

SEPTIC SYSTEM PERFORMANCE EVALUATION GUIDELINES

INTRODUCTION

The purpose of these inspections will be to determine, on an individual basis, whether existing septic systems are functional and meet minimum standards of performance established by the San Francisco Regional Water Quality Control Board (RWQCB) and the County of Marin, Environmental Health Services (EHS). The following performance criteria are established as minimum requirements:

1. There is no surfacing effluent at any time.
2. The effluent is not discharged directly to groundwater. This means that site seasonal high ground water levels may not rise above 36 inches below standard leachlines or 24 inches below alternative sewage disposal systems.
3. There is always positive flow from the leachfield and from the septic tank with no backup to the tank or house plumbing during high groundwater conditions.
4. There is an adequately sized septic tank for the structure being served and it must be serviceable - e.g. access riser for maintenance. The septic tank must be water tight and constructed of approved materials.

The following sets forth procedures in conducting performance evaluations, to assure consistency and thoroughness in verifying the functioning status of existing septic systems.

INSPECTION RESPONSIBILITY

The inspections shall be carried out by a Registered Civil Engineer or Registered Environmental Health Specialist. The individuals conducting the field inspection work shall be well versed in the operation and maintenance of individual sewage disposal systems and trained specifically in the testing and inspection procedures outlined in this document.

BACKGROUND DATA

Prior to conducting the field performance inspection all background information pertaining to the property, structures and septic system shall be compiled and reviewed. This should include permit information, site plan, "As Built" drawings of the septic systems, prior sanitary survey inspection results, etc.

The site plan must show the location of the septic tank and leachfield, the locations of all buildings, decks, cutbanks, creeks, wells, reserve or failsafe area, direction and percentage of slope, or any other items which may affect the septic system. If a reserve or failsafe area is not specified or if any proposed construction encroaches upon it, a new reserve area must be identified. The evaluation must address system performance during wet weather conditions as well as dry weather conditions.

INITIAL SITE RECONNAISSANCE

Initially, the inspector should walk the property to confirm the location of the septic tank, leachfield, and other pertinent features of the system. In verifying the leachfield location, the length of each line and the depth of the drainpipe (below ground surface) shall also be determined for comparison with observed groundwater conditions. This may require probing with a metal rod or actual excavation.

The septic tank and disposal field areas should be checked for any obvious signs of existing system problems such as surfacing effluent, odors, greywater bypasses, selective fertility (i.e., lush vegetation in the leachfield area) or any other condition that may suggest an existing or impending problem. The inspector should determine if the system has dual leachfields, and, if so, locate and check the diversion valve, (a) to see that it is functional; and (b) to determine which leachfield is in service. All observations should be noted.

As part of the initial site reconnaissance a hand augured boring (3-inch minimum) shall also be made alongside (but not within) the leachfield area for observation of groundwater conditions. An initial reading (i.e., depth to groundwater from ground surface) shall be taken when the boring is made. The boring shall then be left open for the remainder of the performance inspection so that a final reading may be taken after the water level has been allowed to stabilize for about 1-hour. The boring should be backfilled before leaving the site.

SEPTIC TANK INSPECTION

After the initial site reconnaissance has been conducted, the detailed inspection of the system should commence.

Access Risers

First, locate the septic tank and determine if permanent access risers have been installed on the septic tank. If the tank is equipped with risers, check their general condition. Ideally, the risers should be properly grouted or sealed to the top of the septic tank to prevent groundwater and/or surface water intrusion. The lids of the risers should also be properly sealed to prevent odors and the entry of insects, (e.g., flies, mosquitoes, etc.). Any observed defects in the access risers should be noted. If the tank lacks access risers, this information should be so noted; and the property owner should be provided information about access risers and shall be required to install them.

Opening the tank

After inspecting the access risers the septic tank lids should be carefully removed. Care must be taken if gardens and shrubs are near to prevent damage and to disturb the yard area as little as possible. Concrete lids are heavy and may be "cemented" in place by silt. A steel bar or other suitable tool may be needed to assist in opening the lids. During the tank inspection process, personnel should wear protective boots and gloves (neoprene) to guard against infection from pathogenic organisms.

Structural Condition

Once the tank is open, the inspector should observe and probe the structural condition of the septic tank to check for any obvious signs of cracking or other structural defects in the tank.. A steel rod is used to probe the walls and bottom of the tank. Normally, the tank will not need to be pumped-out to perform this procedure. The inlet and outlet sanitary "tees" should also be inspected to assure that they are in satisfactory condition, properly positioned, and free of scum accumulation, rocks, root matter or other obstructions. Any problems should be noted and the inspector shall conduct whatever additional tests or observations necessary to verify the structural integrity of the septic tank.

Liquid Level

The liquid level in the tank should be measured with respect to the outlet pipe. In a properly functioning system, the level in the tank should be even with the invert (i.e., bottom) of the outlet pipe (**see Figure 1**). If the liquid level is below the outlet pipe, the tank is leaking. If the liquid is above the pipe, the leachfield is either flooded or obstructed. The depth of water above or below the outlet pipe should be measured and noted.

Tank Capacity

The capacity of the septic tank (in gallons) shall be determined from measurements of the width, length and depth (below outlet pipe) of the tank. The capacity shall then be compared with the established water use/wastewater flow rates for the property. A minimum septic capacity of 3 times the maximum expected daily wastewater flow rate shall be required for the existing septic tank size to be judged adequate. If this criteria is not met or there is any uncertainty regarding compliance, then additional tank capacity is required.

HYDRAULIC LOAD TEST

General

The inspector should then proceed with the hydraulic load test of the septic tank and disposal field. The test, as described here, is conducted only for standard gravity fed leachfields, and does not apply if the system utilizes a pump. A separate test to be conducted for pump systems is described in the next section. The hydraulic load test is conducted by surcharging the septic tank with about 150 gallons of water over a 20 - 30 minute period; and then observing the rise of water in the tank and the subsequent draining process. (Tracer dye may be used to assist in observing leachfield failure). A garden hose discharging into the outlet side of the tank can be used to surcharge the tank. The hose outlet should remain well above the water level in the tank to prevent cross contamination. Before starting the test, the flow rate from the hose should be determined (i.e., with 5-gallon bucket and stop watch) to properly gauge the amount of surcharge water added to the tank. Alternatively, a portable water meter can be installed between the house faucet and the hose to directly measure the water volume added.

Test Procedures

The step-by step procedures for the hydraulic load test are then as follows:

- Measure the location of the static water line in the septic tank (at the outlet side) as an initial reference point.
- Begin surcharging the tank with water to start the hydraulic load test.
- Observe any rise in the liquid level at the outlet pipe and measure the water level at the end of filling. Typically, the liquid level will rise from 0.5-to 1-inch, at which point the liquid level should stabilize for the remainder of filling; and the return to the initial level in a matter of minutes after filling is stopped.
- After the filling cycle is finished, the water level decline in the septic tank is observed until the initial level is reached; and the time to achieve this is recorded. If the initial level is not attained within 30-minutes, the test is terminated and the final water level is noted.

System Rating

Based upon the water level readings during the test, a hydraulic performance rating shall be assigned to the system in accordance with the guidelines provided in **Table 1**. It should be emphasized that these are guidelines only, and special circumstances may be cause for modifying the evaluation and rating of particular systems. A system receiving a "Failed" rating shall require appropriate upgrading. A rating of "Failed" may also be a result of other factors such as not maintaining minimum setbacks to high seasonal groundwater.

FINAL LEACHFIELD INSPECTION_

At the completion of the hydraulic load test, the drainfield area and downslope areas should be checked again for indications of surfacing effluent, wetness, or odors. If any of these conditions exist as a result of the hydraulic load test, this shall be considered conclusive evidence of system failure. If the field observations of wetness are not obviously the result of the hydraulic load test, further investigation may be necessary to determine if the drainfield is failing and the cause of the failure. Additional investigative work may include water quality sampling (for total and fecal coliform, ammonia and nitrate) or dye testing. The cause of seepage could be related to gopher holes, site drainage or erosion problems, excessive water use or simply the age of the disposal system.

PUMP SYSTEMS

For systems equipped with an effluent pump, the following inspection procedures should be followed. **Figure 2** provides a diagram of a typical pump system installation for reference.

General

Remove the pump access cover and basin lid, taking care that no soil or other material enters the basin. Note any signs of scum or sludge buildup, indications of previous pump failure (such as scum line above the high water alarm switch), or evidence of soil or roots entering the basin. Also, inspect the float controls to see that they have free movement, and check the electrical junction box (if located in the basin or access riser) for any obvious signs of corrosion. If the water level in the basin is normal (i.e., between the high and low water controls) proceed with testing of the pump systems.

Pump Test

The pump test is conducted by adding sufficient water to the basin to activate the pump "on" control, and observing the performance of the system over at least one pumping cycle. The total amount of water added should be about 150 gallons, to approximate the same hydraulic loading of the leachfield as for gravity systems. Using a garden hose, the water may be added to the outlet side of the septic tank, or directly to the pump basin. If filling the basin directly, care should be taken to minimize turbulence and disturbance of sediment or sludge that may have collected in the basin. This can be best accomplished by directing the stream of water against the interior side of the chamber, rather than directly toward the bottom of the pump chamber.

Observe the filling of the basin, and note and measure the point at which the pump is activated. Immediately stop the filling operation and observe the pumping cycle until the pump shuts off. While the pump is discharging, examine the piping system for any leaks. Even small leaks could be a forewarning of possible breaks in the pressure line at some point in the future; and these should be corrected as soon as possible. Note and measure the depth at which the pump shuts off, and calculate the volume of water between the "on" and "off" measurements. Compare this dose with the design dose volume specified for the system. If the dose is too high or too low, float controls should be readjusted to correct the dose. Any adjustments to the pump system should be done by a licensed and properly qualified contractor (not by the inspector).

The pumping cycle (from "on" to "off") levels should be timed and the results recorded on the inspection form. Typically, if the pump is sized and operating properly, pump operation lasts 1-5 minutes per dose. Pump cycles lasting longer than this may indicate leachfield clogging and/or pump deficiencies. If this is observed, it should be noted and further investigation of the pump and leachfield should be conducted to determine the specific cause.

If during filling of the sump basin or chamber, the pump does not activate when the water reaches the high liquid level control (i.e., "on" float), discontinue the pump test. This indicates a pump failure, defective float switch or wiring problems and will require the repair service of a competent contractor familiar with these types of systems. The pump system failure should be noted, communicated immediately to the resident/owner, and followed up with a notice requiring prompt corrective action.

Leachfield Inspection

At the completion of the pump test, the disposal field area shall be checked for signs of seepage in the same manner as done for gravity-fed systems following the hydraulic load test.

Clean Up

At the completion of the septic system inspection and testing, the inspector shall replace all access lids and clean all tools before leaving the site. All tools, and equipment that come into contact with wastewater should be cleaned and disinfected with a 1:5 bleach solution; and all contaminated rinse water shall be disposed of in the septic tank.

Note: Check with Environmental Health Services prior to conducting any corrective work to the system. Marin County Code requires permits be issued prior to conducting any repair activity.

TABLE 1

HYDRAULIC LOAD TEST RATING GUIDELINES

RATING	SEPTIC TANK RESPONSE TO HYDRAULIC LOADING
EXCELLENT	No noticeable rise in water level during filling.
GOOD	Maximum water level rise of about 1-inch, with rapid decline to initial level within 5-minutes after end of filling.
SATISFACTORY	Maximum water level rise of about 2-inches, with decline to initial level within about 15-minutes after end of filling.
MARGINAL	Maximum water level rise of about 3-inches, with decline to initial level within about 30-minutes after end of filling.
POOR	Water level rise of more than 3-inches, with decline not reaching initial level within 30-minutes after end of filling.
FAILED	Water level rise of more than 3-inches, with no noticeable decline within 30-minutes after end of filling.