warm-blooded animals. A positive bacteria test can cause serious human illness, however, not all forms of coliform are dangerous. Water should be treated with a chlorination process or an alternate water supply. Other disinfection methods include ultraviolet radiation, ozonation, boiling, or pasteurization.

Escherichia coli (E-coli). Also called Fecal Coliform bacteria are a group of total coliform bacteria that primarily comes from feces of warm-blooded animals. A presence of E-coli poses an immediate risk to human health and indicates the water source has been exposed to feces in some way (home septic systems, livestock, wildlife, etc.).

Chloride

The EPA has a Secondary Maximum Contaminant Level set at 250 mg/L for aesthetics of taste. An increase in chloride can be due to anion exchange, NaCl water softeners, NaCl brine leaks, use of desalinated water, and use of chloride-based coagulants. Chloride can accelerate lead and other metalloid galvanic corrosion by preventing solid formation for protection on the surface.

Chloride Sulfate Mass Ratio (CSMR)

CSMR is a ratio of chloride and sulfate and is an indicator of galvanic corrosion of lead and copper piping and fittings. The higher the CSMR, the higher the potential for galvanic corrosion. An increase in chloride due to anion exchange treatment, NaCl water softeners, NaCl brine leaks, use of desalinated water, and use of chloride-based coagulants results in an increase in CSMR, and therefore, can increases the potential for galvanic corrosion in water fixtures and copper and lead piping. See chloride, sulphate, and reference tables for further information.

CSMR	Potential to Promote Galvanic Corrosion
< 0.2	low
0.2 - 0.5	moderate
CSMR > 0.5, ALK > 50	moderate
CSMR > 0.5, ALK < 50	high

Chlorine

The purpose of Chlorine analysis conducted by *Gatesman Environmental Consulting* is to test if there a chlorine pre-treatment of the well water. If there is a positive result of chloride, then the bacteria test will be null. There is limited sources of chloride in the environment, so the only sources would be a pre-treatment.

Copper

Copper contamination in water is an indicator of corrosive water corroding copper piping. Copper is rarely found naturally groundwater in high concentrations. The secondary drinking water standard set by the EPA is 1.3 mg/L. Health concerns effect children under the age of one year and people with Wilson's disease. There is a metallic taste at concentrations of 1-2 mg/L and water will be undrinkable at 5-8 mg/L. Copper in water causes blue-green staining in plumbing fixtures. The main cause of copper in drinking water is uniform corrosion from waters of low pH and low alkalinity. These types of waters tend to not form scale on piping and fixtures which protects them from corrosion. Water drained from pipes after sitting has highest concentrations as the water has more time to actively dissolve the copper. Mitigation for copper contamination in

your home consists of replacing piping with alternate materials (see aggressive index below for more information). Hot water leaches copper at a higher rate. Avoid using water from the hot water tap for cooking and drinking. Flush the sink with cold water prior to using potable water to flush out standing, contaminated water. Copper is also toxic to plants, use the same precautions for watering house plants.

Total Hardness

Hardness is the measure of calcium and magnesium dissolved in water. This water may have a better taste, but does not make a good lather and can cause spotting on glasses and dishes. Hard water can cause mineral build in hot water heaters as well. However, the increased amount of calcium and magnesium in the water can also have benefits such as reduce pipe corrosion and other health benefits.

To treat hard water, you can soften you water. The most common way is with sodium carbonate water filter. Calcium and magnesium replace sodium resulting in a capture of calcium and magnesium (decreased hardness) and a release of sodium (increased sodium). The increased sodium in drinking water can have negative effects on human health and can increase the risk of septic system failure. The increased amount of sodium is highly conductive and can reduce and disrupt the primary treatment of solids in the septic tank and cause septic drainage failure. Alternatives are potassium carbonate softener or reverse osmosis (RO). The RO softener can also have increased risk in septic system failure because the process yields a large amount of waste water increasing the amount of water into the septic system. This means you will have to manage your septic system more often and it won't be as efficient. Other alternatives are to install softener systems on washing machines or dish washers; some new appliances come with a water softener as well.

Hardness (ppm as $CaCO_3$)	Classification
0-60	soft
61-120	moderately soft
121-300	hard
>300	very hard

Total Iron

Iron sources in drinking water is either naturally occurring dissolved iron from ground water or from corrosive waters dissolving iron from metal piping in well and home. High iron concentrations can cause aesthetic problems such as metallic taste and red staining in plumbing fixtures and laundry. Iron sedimentation and iron bacteria (see below "other contaminants") can cause problems in piping and fixtures. The EPA secondary drinking water standard for public water supply is 0.3 ppm, however, iron does not pose great health risks and is an essential nutrient to the human diet. Please refer to the Aggressive Index below for suggestions on mitigation.

Lead

Lead poses the greatest risk to young children, infants, and pregnant women. The EPA drinking water standard for lead is less than 0.015 ppm. Above this level there are risks to the human body that include damage to the brain, kidneys, nervous system, and red blood cells. The most probable source of lead contamination in your drinking water is due to dissolution of lead from pipes from corrosive waters. Sources of lead in home plumbing are brass fittings, older lead pipes, lead soldering of copper piping, new fixtures (less than 5 years), soft water, and water sitting in pipes for extended period of time. Flushing the pipes with cold water prior to potable consumption can reduce the amount of lead found in water. The main source of contamination is from home plumbing so flushing pipes will flush the stagnant water and introduce fresh water from the well. Hot/warm water can increase dissolution of metals into drinking water source. Use cold water for consumptive uses. It is suggested to use bottled water to make formula if you have high lead contamination in your water. Please refer to the Aggressive Index below for suggestions on mitigation.

Nitrate/Nitrite

Nitrate (NO_3^-) and nitrite (NO_2^-) are forms of dissolved nitrogen in water solution. Nitrite is relatively low in groundwater because nitrite readily converts to nitrate in natural environments. Nitrate is an essential nutrient for plants and bacteria, therefore, anthropogenic sources of nitrate are from fertilizer and waste management systems such as septic systems. Levels of nitrate above 4 ppm can suggest pollution from waste management systems. Nitrate and nitrite have serious health concerns for pregnant women, infants, and the ill. High nitrate and nitrite levels can cause "blue baby syndrome" or methemoglobinemia which is caused by nitrites reacting with hemoglobin's in blood preventing the transport of oxygen in the circulatory system (nitrate turns to nitrite in blood). If nitrate and nitrite values are close to or over the Maximum Contaminant Level (MCL), than use of an alternate water source for drinking and cooking is recommended. Reverse Osmosis drinking water treatment systems can be implemented at Point of Use or Point of Entry to reduce nitrate and nitrite concentrations.

pH

Acceptable pH ranges from 6.5-8.5 pH units. It is the measure of the activity of hydrogen ions in solution, or how acidic a solution is. A pH of 7 is neutral (distilled water), pH less than 7 is acidic, and a pH greater than 7 is basic. A reading of a pH below 6.5 or greater than 8.5 can cause problems in piping such as corrosion or can indicate other water quality problems that can lead to similar problems.

Salinity

Is the amount of dissolved salts in solution and is a contributor to TDS and conductivity. Salinity sources are road and sidewalk salt, wastewater (brackish) discharges, brackish leaks in water softening systems, and natural evaporative processes. High salinity can be toxic to animals and freshwater plants including irrigation of lawn, garden, crops, and pets/livestock.

Scaling Indices

Scaling indices address the formation of calcium carbonate scale onto the interior of piping and fixtures and are referred to as Langelier Saturation Index (LSI), Ryznar Stability Index (RStI), and the Puckorious Scaling Index (PSI). These are indicator indices that describes the likelihood of scale forming on solid surfaces. In general, scale can prevent corrosion of piping and fixtures providing a protective barrier between corrosive waters and metals. LSI Indices with low (negative) values and RSI, and PSI Indices with high values tend to be more corrosive because little to no scale will form and the water will have a higher likelihood to corrode metals. Please refer to the table below for more information.

LSI	PSI	RStI	Description
> 2	< 5	< 5	Heavy Scale
0.5 - 2.0	5 - 6	5 - 6	Light Scale
-0.5 - 0.5	6 - 7	6 - 7	Light Scale or Corrosion
-2.0 - -0.5	7 - 7.5	7 - 7.5	Corrosion
< -2	7.5 - 9	7.5 - 9	Heavy Corrosion
	> 9	> 9	Intolerable Corrosion

Sodium

Sodium sources in drinking water are both anthropogenic and naturally occurring. The most common anthropogenic source are water softeners. Water softeners exchange hard ions (calcium and magnesium) for sodium ions resulting in a decrease in scale forming ions (calcium and magnesium) and an increase in sodium ions. The EPA recommendation for sodium in drinking water is 30-60 mg/L. For individuals with a low sodium diet, EPA advises that sodium in drinking water should not exceed 20 mg/L. See Sodium Adsorption Ratio and Chloride Sulphate Mass Ratio for information on effects of sodium on corrosion.

Sodium Adsorption Ratio (SAR)

SAR is an irrigation water quality parameter. SAR is a useful parameter for home dwellings irrigating for small lawns, gardens, and indoor plants. High SAR values (>13) can result in sodium buildup in soils effecting infiltration and percolation of water due to soil crusting, dispersion, poor seeding emergence, poor aeration, and degradation of soil structure (USDA & NRCS).

Sodium - Anticipated

Anticipated Sodium is a calculation to estimate the amount of sodium added to water system after ion exchange softening. Ion exchange softening exchanges hard water ions, calcium and magnesium, with sodium ions. Two sodium ions will replace each calcium and magnesium ion in solution. Calculations are based on inlet water quality analysis.

Sodium - Excess

Excess Sodium is the difference between recorded sodium and anticipated sodium. The recorded sodium is the concentration recorded form water quality analysis. The anticipated sodium is predicted by the by the amount of the sodium needed to reduce total hardens in solution via water treatment and water softeners. If the Excess sodium is positive, there is too much sodium salt addition to water treatment systems. See Anticipated Sodium and Sodium for further information.

Sulphate

Sulphates are naturally occurring with sources from minerals, soil, rocks, plants, and atmosphere. The EPA has a Secondary Maximum Contaminant Level is 250 mg/L based on taste aesthetics. There is a health-based recommendation for <500 mg/L based on acute laxative effects, especially if mixed with infant formula or an osmotically active ion powdered nutritional supplement. Anaerobic conditions can influence sulfate reducing bacteria and cause microbial influenced corrosion. The bacteria reduce sulfate to hydrogen sulfide (egg odor) that causes corrosion of iron and concrete. See Chloride Sulphate Mass Ratio (CSMR) for further information of sulfate corrosion.

TDS

TDS is the Total Dissolved Solids in water and refers to the amount of dissolved minerals/salts, or ions, in solution. TDS is closely related to electric conductivity (EC) as EC is also a measure of ions in solution. TDS and EC are good indicators for hard water and scaling (high TDS) and corrosive water (low TDS). Very high TDS can indicate saline waters. Low TDS can indicate a solution that is undersaturated with salts and nutrients. The EPA has a Secondary Maximum Contaminant Level set at 500 mg/L for hardness, scaling, staining, colored water, and salty taste.

Other Contaminants

· **Iron or Sulfur Bacteria**: is a non-disease bacteria that causes red staining and sedimentation in household plumbing and fixtures. These bacteria utilize iron and sulfur as a source of energy chemically changing sulfate into hydrogen sulfide gas (rotten egg smell). A common place you can find buildup of this bacteria is in the toilet holding tank. When at high concentration, this may lead to clogging of systems. Chlorination is the most common method for treatment. Carbon filters can also be used to filter out ions including the chlorine added.

Appendix B

Septic System Maintenance

Typical onsite waste water treatment systems (a.k.a. septic systems) function by means of solid separation and anaerobic bacteria decomposition in an air-tight septic tank discharging to a soil treatment area where further bacterial decomposition and filtering occurs prior to recharging into the local aquifer.

Two compartment septic tanks are used to ensure clean effluent is discharging into the soil treatment area. The fist compartment allows for solid separation based on density and composition (fats, oils, and greases float; others sink). Anaerobic bacteria breakdown solids through decomposition. The second compartment allows for further decomposition and separation to ensure that no solids are discharging into the soil treatment area. An effluent filter can be added (and is current state regulations) to the outlet baffle Tee-pipe in the second compartment to further filter effluent before the soil treatment area.

Maintenance

On average, septic tanks should be serviced, or pumped, every 3 years or when scum and sludge is greater than 1 foot or when scum is greater than 3 inches and/or sludge is greater than 12 inches. If there is high use (more than 2 persons per bedroom) or use of garbage disposal, pumping may be required in less than 3 years. If the septic tank is not serviced regularly, it may cause failure such as solids to be discharged into soil treatment area causing the soil pours to be blocked. This can result in back-up into septic tank and lastly into the home. Unfortunately, there is no maintenance for this and a new soil treatment area will have to be designed and installed.

If there is an effluent filter in the tank, the filter should be cleaned 1-3 times per year. A simple rinse with a garden hose is sufficient.

To prevent a failed soil treatment area, do not apply any excess pressure or water on area. Excess pressure consists of traffic from any type of vehicles, livestock, small out-buildings, etc. Excess water can be from irrigation, stormwater runoff from buildings or driveways, and snow removal melt. Do not use area for snow removal as the excess weight and excess water can cause failure. Allowing for natural vegetation and not mowing the vegetation can increase water absorption from rain and snowmelt as well as assist the system in filtration and effluent take-up. Do not allow trees to grow on soil treatment area. Trees can add excess weight and soil turbulence causing a disturbance in soil and any infiltrators in area.

(continue to next page)

How to help your septic system