

**COUNTY OF SANTA CRUZ HEALTH SERVICES AGENCY
ENVIRONMENTAL HEALTH SERVICE
701 Ocean Street, Room 312, Santa Cruz, CA 95060 - (831) 454-2022
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SOILS EVALUATION AND TESTING PROCEDURES

1. Percolation, groundwater and soils tests may be performed by the following persons, who must be licensed within California: a registered civil engineer; a registered Environmental Health Specialist; soils scientist; an Engineering Geologist; or other Qualified Professional approved by the Health Officer.
2. Results of all testing is to be submitted to Environmental Health Service on the form provided by the County or on an equivalent form.
3. A site plan showing location of tests (appropriately numbered or designated to correspond to the test data) is to accompany the data.

SOIL EVALUATION

1. Sites proposed for new sewage system installation must be evaluated for soil conditions by one or more soil excavations. The Health Officer may require soil testing for system replacements where adequate soil information is not available.
2. Excavations must be made by backhoe whenever possible. Auger is allowed only upon a case-by-case determination (a)when a site is inaccessible by backhoe, (b)when necessary only to verify conditions expected on the basis of prior soils investigations, or (c)when done in connection with geologic investigations.
3. Excavations must extend at least 10 feet below the bottom of a proposed leaching trench. Shallower excavations may be approved on a case-by-case basis for enhanced treatment systems.
4. Observations in the excavation are to be made for soil structure, the potential presence of seasonal groundwater, and the presence of low permeability layers. Soils or formations containing continuous channels, cracks, or fractures are to be noted. Gleying, soils mottling, and soil moisture are also to be noted.

PERCOLATION TEST PROCEDURE

General Requirements

1. The number of percolation tests to be performed shall be determined by Environmental Health Service, but in no case shall fewer than 3 tests be performed at each site. The tests must encompass the area proposed for the sewage system installation and the future expansion area. Slopes greater than 30% are not allowed for sewage disposal and should not be tested.
2. When soils to be used for sewage leaching vary, a percolation test is required in each soil stratum. Tests are also required in the soil beneath the leaching system if a change in soil type is observed.
3. When required by Environmental Health Service, soils expected to have a percolation rate slower than 60 minutes/inch (1 inch/hour) or having a high shrink- swell potential due to clay content must be tested during the time period for winter water table observation.
4. Percolation rates in the soils proposed for leaching shall be no slower than 60 minutes/inch nor faster than 1 minute/inch. Soils beneath the leaching system must have a percolation rate no slower than 120 minutes/inch.

Preparation of Percolation Test Holes

1. Percolation holes shall be prepared by hand auger whenever possible. A power auger may be acceptable on sites approved by Environmental Health Service.

2. Holes are to be 4 to 6 inches in diameter and minimum 12 inches deep.
3. Remove any smeared soil surfaces from the sides of the hole by scraping with a sharp instrument.
4. Remove loose soils from the bottom of the hole and add 1 to 2 inches of coarse sand or fine gravel.
5. If soils tend to collapse, insert a perforated pipe in the hole and carefully pack washed gravel around the outside of the pipe.
6. Holes must be thoroughly presoaked prior to testing to compensate for any possible soil swelling. Either of the following presoak methods are acceptable:
 - a. Completely refill each test hole with clear water 4 times on the day prior to the test.
 - b. A continuous soaking of the hole with clear water for four hours on the day of the test.

Use only clear water and gently pour into the hole to prevent scouring of the sides and bottom.

Performing the Percolation Test

1. Adjust the water depth so that it is 6 inches over the gravel in the bottom of the hole.
2. From a fixed reference point, measure the height of the water surface every 30 minutes for a period of four (4) hours. Refill the test hole to 6 inches over the gravel after every 30 minute reading until a total of 8 percolation rate determinations have been made. The final reading is used to calculate the percolation rate, **except when there is a pattern of a significant declining percolation rate towards the end of the testing period, then additional testing might be required (e.g. extended testing, soil texture analyses, etc.)**. Based on this measure, calculate the percolation rate in minutes per inch.
3. When percolation rates are rapid (faster than 5 minutes/inch), test measurements are to be made every 10 minutes. Refill the test hole to 6" after each reading until a total of 8 percolation rate determinations have been made. If the rate drops to slower than 5 minutes per inch before 8 readings have been recorded, then 30 minute readings are required. The final reading is used to calculate the percolation rate.
4. If the percolation rate is slower than 60 minutes/inch or faster than 1 minute/inch, the soil is unsuitable for a conventional sewage disposal system. Additional testing for an enhanced sewage disposal system may be conducted.

PERCOLATION TESTING FOR SEEPAGE PITS

Construction and Pre-Soak

1. Tests shall be in the primary and expansion area at the lowest elevation, or center if site is flat. If the pit field exceeds 50 feet across, there will be another pit percolation test for each area that is over 50 feet from the primary test area. The health officer shall approve the location and number of the tests.
2. Deep borings by a qualified professional may be used to determine the groundwater potential and soils structural and textural properties if located within 50 feet of the test pit area. The depth of the surface clay cap, common to areas using seepage pits, shall be identified.
3. Depth of the proposed seepage pit shall be determined to provide at least 10 feet of separation to the seasonal high groundwater elevations or impermeable layers. The health officer shall establish

this level based upon relevant data provided from other studies, when recorded by a licensed geologist or geotechnical engineer. If the percolation test boring is used to establish groundwater, then the bottom 10 feet above the water must be backfilled and sealed with a bentonite mix.

4. Drilled borings must be a minimum of 4' and shall be constructed to the depth of the proposed pits.
5. After placing 4' of pea gravel in the bottom, insert a saw cut perforated pipe throughout the entire test boring to extend 6' above grade. If the pipe is almost as large as the boring, no gravel is required with enough perforations to allow water contact with all sides. If void space occurs in the annular space, fill with clean flowing coarse sand or pea gravel to prevent collapsing the bore hole.
6. Fill the test pipe with water enough to cover the entire effective flow area on the day prior to the percolation test. Record the depth to water and time of the initial filling. If during the pre-soak, the water level percolates down to half the wetted depth, within a 30-minute period on 2 consecutive attempts, then only a 2-hour pre-soak is required.
7. Recording methods for depths to water may include visual tape methods, float sticks with tape measures, "plunker-tape" soundings, or calibrated electronic devices. Recording methods must be accurate to within 1/8"

Method for Measuring Pit Percolation Rates

1. On the day of the test, measure the starting water depth and time prior to filling, resulting in a rate for the beginning and end of the pre-soak. Next, fill the test pipe with water to the proposed water inlet depth.
2. Record the falling head rate of fall at 30-minute intervals for 8 readings (4 hours). If rapid rates are occurring at 10-minute intervals or timed rate per inch intervals may be used for calculating percolation rates. Continue to monitor the rate of fall until a consistent rate is established.

Optional Method for Pits:

1. If direct absorption rates are being calculated, refilling methods shall be used to maintain the consistent pressure head of a full pit. Soil Absorption methods will need to gauge total amounts of water added per boring surface area wetted, to establish gallons per square foot. Either method is effective and acceptable.
2. The application rates for the sidewall of the seepage pit shall be based on the Tier 1 Table (State Waterboard OWTS Policy) that provides application rate based upon percolation rates. If direct absorption is calculated by the engineer, then the results may be used to calculate the number and sizing of the pits. The rates of multiple test sites covering the pit field may be averaged in inches per hour, before conversion to an overall MPI.
3. Percolation reports shall be provided to the health officer on forms provided or acceptable for recording the field readings. Test locations and legends shall be indicated on the design plans.
4. Minor deviations can occur with percolation test. Depending of the circumstances, these may be considered by the Health Officer for approval.

GROUNDWATER AND SEASONAL WATER TABLE DETERMINATIONS

When required by the Health Officer, observation for seasonal high water table in the area of the proposed sewage disposal system must be made during the period of observation approved by the Health Officer. Observation periods commence when cumulative rainfall during the rainy season reaches 60% of the seasonal average and is maintained as long as 6" of rainfall has occurred within the prior 30 day period. See the procedures for winter water table testing for more information.