SITE EVALUATION AND TESTING PROCEDURES

General

1. Percolation, groundwater and soils tests for OWTS design may be performed by the following persons, who must be licensed within California: a registered civil engineer; a registered Environmental Health Specialist; an Engineering Geologist; or other Qualified Professional approved by the Health Officer.

2. Results of all testing are 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 or GeoProbe direct push 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, (c) when done in connection with geologic investigations, or when there must be minimal site disturbance.

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 or fast 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 for new systems.

2. When soils to be used for sewage leaching vary, multiple percolation tests are required in area and depth of the dispersal area. Results will be averaged

unless the results vary by more than 10 MPI. If they vary by more than 10 MPI, the slower perc rate will be used for design purposes. 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. The soil percolation depths must be approved by the EH prior to installation.

2. Percolation holes shall be prepared by hand auger whenever possible. A power auger may be acceptable on sites if approved in advance by Environmental Health.

3. Holes are to be 4 to 6 inches in diameter and minimum 12 inches deep.

4. Remove any smeared soil surfaces from the sides of the hole by scraping with a sharp instrument.

5. Remove loose soils from the bottom of the hole and add 1 to 2 inches of coarse sand or fine gravel.

6. If soils tend to collapse, insert a perforated pipe in the hole and carefully pack washed gravel around the outside of the pipe.

7. Holes must be thoroughly presoaked 24 hours 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.

8. 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 on the circumstances, these may be considered by the Health Officer for approval.

GROUNDWATER AND SEASONAL WATER TABLE DETERMINATIONS

Background

The EH Land Use Program implements Santa Cruz County Code (SCCC) Sections 7.38.120.B and 7.38.150.B.9 when making determinations of compliance with regard to groundwater separation requirements for proposed onsite sewage

disposal systems, including the use of enhanced treatment systems with reduced groundwater separation. 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.

Where is WWT Required?

For parcels lacking adequate data and/or when EH doesn't have adequate knowledge or information about the area or when maps, files, or other sources indicate potential seasonal high groundwater and/or prolonged near surface soil saturation, Winter Water Testing (WWT) will be required before EH may proceed with permit application design review. Applicants or their representative are notified of the WWT requirement and are notified in writing when the WWT test period opens. Applicants may request WWT services as a separate Site Evaluation consultation where no sewage disposal permit application has been submitted. Alternatively, the applicant with a "full Site Evaluation" that may include the WWT services if the hours of service have not been exhausted. For all parcels requiring WWT, applicants must submit the completed Site Evaluation forms and fees according to the requirements outlined below.

Procedures

1. Sewage Disposal Proposals Requiring Winter Water Testing
   Sewage disposal proposals must include information on verifiable site soil conditions, duration of saturation of near surface soils (upper 4 feet) and groundwater information adequate to confirm that water table separation requirements are satisfied, and specific dispersal system will function properly. Site testing for groundwater will be required unless the system designer demonstrates to the satisfaction of Environmental Health staff that there is already adequate information regarding the location to determine that groundwater separation requirements can be met. The soil saturation depths must be approved by the EH prior to installation.

2. Site Evaluation with WWT Service Request
   a. Early application, planning, site work, and preparation are strongly encouraged. All required site work, soils excavations, soils morphology determinations, groundwater piezometer installations and surface saturation port installations should be completed prior to the official WWT start date unless otherwise approved by EH. Locations for testing shall be identified and approved by EH staff.
   b. Install the piezometers and near surface soil saturation ports before preparing and submitting the WWT Monitoring Plan.
   c. Submit "Site Evaluation" forms, site plans, WWT Monitoring Plans and fees by

Jan 1, as set forth in SCCC Section 7.38.120.B unless otherwise approved by EH.

d. WWT evaluations not submitted on time will cause the septic system application approval to be postponed until the subsequent winter testing periods.
e. Submit a site plan after WWT testing is completed that clearly indicates the actual location of each piezometer, near surface soil saturation port, and all test-pit excavations.

3. WWT Monitoring Plan

The WWT Monitoring Plan must minimally include the following elements:

a. Detailed site plans with piezometer and near surface soil saturation test port locations and development logs (i.e. diameter or hole and pipe intervals/depths of sand, gravel, bentonite, slotted pipe, etc.)
b. Proposed frequency and duration of monitoring
c. Description of observed test-hole soils profile characteristics:
   Note: Soils morphology determinations must be performed by a Qualified Professional formally trained in soils science.
d. Description of near surface soil saturation duration testing methodologies

4. Piezometer Design

a. Piezometers must be installed and constructed in accordance with the above work plan; also see Figure 1 (attached sheet).
b. Piezometers must be constructed with 2” minimum to 4” maximum Schedule 40 PVC, ABS or NDS leach pipe (non-perforated) piping and shall be equipped with threaded end-caps or snugly fitted end-plugs that can be removed by hand.
c. Each piezometer shall be equipped with a minimum functional 1” wide x 12” deep (minimum) annular seal composed of bentonite, concrete or cement grout to prevent infiltration of surface and near surface water from channeling down the annular space of the borehole. Deeper annular seals may be necessary for accurate groundwater level measurements, based on soil conditions.
d. Piezometer casings must extend at least 6 inches above grade and must be slotted at the desired depth below the 12” minimum surface seal depth.
e. Clean gravel or approved sand must be placed to fill the annular space below the seal or as designed in EH approved WWT Monitoring Plan.
f. Piezometers shall be labeled with permanent ink for identification purposes. A permanent reference mark, from which all water table measures are to be taken, must also be provided along the top edge of each piezometer riser.
g. At the end of the official WWT monitoring period each piezometer will be deconstructed and the remaining bore holes backfilled with clean native material.

5. Piezometer Siting & Installation

a. A minimum of 3 piezometers shall be installed across the area proposed for wastewater dispersal (this means a total of 3 piezometers needed for both the primary and expansion dispersal areas if located in close proximity). The siting must be approved by EH prior to installation.
b. Additional piezometers may be required by EH to obtain more accurate or

comprehensive groundwater data.

c. An additional array of 3 WWT piezometers may be required if 100% leach field expansion area is not in close proximity.

d. One piezometer will be installed near each end of the proposed dispersal area (including top and bottom portions of sloped dispersal areas); a third piezometer shall be installed centrally within the designated dispersal area. The depth of the piezometer screen or slots shall be greater than: {proposed total trench depth} +2 feet + {groundwater separation requirement set forth in SCCC 7.38.150.B.9: 5' or 8', depending on perc rate and distance to a water body} or {proposed total trench depth} + 2', 3', or 5' if enhanced treatment is specified. Ex. 2.5' proposed flow w/ 1.5' cover soil, therefore a 4' total trench depth +8' (if well is +250' feet away from septic system and soil is medium perc, 6-30 MPI) = 14 feet piezometer depth.

e. Additional piezometers will be required for depths above each restricting layer, if any are identified, as determined by soils morphology and EH site observations.

f. WWT for enhanced treatment and mound systems, where the standard separations are not possible, and groundwater is high must be discussed with EH staff prior to finalizing of the WWT Monitoring Plan.

6. Near Surface Soil Saturation Testing.

a. In addition to testing for water table depth, additional data shall be obtained to verify that near surface soil saturation will not adversely affect function of the proposed dispersal system. Existing percolation test ports or new test ports can be used for near surface soil saturation duration determination. Existing perc test data and/or new test data may be used for near surface soil saturation testing as long as testing is extended over a time frame that verifies that water either moves through upper soils relatively rapidly (i.e. percolates faster than 30 minutes per inch) and/or does not remain perched over tight soils, in critical dispersal zones, for an extended period of time. Unless EH determines that adequate information exists, the following testing for saturation will be required. A minimum of 3 near surface soil saturation ports shall be installed across the area proposed for wastewater dispersal (this means a total of 3 ports needed for both the primary and expansion dispersal areas if located in close proximity). Additional ports may be required by EH to obtain more accurate or comprehensive surface saturation data.

b. An additional 3 WWT near surface soil saturation ports may be required if 100% leach field expansion area is not in close proximity. One near surface soil saturation port will be installed near each end of the proposed dispersal area (including top and bottom portions of sloped dispersal areas) a third port shall be installed centrally within the designated dispersal area. The depth of the ports shall be equal to the proposed total trench depth. Additional ports may be required, as determined by soils morphology and EH site observations

7. Qualified Professionals Requirement for WWT

WWT data collection, analysis of results, and final reporting must be performed by an independent and currently licensed Qualified Professional (QP); including Registered Environmental Health Specialists, Soil Scientists, Geotechnical

Engineers, Registered Professional Geologists, Soils Engineers ("Soil Engineer" means a state of California Registered Civil Engineer whose field of expertise is soil mechanics), and Registered Civil Engineers. All the above Qualified Professionals must have specialized training/education in present day descriptions and interpretations of soils morphology.

8. Data Analysis & Interpretation
    a. The Qualified Professional shall present a WWT Final Report to EH on behalf of the applicant wherein all required WWT information outlined above is compiled and results interpreted. The QP shall submit a professional opinion regarding the subject parcel's suitability for sewage disposal and present system design criteria based on site evaluation and WWT findings.
    b. The qualified Professional must report WWT findings to EH within 90 days after the WWT period terminates, regardless of the final outcome of the study.
    c. Extremely heavy rainfall with high GW readings and near surface soil saturation which appear to be short- lived or brief inundation events should be recorded and reassessed 1-3 days after heavy rains, as set forth in SCCC Section 7.38.120.B. The highest persistent readings will be used as the acknowledged measured depth to seasonal high groundwater and/or near surface soil saturation for disposal system design and permitting purposes.
    d. EH staff must be scheduled to observe at least one set of piezometer readings and two sets of near surface soil saturation readings (initial reading taken shortly after significant rain and the other showing the time length of near surface soil saturation duration) with the QP present during the WWT testing period.

Figure 1. CROSS SECTION OF TYPICAL GROUNDWATER PIEZOMETER