Interpreting Your Test Results

This supplemental attachment to your On-Site Water Supply and Wastewater Disposal System report contains valuable information regarding the evaluation and testing procedures *Goldstream Technical Services, Inc.* uses to evaluate your systems, along with operation and maintenance recommendations. The report itself is incomplete unless read in conjunction with this supplement and this supplement in and of itself is incomplete without the accompanying report.

The evaluation procedure for on-site water and wastewater systems consists of both system installation evaluations and performance tests. The installation evaluations include measurements and observations of the visible and accessible portions of the individual systems to determine compliance with ADEC regulations and construction requirements for residential on-site water and wastewater systems as contained in 18 AAC 72, Wastewater Disposal, and 18 AAC 80, Drinking Water. At the present time, the Alaska Department of Environmental Conservation (ADEC) does not require permits for residential water and wastewater systems and does not regulate the operation and maintenance of on-site septic systems.

WASTEWATER DISPOSAL SYSTEM

The performance test for the septic system adequacy test is based on the procedure outlined in "Testing of On-site Soil Absorption Systems" by L. C. Reid, Ph.D., P.E. of Anchorage. The test methods have been modified to reflect local conditions, ADEC requirements, and our experience in on-site testing and evaluation of residential water and wastewater systems. Included in your adequacy report is information about the performance and configuration of the water supply and wastewater disposal systems obtained from our on-site observations and from documents received through the owner, resident, real estate agent or other source, or obtained directly from ADEC files. No direct inspections or observations were made of any below ground system component, and our conclusions as to system construction are based on existing file information, measurements obtained from field observations and our experience in wastewater disposal system construction practices. We do not verify that the septic system or water source lies wholly or partially outside of lot lines, in utility easements or other right of ways. If you are concerned about possible encroachments we recommend that a professional land surveyor be retained to accurately place the septic system in relation to property lines.

Septic systems are designed for a maximum daily flow, usually based on the number of bedrooms. ADEC assumes 2 people per bedroom and that each person uses an average of 75 gallons per day for a design flow of 150 gallons per bedroom. On-site septic systems consist of two major components: A septic tank, used to separate solids from the effluent and to provide some biological treatment of the wastewater; and the soil absorption system (leach field) used to treat and redistribute the water component back into the groundwater system. Septic tanks are sized to provide a minimum amount of water detention time for treatment and solids removal for the design flow, usually equal to about 48 hours. For example, a 3 bedroom house (450 gpd wastewater flow) is required to have a 1000 gallon septic tank. The minimum permissible septic tank size is 1000 gallons. Each additional bedroom increases the septic tank size by 250 gallons to maintain the correct detention time. Septic tanks can be constructed of steel, plastic, fiberglass or concrete, although plastic tanks are preferred based on durability and cost. The leach field is sized to meet the maximum daily flow and is constructed to meet site-specific geological and topographical features, including soil types, groundwater location, terrain and surface water features. Leach field sizing varies depending on the number of bedrooms (design flow) and soil type.

ADEC recommends that a septic system be capable of treating and disposing of an amount of wastewater equal to 150 gallons per bedroom per day (daily absorption capacity) and recommends absorbing 40% of that amount in less than 4 hours (surge capacity). For example, for a 3 bedroom home this is equal to 450 gallons total absorption capacity and 180 gallons surge capacity. The system performance test measures the capacity of the septic system to meet these requirements by introducing water directly into the leach field monitor tube at the maximum capacity of the home water delivery system (surge test) and monitoring the water levels in both the leach field and septic tank. In order to pass the surge test, the system must be capable of accepting the surge flow without backing up into and causing a rise in the septic tank water level. After the required surge amount has been added to the leach field, water is then added directly to the septic tank cleanout and the connection between the septic tank and leach field is verified. We continue to monitor the water levels to verify that the system is capable of treating and disposing of the estimated maximum daily flow required by ADEC.

In the event that the leach field monitors are missing, damaged or otherwise unavailable we then test the leach field through the septic tank, adding 1-1/2 to 2 times the maximum daily flow directly into the tank. For a properly operating leach field the water level in the septic tank should rise no more that 1-2 inches while water is being added, and then should drop back to the original level within a few minutes after water flow is terminated.

It is occasionally necessary to use a water delivery service to test the system, in which case water is added at a much higher rate than the home water system can usually deliver. In this event we take into account the increased flow rate when evaluating the system response and performance.

Pumping the Septic Tank

Under normal use the solids in the septic tank should be removed when the buildup reaches about 1/4 of the volume of the tank or at least once every two years to prevent solids carry-over and subsequent plugging and failure of the leach field. The use of garbage grinders increases the solids in the wastewater stream and accelerates solids accumulation in the septic tank; the use of garbage disposals should be avoided with septic systems. Use of water softeners using salt-regenerating cycles may also increase the solids accumulation in the septic tank and contribute to corrosion in steel tanks, reducing the life of the leach field when the baffle between the primary and secondary compartments deteriorate and floating solids end up in the leach field. Accelerated solids accumulation in the septic tank requires more frequent pumping, and the increased concentrations of suspended solids in the effluent may reduce the design life of the soil absorption system. We recommend pumping the septic tank on an annual basis if these conditions apply. Introduction of chemical or enzymatic conditioners have not been shown to be of any significant value in reviving or increasing bacterial decomposition of the solids in a septic tank. Attempting to delay cleaning by adding enzymes or a large quantity of caustic chemical can be harmful to the disposal system.

Freeze Protection

ADEC recommends 4 feet of earth cover or 2 feet of earth cover and 2 inches of foam insulation over systems. This amount of cover is considered adequate protection from freezing if the snow cover on the area is left undisturbed in the winter. Therefore, it is important that the snow cover be allowed to accumulate during the winter over the area involving the on-site system. This maintenance practice will help to avoid freezing problems. The cleanout/monitor tubes on the wastewater system should be kept properly sealed which also minimizes the potential for freezing and reduces odor problems.

Lift Stations

ADEC requires a minimum of 4 feet of separation distance between the base of the leach field distribution rock and the ground water surface to provide adequate treatment before the leachate re-enters the groundwater aquifer. A certified septic installer is required to verify the water table depth prior to installing a new leach field to make sure that the vertical separation requirements are met. If vertical separation cannot be achieved with gravity flow a lift station will be installed to elevate the leach field to meet the vertical separation requirement. All new lift stations are required to have high water alarms installed to detect pump or system failures, although many older systems are not equipped with visual and/or audible alarms. If major repairs are made to an existing non-alarmed system, the lift station must be retrofitted with an alarm. We recommend that all high water level alarms be installed on a separate electrical circuit from the pump to alert the homeowner of potential problems before the pump either fails or trips the circuit breaker, stops working, and wastewater backs up into the residence.

Expected Life Span

Leach fields are usually the first component of a septic system to fail, when solids plug the soil matrix and prevent water percolation back into the ground. All leach fields eventually fail and require replacement; no definitive remaining life for the leach system can be predicted. The life of the system is a function of initial construction methods and materials, use and maintenance.

Steel septic tanks have an average life span of 25 years until the tank begins to leak or the internal baffles that are used to keep floating particles from entering the leach field have rusted out. The use of water softeners with salt-regenerating cycles may shorten the life of a steel septic tank, and the interior baffles are particularly affected by salt corrosion. Suspended solids in the effluent may reduce the design life of a soil absorption system. Plastic septic tanks have a significantly longer life span and are not affected by the corrosive action of salt in the effluent and the soils surrounding the tank. Insulating a septic tank can raise the water temperature and increase biological activity, enhancing water treatment within the septic tank. Better treatment in the septic tank will increase the longevity of a leach field, although the overall life is primarily a function of use and maintenance. Increasing the water temperature also increases the corrosion potential, so we do not recommend insulating steel septic tanks; plastic, concrete or fiberglass tanks are more suitable for insulation.

WATER SUPPLY SYSTEM

ADEC has established construction and water quality standards for public and private drinking water systems, but does not regulate or enforce these requirements for private residential water systems unless there are separation distance violations from potential sources of contamination that require waivers. Our analysis is based on these standards and our recommendations are suggestions only and should not be considered requirements unless a public drinking water system is involved, in which case violations are required to be addressed or remedied.

System Construction

Our on-site water system evaluation includes measurements between the water source and potential sources of contamination including septic systems, sewer lines, cleanouts and below ground fuel tanks both on and off site to verify compliance with ADEC requirements. We only measure between above ground features such as standpipes, well casings and fill/vent lines that are usually associated and connected to below ground structures. In most cases these distances are measured directly with a hand held tape measure. Occasionally we obtain swing tie offsets from known structures and calculate the separation distances when straight line sight distances are not possible. We also note the condition of the well casing seal and pump power cables and occasionally recommend improvements if we believe there is a potential for contamination of the water supply by surface elements.

Flow Test

The flow test performed in conjunction with the septic system performance test is measured at an outside hose bib or other location on the water system. The actual amount of water that can be produced may vary at different points in the house and can be affected by filters, fittings, valves and other flow restricting devices. Our test does not usually test the well flow directly but does provide an indication of the flow rate for the overall water system during the test period.

WATER QUALITY

The total coliform test checks for the presence of any coliform bacteria, which are very common indicator organisms for potential contamination. Total coliform bacteria is occasionally encountered in water systems and is typically the result of human or animal contact with the water system components, such as filters and water treatment systems or recent installation or repair of water system fittings. Coliform bacteria can also contaminate ground water systems that have surface water infiltration. Coliform can be eliminated from a water system by disinfection with chlorine. E. coli bacteria are commonly found in fecal matter and are an indicator organism that could indicate possible cross contamination from the wastewater disposal system. E. coli contamination is uncommon in well water samples, but if encountered it could be a potentially serious health issue. Additional investigation work is usually recommended if E. coli is detected.

Arsenic is a naturally occurring compound in some bedrock aquifers around Fairbanks. The current ADEC Maximum Contaminate Level (MCL) for arsenic in public water supplies is 10 ug/l (micrograms per liter). Nitrogen compounds including nitrite and nitrate can occur in groundwater contaminated from domestic wastewater, agricultural sources, or naturally occurring decomposing organic matter, and has been noted in several locations in Fairbanks. The test most commonly requested is a combined nitrite/nitrate evaluation, which does not distinguish between the two nitrogen compounds. The current MCL for combined nitrite/nitrate in public water supplies is 10 mg/l (milligrams per liter) and the MCL for nitrite is 1 mg/l. If your water sample contains over 1 mg/l and less than 10 mg/l combined nitrite/nitrate it is possible that the MCL for nitrite has been exceeded and may be flagged on your water analysis report. The occurrence of nitrite in drinking water sources in Alaska is rare. However if you are concerned we recommend that you have your water tested for nitrite separately. Water quality standards for public water systems are outlined in 18AAC 80.300, however private residential water supplies are not required to meet these standards.

Occasionally during the flow test we observe water discoloration and what appears to be oxidized iron and manganese in the well water. Iron and manganese are common to virtually all ground water in the Fairbanks area. ADEC considers iron and manganese to be secondary contaminates that do not impact health but are aesthetic concerns regarding taste and odor. When mixed with air during the pumping process the iron and manganese oxidize and precipitate into rust colored or black gritty sediment that can stain laundry and plug filters and screens. Most ion-exchange type water softeners are not specifically designed for iron/manganese removal and do not provide efficient removal over a long period of time. If the levels of iron and/or manganese are objectionable, we recommend installing a greensand type ion-exchange filter specifically designed to remove iron and manganese. Other water quality tests such as copper and lead, hardness, corrosivity (Langlier Index), pH and other water index tests are available.

There is additional water system information for homeowners with wells available on the ADEC website at http://www.dec.state.ak.us/eh/dw/dwmain/homeowners.html and http://www.dec.state.ak.us/eh/dw/publications/publications.html. Additional information can also be found on the EPA website at http://www.epa.gov/ogwdw/privatewells/faq.html.