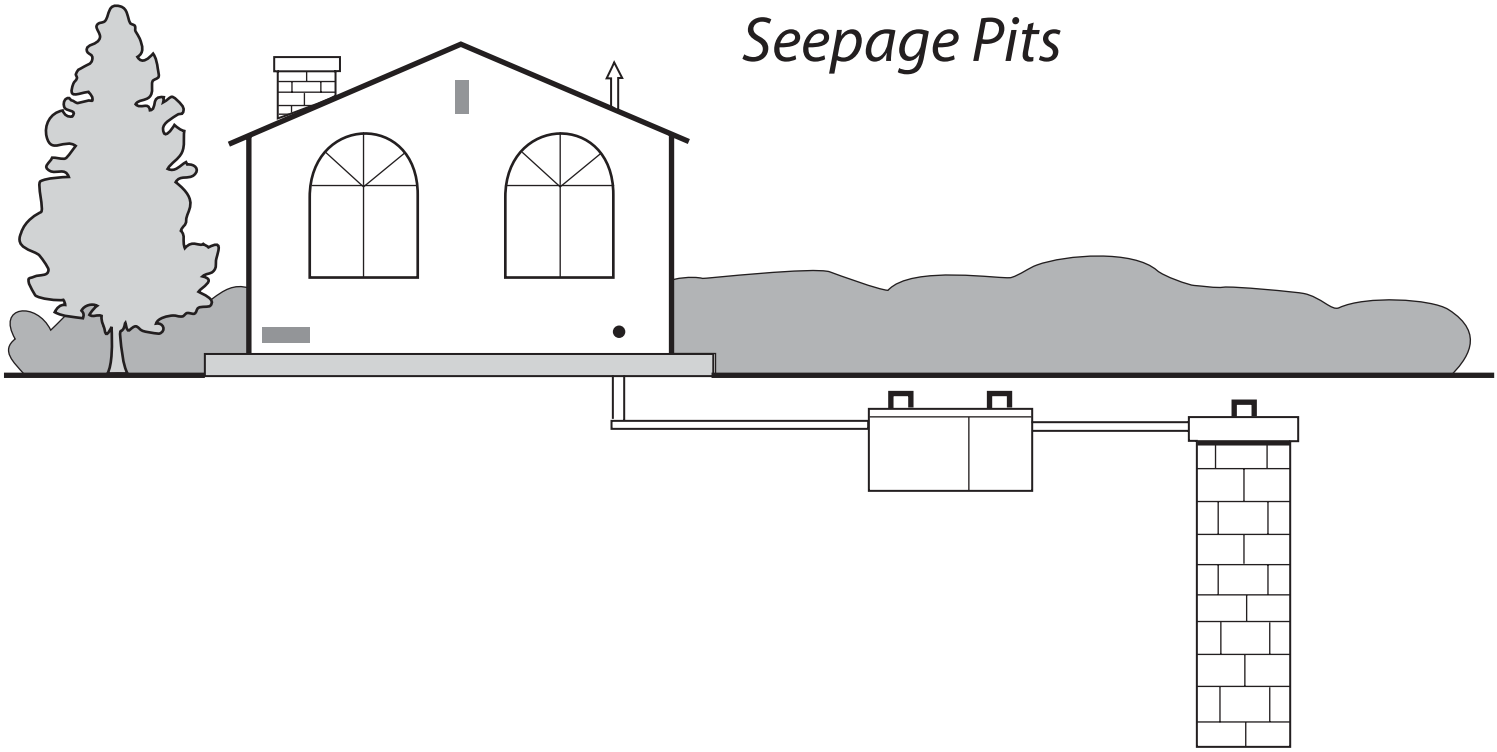
# On-Site Waste Water Disposal System

## Soil Percolation (PERC) Test Report Standards: *Suitability of Lots and Soils for Use of Leachlines or Seepage Pits*



County of San Bernardino Department of Public Health
DIVISION OF ENVIRONMENTAL HEALTH SERVICES

http://www.sbcounty.gov/dehs

August 1992

# FOREWORD

A soil percolation report is a technical document which establishes whether on-site sewage disposal systems can be used for a specific parcel of land to serve a given type of development (such as single/multiple family dwellings, restaurant, campground, etc.).

The soil's percolation condition is determined by testing at the specific site and topographical, geologic, and hydrologic conditions are determined and described in the report. The on-site system is then designed in accordance with this information and County Standards. A properly installed, operated and maintained system should not be subject to premature failure causing nuisances, odors or public health hazards.

Complete reports must be submitted, and all appropriate fees paid to the Division of Environmental Health Services (DEHS), prior to the approval of the use of any on-site percolation system and the application of the design rate.

**CONTENTS**


PAGE

I. When a perc report is required ..... 1

II. Responsibility for perc report ..... 1

III. Format and other requirements ..... 2

1. Description of Site and of Proposal ..... 2

2. Equipment ..... 3

3. Methodology and Procedures ..... 3

3.1 Locations of Borings and Trenchings ..... 3

3.2 Determining the Number of Borings (or Trenchings), and of Tests ..... 3

3.3 Number of Exploratory Borings ..... 4

3.3.1 Boring/Trenching Results ..... 5

3.4 Number of Tests for Leachlines ..... 6

3.4.1 Leachline Standard Percolation Test Procedure ..... 6

3.4.2 Leachline (Continuous Pre-soak Percolation Test Procedure) ..... 8

3.4.3 Leachline Test Results ..... 10

3.5 Number of Tests for Seepage Pits ..... 11

3.5.1 Seepage Pit, Weighted Average Percolation Test Procedure ..... 12

3.5.2 Seepage Pit, Falling Head Percolation Test Procedure ..... 12

3.5.3 Seepage Pit Test Results ..... 12

4. Discussion of Results ..... 13

5. Design ..... 14

6. Plot Per Currently Adopted Uniform Plumbing Code ..... 17

7. General Discussion and Conclusions or Recommendations ..... 18

**APPENDIX**

PAGE

Textural Properties of Mineral Soils ..... A-2

Minimum Requirements for Location of Liquid Waste Disposal Systems..... A-6

Special Soil Conditions..... A-7

Special Discharge Conditions ..... A-9

Alternative On-Site Sewage Disposal Options ..... A-9

Waiver Criteria ..... A-10

Distance to Daylight Requirements ..... A-12

Sloping Ground Considerations..... A-12

Gravel Packing Corrections ..... A-13

Current List of Perennial Streams..... A-14

Regional Water Quality Control Board Criteria..... A-17

Attachment A - Water Quality Control Plan, Santa Ana River Basin ..... A-25

Attachment B - Water Quality Control Plan, Lahontan excerpt..... A-28

**SAN BERNARDINO COUNTY**
**DIVISION OF ENVIRONMENTAL HEALTH SERVICES**
385 North Arrowhead Avenue
San Bernardino, CA 92415-0160
Telephone: (909) 387-4666
FAX Number: (909) 387-4323
**http://www.sbcounty.gov/dehs**

# SOIL PERCOLATION (PERC) TEST REPORT STANDARDS

SUITABILITY OF LOTS AND SOILS FOR
USE OF LEACHLINES OR SEEPAGE PITS

**NOTICE:**
At least two working days before conducting routinely scheduled percolation tests, you must contact the Division of Environmental Health Services. Please provide the following: assessor's parcel number, firm's name and person to contact, date(s) of testing, and telephone number. At the option of the specialist, a field inspection during testing or shortly thereafter may be conducted. The date that the specialist (or DEHS Water/ Wastewater Section) was contacted must be stated in the report.

**I. A perc report is required by DEHS:**

a) For all subdivisions of land, except those for which a waiver has been granted. (see pg A-10, item 4 for criteria.)

b) For any parcel or land division where existing data will not allow the county liquid waste specialist to set a sewage disposal rate.

c) For any single lot where space or soil conditions for on-site sewage disposal are critical (i.e., very small or steep lots, very slow perc times, shallow groundwater with fast perc times, etc.)

d) For all new on-site septic systems within the San Bernardino or Angeles National Forest boundaries and in other mountain areas.

e) For all on-site septic systems requiring an exemption from California Regional Water Quality Control Board (CRWQCB) wastewater discharge prohibitions. (Check with Specialist/ RWQCB for designated areas.)

f) For any commercial or sanitary wastes from industrial developments utilizing on-site percolation systems.

g) For a replacement system where existing data will not allow the county liquid waste specialist to set a design rate.

**II. Those who prepare perc reports must have professional experience and be knowledgeable in assessing the site's on-site sewage disposal feasibility. They assume responsibility for the report's contents in accordance with the obligations of their professional registration and may be held liable if false or misleading information is presented. Preparers must possess one of the following professional registrations:**

a) A State of California Registered Civil Engineer,

b) A State of California Certified Engineering Geologist,

c) A State of California Registered Environmental Health Specialist,

d) A State of California Registered Geologist,

e) A State of California Geotechnical Engineer

Reports must be properly documented with the original signature, stamp, professional registration number and license expiration date of the preparer. Photo copied signatures are not acceptable. Preparers shall be identified by name, field technicians by initial.

## III. Format and other requirements:

### 1. DESCRIPTION OF SITE AND OF PROPOSAL

1.0 Date/individual that was notified of testing.

1.1 Prepared for: Name of client, address and phone number.

1.2 Location of land:

a) Provide a sufficiently detailed vicinity map, township, range, section, assessor's parcel map or subdivision map, and/or legal description of property. Make sure you have the right parcel; state how the property is identified. (Owner's word alone is not acceptable.) Indicate landmarks and street addresses when possible. Specify those survey monuments found and if the property lines were surveyed, by whom.

1.3 Proposed Development/Project/Land use:

a) State the type of project: i.e., condominium, subdivision tract, lot sale, parcel map, shopping center, etc.
b) State the total acreage, the number of lots, and the average and range of the lot sizes.
c) State the type of sewage disposal system: i.e., septic tank or package plant, leachline(s),or seepage pit(s), separate or common system, other.
d) State if grading is proposed for the development, and how much.

1.4 Description of site and surroundings: (A photograph is often useful.)

a) Topography: Include a topographic map prepared by a Registered Civil Engineer or Licensed Land Surveyor, unless the site and the surroundings are flat or have a uniform, constant slope (+ or - 1% variation) of less than 20%. For instance, "slope of 10% downward from north property line to south property line".

| % Slope | Maximum Interval of Contours in Feet For Topo Map |
|---|---|
| 0-2 | 2 |
| >2-10 | 4 |
| >10 | 10 |

Describe the topography in the area of the proposed disposal site(s) and its location relative to the proposed development.

b) Water courses: Indicate and show on the plot plan any floodway, floodplain, spring(s),

stream(s), and drainage course(s) which encroach within a distance of 1 ½ times the required minimum setback from the disposal area(s).

c) Vegetation type and density (especially groundwater indicators such as willows, reed grasses, cattails, and smoke trees) as well as trees in general, area(s) of proposed system(s).

d) Existing structures: (1) General description of proximity, density, probable kind and number of neighboring septic systems. (2) Indicate whether the proposed system could adversely impact any existing structure's disposal system(s) or replacement area on or in the vicinity of the parcel being tested where known. (3) Indicate location of nearest sewer, and any sewer manholes observed.

e) Indicate the location of any active or inactive well(s) (and their construction details where known) located within 300 feet of the proposed disposal area. Indicate proposed source of domestic water. Identify future well sites, when appropriate.

f) Rock outcroppings: Specify the type of rock (shale, slate, schist, granite).

g) Indicate the depth to historic groundwater and how it was determined. Provide the date and source of information used (Flood Control Agency, local water companies, California Department of Water Resources Bulletin, USGS, DEHS Water/ Wastewater Section, etc.)

h) Any other feature that may affect sewage disposal: fill material, spots of vegetation, obvious signs of slope instability, fractured bedrock, root channels, cracks in the soil profile, suspected infiltration galleries or old mine tunnels, proposed grading over the system, etc.

## 2. EQUIPMENT

Describe in detail equipment used to perform perc test - backhoe with 12" bucket, rig with 8" diameter, screw-type auger (identify type), 6" posthole digger, shovel, fork and spoon, measuring tape with 1/8" divisions, wire-onfloat sliding on 1/10" gradation scale, etc.

## 3. METHODOLOGY AND PROCEDURES

**3.1 Location of borings and trenchings.** Under most circumstances, the random grid method should be utilized. In the event that other methods are used, explain the method and state the specific reason(s) it was used in lieu of the grid method. It is the report preparer's responsibility to ensure that tests were conducted where described in the report. Indicate locations on the plot plan. For easy identification leave three-foot laths marked with your initials, hole/trench number, and the date the test was conducted at each backfilled hole. Estimate theoretical cuts and fills and perform the tests and borings <u>at the depths</u> at which percolation will occur when the system is installed. When final grading is unknown, indicate that leachlines will be located in natural soil ± two (2) feet of cut or fill (± five (5) feet if pits) or at tested depths. If the final system design is not located within the stated range, additional testing will be required prior to final recordation or issuance of a building permit.

**3.2 Soil characteristics to determine number of borings or trenchings and tests.** Unless deviations are permitted in advance by the county liquid waste specialist, the <u>minimum</u> number of explorations and tests in Tables 3.3, 3.4, and 3.5 is determined based on the following soil characteristics:

A. **Favorable** is defined by the following:
   1. Ideal soil conditions are anticipated.
   2. There is no visual evidence of shallow groundwater, bedrock, impervious materials, etc. Tests and borings performed agree with the visual evidence. Natural or finished slope of the disposal area is 20% or less.

B. **Moderate** is defined by the following:
   1. Only isolated areas of the property are suspected to encounter problems due to groundwater, bedrock, impervious materials, etc.
   2. No more than 10% of the tests and deep borings fail to meet standards.
   3. The minimum number of tests and borings should be spaced in a random grid, the additional tests describe the limits of the problem area(s).
   4. Natural or finished slope of the disposal area is less than 30%.

C. **Severe** is defined by the following:
   1. Obvious surface features indicating site conditions that will hinder subsurface disposal are present.
   2. Through random testing, more than 10% of the tests and borings do not meet standards.
   3. Acceptable testing rates approach the upper limit of approval, or a nonuniform pattern of test rates develop.
   4. Natural or finished slopes of the disposal area equal or exceed 30%.

### 3.3 Minimum number of exploratory borings

| | Gross Lot Size | Soil Conditions | |
|---|---|---|---|
| | | Favorable to Moderate | Severe |
| Subdivisions and individual lot sales | <1 acre | 3 borings first 10 lots<br>1 boring every 10 thereafter | 8 borings first 10 lots<br>5 borings every 10 thereafter |
| | 1-5 acres | 5 borings first 10 lots<br>3 borings every 10 thereafter | 2 per lot* |
| | >5 acres | 1 boring per lot* | 2 per lot* |
| Residential lot | | 1 boring* | 2 per lot* |
| Commercial lot, confluent systems under one ownership | | 1 boring per 4,000 gallons septic tank capacity* | 1 boring per 2,000 gallons septic tank capacity* |
| Parcel Map | 5 acres or less | 1 boring in the center of the undivided parcel | 2 borings evenly spaced in the undivided parcel |

*** In the area of the disposal system, if known.**

**3.3.1 Boring/Trenching Results - Number each hole or excavation. Graphically describe soil strata at each hole or excavation.**

a) Soil profile descriptions shall be written under the supervision of the registrant for all of the excavations. The thickness (in inches or tenths of a foot) of the different soil horizons observed shall be indicated. Soil horizons shall be described on the basis of color, field texture analyses, soil mottles, bedrock, structure, roots, and pores. Depths shall be measured from the existing ground surface.

b) Where the soil lithology is stratified and low-permeability layers such as sandy silts and clays, or caliche could affect the on-site disposal system performance (leachlines and seepage pits bottomed less than 20 feet below grade), the soil profile shall be described by direct visual observation: i.e., in a backhoed trench, road cut, suitable large (> two (2) feet diameter) boring, or splitspoon sampling.

c) Textures - Use any of the classifications in Appendix pages Al-4. State the approximate percentage of cobbles, gravel, sand, silt, and clay.

d) Colors (dry/moist), reduction-oxidation mottling. (See Appendix.) The Munsell soil color chart shall be the descriptive tool utilized to determine the background soil color.

e) Presence and extent of small/large roots.

f) Ease of excavating/drilling, depth to bedrock and rock competency (soft, firm, hard, refusal).

g) Moisture - If soil at or near the point of saturation is encountered in the exploratory boring, observe the borehole after 24 hours to determine the presence of free water.

h) Free water - The depth to groundwater, if present, shall be reported. Observed groundwater shall be reported at the level groundwater reaches in the excavation, or at the highest level of sidewall seepage into the excavation after 24 hours. Measurements shall be made from the ground level. Soil above the water level in the excavation shall be checked for conditions associated with saturation (mottles).

i) Structural characteristics, stratigraphy, and geologic origin shall be described when determined necessary by the consultant for severe sites only.

j) Indicate method of boring abandonment.

### 3.4 Minimum Number of Tests for Leachlines:

| | Gross Lot Size | Soil Conditions | | |
|---|---|---|---|---|
| | | Favorable | Moderate | Severe |
| Subdivisions (Note-Individual lot sales requires 100% lot testing) | <2.5 acres | 6 tests first 10 lots, 1 test every 10 thereafter | 9 first 10, 6 next 10 | 1/lot |
| | 2.5 acres to 5 acres | 8 tests first 10 lots, 3 tests every 10 thereafter | 10 first 10, 7 next 10 | 1/lot |
| | >5 acres | 1/lot | 1/lot | 1/lot |
| Residential lot | | Minimum 4 tests* | 4* | 6* |
| Commercial lot, c o n f l u e n t systems under one ownership | | 4 tests/3,000 gallons septic tank capacity*, 1 test for each additional 2, 000 gallons septic tank capacity | 5/3, 000* 2/2,000 | 6/3,000* 3/2,000 |
| Parcel Map | | Minimum one test for each lot in the area of the disposal system or County assigned rate per waiver criteria (minimum 4 tests) | 2 tests per 1ot* (minimum 6 tests) | 3/lot* (minimum 8 tests) |

Note: *In the general area of the disposal systems (primary and expansion); if known or where proposed.

#### 3.4.1 Standard Percolation Test Procedure for Leachlines

Excavation: Test holes shall be augered or excavated to within 13 inches of the actual test depth which corresponds to the anticipated depth of the leachline or the bed trench bottom. Vary depths to include testing of side wall if the disposal system will be more than three feet below the ground surface. In addition, perform one test in the least permeable soil stratum found during the deep excavation if the soil type changes within 5 feet of the proposed trench bottom.

Test Hole: 1. A hole of diameter 5.5” - 8” (D) or square 5” - 7” (S) should normally be used.

2. Larger holes than stipulated in coarse soils with a rate of less than 8 minutes/inch (mpi) will require a correction factor using the formula:

$$\frac{\text{mpi (test)} \times 6}{\text{actual “D” or “S” dimension}} = \text{mpi corrected}$$

Rates greater than 8 mpi do not need to be corrected.

3. Depth - The minimum test hole depth is 13". All sides to be vertical. (Below the test excavation bottom or at least 5 feet horizontal distance to daylight in a trench bench.)

4. All loose material must be removed from the test hole and the bottom of the hole should be in natural, undisturbed soil.

5. Place two (2) inches of 1/4" to 3/4" gravel over the bottom of the test hole. A perforated can may be placed over the gravel. (Note: if the can has a bottom, gravel may not be necessary.)

Pre-Soak: Fill the hole with 12" of clear water (10" above the gravel or the bottom of the perforated can.)

1. If ten (10) inches of clear water seeps away in two consecutive readings in less than ten (10) minutes each <u>and</u> the soil is of coarse texture, testing can be conducted immediately. Otherwise:

2. Pre-soak by:

   a. Maintain the water level in the test hole at ten (10) inches above the gravel, for at least four (4) hours, or;

   b. For augered test holes with a total depth over four (4) feet from the surface to the gravel, fill the entire hole to the surface. This pre-soak method may require recleaning of the hole and new gravel placement prior to testing, or;

   c. For augered test holes of less than four (4) feet total depth, fill the test hole to the surface and invert a five (5) gallon bottle of water in the hole. This pre-soak method may require recleaning of the hole and new gravel placement prior to testing.

   NOTE: All of the above procedures are designed to allow a minimum of five (5) gallons of water to percolate and saturate the lower 12 inches of the test hole. Other pre-soak methods that also accomplish this may be used, but should be fully described in the final report.

Testing: 1. Begin testing 15-26 hours after the beginning of soaking (except for sandy soils as

noted), to allow time for swelling of clays but prevent soil from drying out.

2. Fill or refill the hole with clear water to eight (8) inches from the bottom of the hole, (6) six inches over the gravel.

Readings:

1. If more than five (5) inches of water is gone in 30 minutes, take readings every 10 minutes for one hour minimum. Refill after each reading. All final time intervals shall provide a minimum of a one (1) inch drop and not more than a three (3) inch drop.

2 . If 1ess than one (1) inch is gone in 30 minutes, take 60 minute readings for three (3) hours minimum. Do not refill until at least a one (1) inch drop has occurred.

3. For all other cases, take 30 minute readings for three (3) hours minimum. Refill after each reading. All readings shall provide a minimum 1 inch drop, and a maximum 3 inch drop.

Accuracy: All measurements will be read to the closest 1/8". If the difference between the last two readings is greater than 10%, additional measurements shall be made.

Results: The reported results shall be the most conservative reading in minutes/inch drop.

### 3.4.2 Continuous Pre-Soak Percolation Test Procedure-Leachlines

DESCRIPTION

This method requires the use of a water reservoir to provide a continuous volume of water in the hole during the pre-soak period. After a predetermined volume of water has seeped through the test hole, the measurement of the percolation rates may commence.

The method described in the following procedure utilizes a 5-gallon water bottle inverted in the test hole. This procedure can be modified to use a reservoir and a float device to control the water level as described:

PROCEDURE:

Excavation: The test excavation shall be constructed so as to facilitate the placement of the 5-gallon reservoir of water over the test hole. The excavation shall reach to within 13 inches of the actual test depth which corresponds to the approximate depth of the leachline or the bed trench bottom. Vary the depths in order to include testing of the sidewall if the disposal system is to be more than three feet below the ground surface. In addition, perform one test if the soil type changes within 5 feet of the proposed trench bottom.

Test Hole:

1. Auger or hand excavation.
2. A hole of diameter 5.5" - 8" (D) or square 5" - 7" (S) shall normally be used.
3. Larger holes than stipulated in coarse soils with a rate of less than 8 minutes/inch (mpi) will require a correction factor using the formula:

$$\text{mpi corrected} = \frac{\text{mpi (test)} \times 6}{\text{actual "D" or "S" dimension}}$$

Rates greater than 8 mpi do not need to be corrected.

4. The minimum test hole depth is 13 inches.

5. All loose material must be removed from the test hole and the bottom of the hole should be in natural, undisturbed soil.

6. Place 2 inches of 1/4" to 3/4" gravel over the bottom of the test hole. A perforated pipe is then placed in the hole to prevent caving and to support the water bottle. The pipe length shall be approximately the same as the test hole depth.

Pre-Soaking: To start, fill the test hole with water to 8 inches above the gravel. Invert a full 5-gallon bottle of clear water over the hole (in a bottle support) so that the hole is filled continuously to approximately 8 inches over the gravel.

When the 5 gallons of water has percolated through the test hole, or after 15 hours but before 26 hours from initiating pre-soak, testing may commence.

Testing:

A. Same day testing - When the 5 gallons has percolated while the tester is present, the test may proceed the same day as the pre-soak.

1. Remove the bottle and adjust the water level to 6 inches above the gravel:

2. Take a minimum of four (4) consecutive measurements at timed intervals that provide not less than a one (1) inch nor more than a 3 inch drop. Refill the water level to 6 inches above the gravel after each measurement.

B. Next day testing - (15-26 hours after starting pre-soak)

1. If water is still present in the test hole, the test shall not start less than 15 hours from initiating the pre-soak.
   a. Remove the bottle and adjust the water level to 6 inches above the gravel.
   b. Take a minimum of two (2) consecutive measurements at time intervals that provide not less than a 1 inch nor more than a 3 inch drop in the water level. Refill the water level to 6 inches above the gravel after each measurement.
2. If no water is left in the test hole, the test shall begin within 26 hours from starting the pre-soak. (Repeat the pre-soak procedure if more than 26 hours have passed.)
   a. Remove the bottle and adjust the water level to 6 inches above the gravel.

   b. Take a series of readings for a minimum of two hours, or four consecutive readings at time intervals that provide not 1ess than a 1 inch nor more than a 3 inch drop in the water level. Refill the water level to 6 inches above the gravel after each measurement.

Accuracy: All measurements shall be read to 1/8". If the difference between the last two readings is greater than 10%, additional measurements shall be made.

Results: The reported results shall be the most conservative reading in minutes/inch drop.

### 3.4.3 Leachline Test Results

3.4.3.1 Tabulate all the results, including all tests that "failed" to meet the minimum acceptable standards.

3.4.3.2 Provide copies of all the field data and calculations using the following format:

**Leachline Test:**

1. Hole No:
2. Diameter in inches:
3. Hours presaturation; gallons used, time presoak initiated:
4. Depth (of bottom) below grade:
5. Types of strata tested:
6. Condition of hole: caving or siltation?
7. Any method used to prevent sidewall caving?
8. Name of tester:
9. Date tested:

Provide numerical values for each of these parameters

$t_1$ | $depth_1$ | $t_2$ | $depth_2$ | ^t | ^d | $\frac{^t}{^d}$ mpi (or mpc)

Where:

$t_1$ = initial time when filling or refilling is completed - minutes

$d_1$ = initial depth of water in hole

$t_2$ = final time in minutes

$d_2$ = final depth of water in hole

^t = change in time - minutes

^d = change in depth - inches

### 3.5 Minimum Number of Tests for Seepage Pits:

| | Gross Lot Size | Soil Conditions | | |
|---|---|---|---|---|
| | | Favorable | Moderate | Severe |
| Subdivisions (Note: Individual lot sales r e q u ire 10 0 % testing) | <1 acre | 3 tests first 10 lots; 2 tests for every 10 1 ots thereafter | 6 first 10<br>3 next 10 | 1/lot* |
| | 1 acre to 2.5 acres | 4 tests first 10 lots; 2 tests for every 10 lots thereafter | 7 first 10<br>4 next 10 | 1/lot* |
| | >2.5 acres to 5 acres | 5 tests first 10 lots; 3 tests for every 10 lots thereafter | 8 first 10<br>5 next 10 | 1/lot* |
| | >5 acres | 6 tests for first 10 lots; 4 tests for every 10 lots thereafter | 1/lot* | 2/lot* |
| Residential lot | | 2 tests* 2 tests* | 3 tests* | |
| Commercial lot, c o n f l u e n t systems under one ownership | | 2 tests/4,000* gallons septic tank capacity in sewage disposal area<br><br>1 additional test per 2,000 gallons of septic tank capacity or fractional part thereof | 2/3,000*<br>1/2,000 | 2/3,000*<br>2/2,000 |
| Parcel Map | | 2 tests evenly spaced on the undivided parcel | 3 tests evenly spaced on the undivided parcel | 4 tests evenly spaced |

Note: *In the general area of the disposal systems (primary and expansion); if known or where proposed.

### 3.5.1 Seepage Pit, Weighted Average Percolation Test Procedure

Test each stratum as for leachlines, in Section 3.4.1. Multiply the thickness of each stratum by its perc time; add the results. Divide the total by the sum of all the thicknesses. The result is the average mpi for the given total depth. Exclude all strata with pi > 30. This is not an easy procedure to perform without very accurate instruments.

### 3.5.2 Sewage Pit, Falling Head Percolation Test Procedure

Test Holes:

a) Holes are 6" to 8" in diameter. Exploratory borings (6"-8") may be backfilled at least 10 feet and used for testing. When backfilling, if soils are too coarse (less than 20% fines) mix top of backfill with driller's mud or other material approved by the Division of Environmental Health Services; cover with one (1) foot of gravel.

b) Depth - Same as the depth estimated for the pit based on the soil log. If distinctly lower permeable stratum (strata) are found with higher permeable stratum within the test boring, the lower permeable stratum should be tested separately. Vary depths when unsure.

c) Because caving may invalidate the results in anticipated adverse areas of percolation, precautions, such as gravel packing, should be used.

Measurements

a) Carefully fill the hole with clear water until the water level is even with the surface of the ground. Refill to the surface for all but the last two (2) readings. The final refills shall be to the proposed depth of the inlet or a minimum of 4 feet below the ground surface.

b) In very sandy soils, where the water on two consecutive readings seeps faster than half the initial wetted depth in 30 minutes, the time intervals shall be 10 minutes or shorter and measurements shall be taken for at least one additional hour until three consecutive readings do not vary by more than 10%. Gravel packed holes must have four (4) consecutive readings where the water seeps faster than half the initial wetted depth in 30 minute intervals to compensate for the reduced water volume of each pre-soak.

c) In soils with fines, soak the hole and let it set overnight. The perc rate measurements shall be made on the day following the soaking, not more than 26 hours after the pre-soak. From the reference point, measure the drop in water level over thirty minute.periods for at least six hours. For the final two readings, read every 30 minutes without refilling and check for possible nonuniform absorption; measure how fast the water level keeps on falling until it gets down to the bottom or slows down. The consultant must determine if the minimum six hour testing should be extended for another 30-60 minutes.

d) Remeasure the depth of the hole with each reading to see if caving has occurred. Caving in excess of 15% of total depth may invalidate the results of shallow test holes.

### 3.5.3 Seepage Pit Test Results

3.5.3.1 Tabulate all the final results, including all tests that "failed" to meet the standards.

3.5.3.2 Provide copies of all the field data and calculations using the following format:

3. Hours presaturation, time presoak initiated:
4. Depth (of bottom) below grade
5. Strata peculiarities:
6. Name of tester:
7. Date tested:
8. Method to prevent sidewall caving: Gravel Packed. See Appendix, page A-13.

**Provide numerical values for each of these parameters**

| $t_i$ | $t_f$ | ^t | $d_b$ | $d_i$ | $d_f$ | $F=d_f-d_i$ = ^d | Lave = | $Q = \frac{F\ D\ 9}{Lave^t}$ | pit mpi = $\frac{180}{Q}$ |
|---|---|---|---|---|---|---|---|---|---|

Where:

$t_i$ = initial time when filling or refilling is completed, hour: minute
$t_f$ = final, end-time of fall, hour: minute
^t = usually .5 or .166 hour
$d_b$ = depth to water bottom, feet
$d_i$ = depth to water surface at $t_f$, feet
$d_f$ = depth to water surface at $t_f$, feet
Lave = average length of water column, feet
$d_b - (d_i + d_f) /2$
D = diameter of hole in feet
Q = gallons of sewage (or septic tank capacity, whichever is greater) per square foot per day (g/sf/d).

**Show your work!!**

b) Seepage pit - weighted average method - use format per 3.4.3.2

## 4. Discussion of Results

4.1 Discuss the uniformity of the soils in regards to the soil classification (favorable, moderate or severe) and percolation times obtained. (Uniform is defined as 4 test results falling within + 1/4 of their mean percolation time.) Based on boring/trenching data, discuss how the most restrictive layer below the disposal area was tested, or can be avoided by proper separation or design. For a given system, at least 3/4 of tests must show acceptable results. For example, if there is a failing test on a lot in a proposed tract/minor subdivision, three additional acceptable tests must be shown on that lot.

4.2 Discuss possible sources of error or variability of results such as: measurement accuracy, cavings, one atypical location, etc. Siltation or caving of test holes may require special construction measures to prevent the soil absorption system from suffering the same fate. Discuss in #7 under Recommendations.

4.3 Especially if seepage pit testing was done by procedure 3.5.2, interpret the results in light of the soils profile and the final readings. Do not rely only on the formula results. The falling head test is not a suitable test procedure for markedly different strata, unless the strata are tested separately, or mounding analyses performed. (Check references) Discuss under 7.3.

## 5. Design

### 5.1 General Criteria

5.1.1 For uniform soil units, use a mpi between mean and most conservative mpi(s), i.e., average mpi = 7, most conservative mpi = 9, design mpi = 8. If there are no uniform soil units, use the most conservative mpi for the entire area. (See 4.1 - Note: Use pit mpi, not Q, for averaging.)

5.1.2 Unless an area has been determined to have degraded groundwater by a CRWQCB, there shall be a minimum of 5 feet (leachlines) or 10 feet (seepage pits) of original soil between the bottom of the soil absorption system and groundwater. If a soil has a perc time less than 5 mpi, then the soil for a total thickness of five (5) feet below the bottom of a leachline to groundwater shall contain at least 15% of material passing the #200 U.S. standard sieve (and less than one fourth (1/4) of the representative soil cross-section shall be occupied by stones larger than 6"). Where this requirement is not met, a 40-foot separation shall be maintained below the bottom of the leachline and the highest historic groundwater level based on recorded data or on observed mottling. Fairly uniform coarse-textured soils (SM or more coarse) shall not be used for seepage pits when a “pit mpi” is less than 10 and where a sieve analysis shows less than 15% fines passing the #200 U.S. standard sieve for a thickness of 10 feet and the separation to groundwater is less than 40 feet. Lahontan Region criteria are more stringent; Board clearance is required.

Basis for 100% passing - 3/8" sieve.

5.1.3 The design Q for seepage pits must be > 1.1 g/sf/day of sewage, but < 4 g/sf/day. Q’s greater than 4 g/sf/d will not be credited. Caving seepage pit test holes in coarse textured soils shall not be credited with rates greater than 3 g/sf/day.

5.1.4 Gallons per day are calculated per the most current addition of the UPC Table 1-4/UBC Table 33A and either UPC Table I-2 or Table I-3. 5.2 Convert percolation times to leachline design rates.

### 5.2 Convert percolation times to leachline design rates

5.2.1 Leachline application rates for domestic sewage (Source: EPA’s Design Manual, 1980) minimum square feet of absorption area per gallon of effluent per day

UTILIZE GRAPH FOR APPLICATION RATE

For single homes you may use:

| Bedrooms | Gallons of Effluent Per Day | Gallons of Septic Tank Capacity |
|---|---|---|
| 1-2 | 500 | 750 |
| 3 | 670 | 1,000 |
| 4 | 800 | 1,200 |
| 5-6 | 1,000 | 1,500 |

## 5.3 Convert Q to seepage pit design rates

5.3.1 Seepage Pit Design - Falling Head Method

Square feet/ gallons septic tank capacity (sf/gstc)

1/Q X 100 = sf/100 gstc

Design depth below inlet = $\frac{\text{septic tank capacity}}{Q \times D\ ä}$

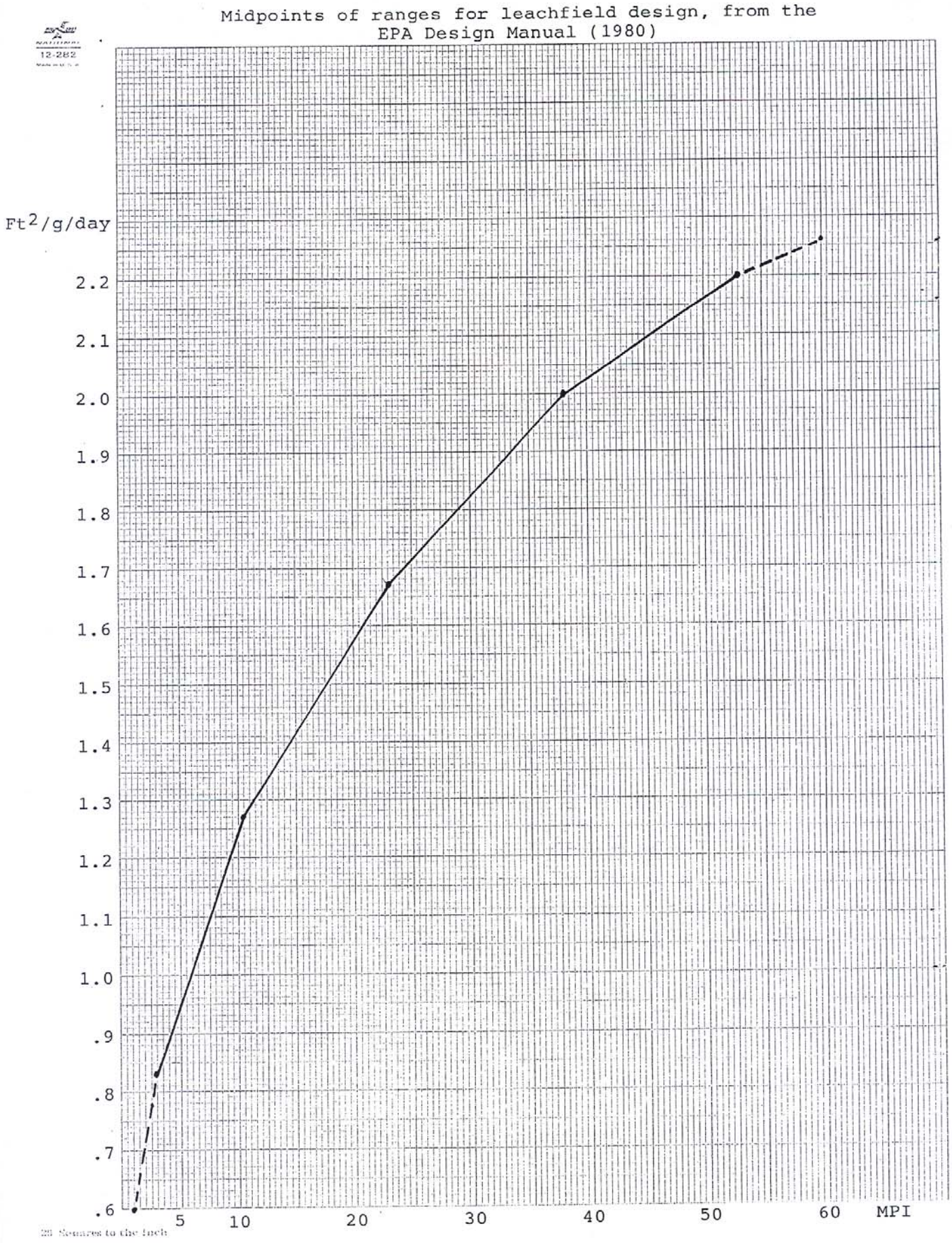
D = Diameter of pit in feet ä = 3.14

Depth below inlet shall be limited to tested depth or by groundwater.

5.3.2 Seepage Pit Design - Weighted Average Method.
Use EPA Design Graph for square feet of pit sidewall.

## 5.4 Special Criteria

5.4.1 If leachlines or pits serve a common system for two or more units, add 30% more square footage.


Midpoints of ranges for leachfield design, from the
EPA Design Manual (1980)
Ft2/g/day
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
.9
.8
.7
.6
5
10
20
30
40
50
60
MPI

5.4.2 For laundromats, restaurants, and confluent systems serving mobilehome parks or shopping centers (three or more retail shops), or if septic tank volume is calculated for flows > 2000 gpd with Vol = .75 flow +1125, multiply square footage by 2.5.

5.4.3 Credit for Alternating Fields:
A credit of 10% reduction in square footage may be given for installation of alternating leach fields or seepage pits (unless the consultant specifies otherwise).

Single houses on lots less than 10,000 square feet in area or with leach fields on ground naturally sloping >30% (with CRWQCB approval) may require alternating leach fields. The 100% expansion area can be used for one of the alternating leach fields. The report preparer must recommend that adequate future access to install the replacement system be maintained. Alternating systems, as well as standard systems, are not recommended in areas where mechanical obstruction of the system(s) may occur due to root intrusion.

Alternating systems may be considered when future access, or critical soils are limiting factors.

5.4.4 Special considerations: See Appendix page A-7, Section B.l.a.

**6. Plot System Per Currently Adopted Uniform Plumbing Code**

Draw tested property to scale:

Single Family Home, Small Commercial Minimum 1" = 30'
Parcel Map, Subdivision, Large Commercial Minimum 1" = 40'

6.1 Plot system and 100% expansion area, show existing and potential structures, wells, streams, etc. (Check Appendix for allowable separations.) Include contours, significant vegetation (including trees), rock outcropping, location of all borings and tests, and the proposed house pad.

6.2 For lot sales zoned for single family homes (lot sale subdivisions) show a hypothetical system for a five (5) bedroom home on each and every lot; if zoned for multi-unit development, show a hypothetical system sufficient for the effluent discharged by an average of three bedrooms per unit.

6.3 Where grading is expected, include original and finished elevations. If the grading plan was prepared by others, comment as it regards the recommendations set forth in the report. If grading is unknown, include qualifying statements in area(s) for the primary and expansion systems (see 3.1), or title the report “Preliminary”. (Preliminary reports must still be adequate for purposes of recordation with recommendations to be followed for building permit purposes.)

6.4 The proposed dwelling/development shall be located so that the initial subsurface sewage disposal system and the required 100% expansion area shall function by gravity flow unless otherwise approved.

6.5 A pump system will be considered only under the following hardship conditions:

a. To salvage an existing structure when an adequate disposal area cannot be reached by gravity flow.

b. To allow new house construction on an existing lot when there is absolutely no other alternative to pumping. This hardship consideration will be based on reasonable site development.

c. See Appendix, Page A-9.

6.6 All designed systems construction details are subject to review by the DEHS and approval by the Department of Building & Safety. Minimum conventional construction details are to be found in the currently adopted Uniform Plumbing Code.

## 7. General Discussion and Conclusions or Recommendations

7.1 Specify any pertinent CRWQCB requirements and state whether they are being met. All systems must meet the CRWQCB requirements. See Appendix pages A-17-A-22.

7.2 State whether each lot has sufficient area to support an individual sewage disposal system that will meet DEHS standards for the use intended. Include a qualifying statement if swimming pools, building expansions, etc. are or may be allowed; also if grading must be restricted, or if grading plans must be reviewed prior to grading, and installation inspected after grading by soils consultant, or if special construction techniques are required.

7.3 Discuss sewage mounding if lots are to be developed commercially or industrially with flows of 1500 g/d or greater and/or as determined necessary under 4.3. In addition, for commercial and industrial discharges, discuss the on-site system's ability to adequately treat harmful waste constituents prior to entering the groundwater if other than sanitary wastes may be discharged. Indicate if a special treatment process study should be done after the exact nature of the discharge(s) has been determined.

7.4 Recommend that a copy of the DEHS septic system handout *Taking Care of Your Septic System* be obtained by the owner/developer, or provide a copy in report Appendix.

** A P P E N D I X **

August 1992

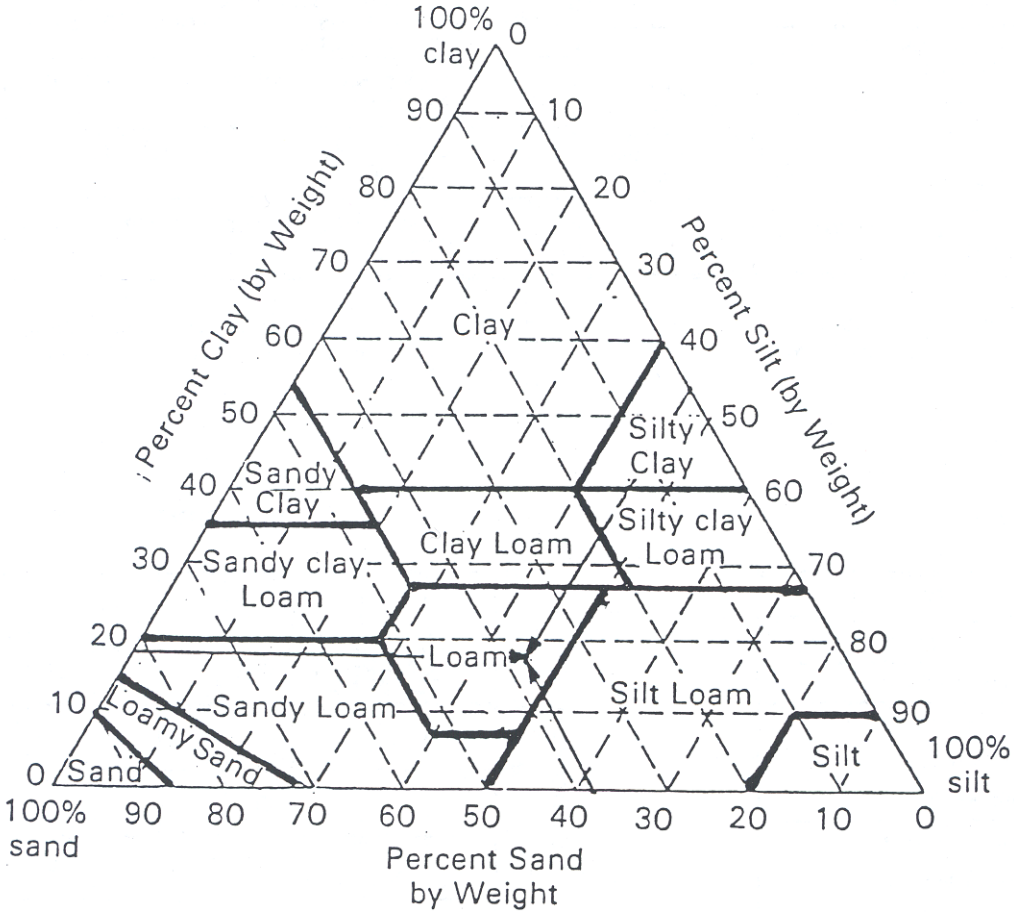
Note: The Regional Water Quality Control Board criteria are current at time of publication, but may change. It is the consultant's responsibility to be aware of the minimum criteria. Changes will be made as necessary to the Appendix by the Department.

SOURCE: EPA DESIGN MANUAL FOR ON-SITE SYSTEMS
TEXTURAL PROPERTIES OF MINERAL SOILS

Characteristics & Appearance

| Soil Class | Dry Soil | Moist Soil |
|---|---|---|
| Sand | Loose, single grains which feel gritty. Squeezed in the hand, the soil mass falls apart when the pressure is released. | Squeezed in the hand, it forms a cast which crumbles when touched. Does not form a ribbon between thumb and forefinger. |
| Sandy Loam | Aggregates easily crushed; very faint velvety feeling initially but with continued rubbing the gritty feeling of sand soon dominates. | Forms a cast which bears careful handling without breaking. Does not form a ribbon between thumb and forefinger. |
| Loam | Aggregates are crushed under moderate pressure; clods can be quite firm. When pulverized, loam has velvety feel that becomes gritty with continued rubbing. Casts bear careful handling. | Cast can be handled quite freely without breaking. Very slight tendency to ribbon between thumb and forefinger. Rubbed surface is rough. |
| Silt Loam | Aggregates are firm but may be crushed under moderate pressure. Clods are firm to hard. Smooth, flour-like feel dominates when soil is pulverized. | Cast can be freely handled without breaking. Slight tendency to ribbon between thumb and forefinger. Rubbed surface has a broken or rippled appearance. |
| Clay Loam | Very firm aggregates and hard clods that strongly resist crushing by hand. When pulverized, the soil takes on a somewhat gritty feeling due to the harshness of the very small aggregates which persist. | Cast can bear much handling without breaking. Pinched between the thumb and forefinger, it forms a ribbon whose surface tends to feel slightly gritty when dampened and rubbed. Soil is plastic, sticky and puddles easily. (Thumbprints visible) |
| Clay | Aggregates are hard; clods are extremely hard and strongly resist crushing by hand. When pulverized, it has a grit-like texture due to the harshness of numerous very small aggregates which persist. | Casts can bear considerable handling with breaking. Forms a flexible ribbon between thumb and forefinger and retains its plasticity when elongated. Rubbed surface has a very smooth, satin feeling. Sticky when wet and easily puddled. |

TEXTURAL TRIANGLE DEFIINING TWELVE TEXTURAL CLASSES OF THE USDA
(ILLUSTRATED FOR A SAMPLE CONTAINING 37% SAND, 45% SILT, AND 18% CLAY)



## METHOD OF SOIL CLASSIFICATION
## (ASTM D 2487)

### COARSE-GRAINED SOILS

LESS THAN 50% FINES*

| GROUP SYMBOLS | DESCRIPTION | MAJOR DIVISIONS |
|---|---|---|
| GW | WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES | GRAVELS More than half of coarse fraction is larger than No. 4 sieve size |
| GP | POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES | |
| GM | SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, MORE THAN 12% FINES | |
| GC | CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, MORE THAN 12% FINES | |
| SW | WELL-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES | SANDS More than half of coarse fraction is smaller than No. 4 sieve size |
| SP | POORLY-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES | |
| SM | SILTY SANDS, SAND-SILT MIXTURES, MORE THAN 12% FINES | |
| SC | CLAYEY SANDS, SAND-CLAY MIXTURES, MORE THAN 12% FINES | |

NOTE:
Coarse-grained soils receive dual symbols if they contain 5 to 12% fines (e.g. SW-SM, GP-GC, etc.)

### FINE-GRAINED SOILS

MORE THAN 50% FINES*

| GROUP SYMBOLS | DESCRIPTION | MAJOR DIVISIONS |
|---|---|---|
| ML | INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS | SILTS AND CLAYS Liquid limit less than 50 |
| CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS | |
| OL | ORGANIC SILTS OR ORGANIC SILTY-CLAYS OF LOW PLASTICITY | |
| MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS | SILTS AND CLAYS Liquid limit more than 50 |
| CH | INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS | |
| OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY | |
| PT | PEAT, MUCK, AND OTHER HIGHLY ORGANIC SOILS | HIGHLY ORGANIC SOILS |

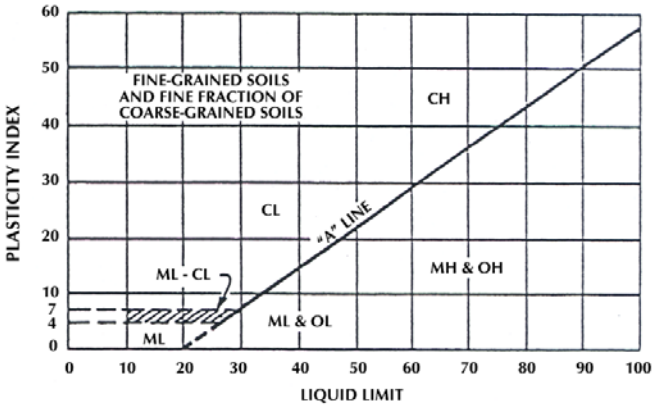
NOTE:
Fine-grained soils receive dual symbols if their limits plot in the hatched zone on the Plasticity Chart (ML-CL)

### SOIL SIZES

| COMPONENT | SIZE RANGE |
|---|---|
| BOULDERS | ABOVE 12 in. |
| COBBLES | 3 in. to 12 in. |
| GRAVEL | No. 4 to 3 in. |
| Coarse | ¼ in. to 3 in. |
| Fine | No. 4 to ¼ in. |
| SAND | No. 200 to No. 4 |
| Coarse | No. 10 to No. 4 |
| Medium | No. 40 to No. 10 |
| Fine | No. 200 to No. 40 |
| *Fines (Silt or Clay) | BELOW No. 200 |

NOTE:
Only sizes smaller than three inches are used to classify soils.

### PLASTICITY CHART



| MAJOR DIVISIONS | | | GROUP SYMBOLS | TYPICAL NAMES |
|---|---|---|---|---|
| COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size) | GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size) | CLEAN GRAVELS (Little or no fines) | GW | Well graded gravels, gravel-sand mixtures, little or no fines. |
| | | | GP | Poorly graded gravels or gravel-sand mixtures, little or no fines. |
| | | GRAVELS WITH FINES (Appreciable amt. of fines) | GM | Silty gravels, gravel-sand-silt mixtures. |
| | | | GC | Clayey gravels, gravel-sand-clay mixtures. |
| | SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size) | CLEAN SANDS (Little or no fines) | SW | Well graded sands, gravelly sands, little or no fines. |
| | | | SP | Poorly graded sands or gravelly sands, little or no fines. |
| | | SANDS WITH FINES (Appreciable amt. of fines) | SM | Silty sands, sand-silt mixtures. |
| | | | SC | Clayey sands, sand-clay mixtures. |
| FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size) | SILTS AND CLAYS (Liquid limit LESS than 50) | | ML | Inorganic silts, and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. |
| | | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| | | | OL | Organic silts and organic silty clays of low plasticity. |
| | SILTS AND CLAYS (Liquid limit GREATER than 50) | | MH | Inorganic silts, micaceous or diotomaceous fine sandy or silty soils, elastic silts. |
| | | | CH | Inorganic clays of high plasticity, fat clays. |
| | | | OH | Organic clays of medium to high plasticity, organic silts. |
| HIGHLY ORGANIC SOILS | | | PT | Peat and other highly organic soils. |

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

P A R T I C L E  S I Z E  L I M I T S

| SILT OR CLAY | SAND | | | GRAVEL | | COBBLES | BOULDERS |
|---|---|---|---|---|---|---|---|
| | FINE | MEDIUM | COARSE | FINE | COARSE | | |

NO. 200 NO. 40 NO. 10 NO. 4 3/4 IN. 3 IN. (12 IN.)

U . S . S T A N D A R D  S I E V E  S I Z E

# UNIFIED SOIL CLASSIFICATION SYSTEM

Reference
The United Soil Classification System, Corps of Engineers, U. S. Army Technical Memorandum No. 3-357 Vol. 1, March, 1953 (Revised April, 1960)

## MINIMUM REQUIREMENTS FOR LOCATION OF LIQUID WASTE DISPOSAL SYSTEMS

The minimum requirements for the installation of new sewage disposal systems for either new or existing structures shall generally be as follows:

A. Minimum Separations

1. Septic tank to:

| | | |
|---|---|---|
| a. | Water supply well | 100 feet |
| b. | Buildings or structures[1] | 5 feet |
| c. | Property line adjoining private property | 5 feet |
| d. | Perennial streams[2] | 50 feet |
| e. | Ephemeral streams[3] | 50 feet |
| f. | Large trees[4] | 10 feet |
| g. | Seepage pits or disposal fields | 5 feet |
| h. | Private domestic water lines (building service line) | 5 feet |
| i. | Public domestic water lines (water purveyor's line) | 10 feet |
| j. | Groundwater | 5 feet |

2. Soil absorption system to:

| | | |
|---|---|---|
| a. | Water supply well - 100, 150, or 200 ft. depending on whether system has a: | |
| | Leaching field | 100 feet |
| | Seepage pit | 150 feet |
| | Any system discharging 5,000 gallons/day or more | 200 feet |
| b. | Building or structures[1] | 8 feet |
| c. | Property line adjoining private property (leachlines) | 5 feet |
| d. | Property line adjoining private property (seepage pits) | 8 feet |
| e. | Large trees[4] (seepage pits) | 10 feet |
| f. | Perennial streams[2] | 100 feet |
| g. | Colorado River/Mojave River | 200 feet |
| h. | Ephemeral streams/ Drainage Courses[3] | 50 feet |
| i. | Septic tank | 5 feet |

| | | |
|---|---|---|
| j. | Distribution box | 5 feet |
| k. | Private domestic water line (building service line) | 5 feet |
| l. | Public domestic water line (water purveyor's line) | 10 feet |
| m. | High groundwater table level[5] | |
| | Leachline | 5 feet |
| | Seepage pit | 10 feet |
| n. | Ground surface on sloping ground (When disposal fields and/or seepage pits are installed in sloping ground, the minimum horizontal distance between any part of the leaching system and ground surface shall be 15 feet.) Also see page A-16. | 15 feet |
| o. | Lakes, water reservoirs | 200 feet |

3. The minimum separations listed herein are largely derived from the Uniform Plumbing Code. In some cases, additions or changes have been made in order to adequately protect the public health. Where differences exist, the greater separation prevails unless specifically waived for cause by the Department of Environmental Health Services.

Footnotes:

[1] Includes porches and steps whether covered or uncovered, breezeways, roofed porte cocheres, roofed patios, carports, covered walls, covered driveway, and similar structures or appurtenances.

[2] A listing of perennial streams will be maintained by the Division of Environmental Health Services. See pages A-14.

[3] An ephemeral stream/drainage course is any stream not listed as a perennial stream by the Division of Environmental Health Services (see Footnote 2). To determine where the setback restrictions should be applied, the U. S. Geological Survey Maps are used as a guide. If a stream is designated on the USGS Map by a blue dash/dotted line, the setback requirements must be met. If not shown, but there is obvious visual evidence of water flow, the setback is determined by the topography and the geology of the proposed site, but is not less than 25'. Distances are measured from the edge of the channel or assumed 0- 100 year flow.

[4] Any tree with a trunk diameter of one foot or more within 5' of the system that are not to be removed during construction.

[5] The highest known level to which groundwater is known to have occurred rather than the level at the time when testing occurred.

B. Other Factors

1. Special Soil Conditions

a. Special soil conditions may require special consideration by the Division of Environmental Health Services and must be considered on a case-by-case basis, particularly in areas of high rainfall or in proximity to water sources.

b. In the Carbon Canyon area for an individual system, the area of the disposal system tests must be located and tested such that borings are spaced 25 feet or less from proposed disposal area(s).

c. San Bernardino County is known to be criss-crossed with flood control channels, water infiltration basins, perc ponds, tunnels and pipelines which supply water to water districts. Special care must be taken in siting the disposal systems. Check with county liquid waste specialist during notification.

d. Mottled soil - A mottled soil is a soil that is marked with spots or blotches of contrasting color which is usually caused by saturation for some period during a normal year.

If this process has prevailed for significant periods over the recent geologic past, the resulting mottled soil colors can be readily observed.

Zones of seasonal or periodic soil saturation shall be estimated at the highest level of soil mottles. However, soil mottles can occur that are not due to zones of seasonal or period soil saturation; therefore, consult with County Specialist. Monitoring wells may be required to verify lack of groundwater. The abundance, size, contrast and color of the soil mottles shall be described in the following manner: (except frozen soils and soils with rapid permeability).

Abundance shall be described as “few” if the mottled color occupies less than 2% of the exposed surface; “common” if the mottled color occupies from 2% to 20% of the exposed surface; or “many” if the mottled color occupies more than 20% of the exposed surface.

Size refers to the length of the mottle measured along the longest dimension and shall be described as fine if the mottle is less than 5 millimeters (mm); medium if the mottle is from 5-15 mm; or coarse if the mottle is greater than 15 mm.

Contrast refers to the difference in color between the soil mottle and the background color of the soil and is described as faint if the mottle is evident, but recognizable with close examination; distinct if the mottle is readily seen but not striking; or prominent if the mottle is obvious and one of the outstanding features of the horizon. The color(s) of the mottle(s) shall be indicated.

e. A leachline test hole 12 inches (30.5 cm) in diameter is used only when the soil is so stoney or coarse-textured that it is not feasible to dig or bore a standard diameter test hole. The results obtained with this larger diameter hole in minutes per inch or minutes per centimeter are multiplied by the correction factor contained in the leachline formula.

f. Technical Modifications

Where sidewall soil materials may slough into the test hole during soaking, two techniques are applied: gravel packing and manual removal.

For gravel packing, a perforated open-top cylinder is placed over the 2 inch (5.1 cm) layer of gravel at the bottom of the test hole. The cylinder is centered in the test hole. The 1 to 2 inch (2.5 to 5.1 cm) space between the hole sidewall and the cylinder is filled with loose, uncompacted, pea-sized gravel. The cylinder may be made out of a perforated piece of pipe, tin can, or hardware cloth. The measured water level drops must be corrected after calculating the effect of the gravel volume.

2. Special discharge conditions:

a. Local hydrogeological conditions may necessitate more separation of the sewage disposal system for protection of special resources (drinking water supply, recreation areas, water storage reservoirs, lakes, etc).

b. Fractured bedrock (decomposed granite is not included) and impervious strata are not suitable for sewage disposal. Impervious is defined for design purposes as a stratum with perc times of >120 mpi.

c. The discharge of surface, rain or other clear water into a sewage disposal system is prohibited.

d. Water softener and iron filter discharge to a sewage disposal system or on the ground surface is prohibited unless specifically approved by RWQCB. Discharge shall be by physical or manual removal to an approved disposal site.

e. Discharge of toxic or hazardous chemicals to a domestic system is prohibited. Industrial developments shall have individual monitoring ports for each unit connected to a confluent sewage disposal system if there is a single owner of the development. Multi-owner industrial units (condo type) shall have a separate system for each unit.

f. Other (Sand and grease interceptors and traps will be considered on a case-by-case basis).

3. Alternative On-Site Sewage Disposal Options

a. Pump systems - All proposals for pumping shall be detailed in the perc report and shall be subject to DEHS and Building & Safety approval. A pump system may be approved when it is determined that the proposal is a hardship as defined. The following information is required for review:

1. Percolation data
2. Pump data
3. Design of the pump chamber, to include a storage volume equal to 24 hours design flow, in the event of a power outage or a pump failure, or make provision for overflow to an adequately sized back-up gravity disposal area.
4. Alarm system design

5. Force main and backflow prevention design certified by AWWA Grade II cross-connection specialist

6. Design of a receiving chamber at the disposal site which allows the simulation of gravity flow to the disposal system. In all cases, gravity flow to the septic tank is required, such that only settled effluent is pumped from the pump chamber. All components shall comply with the latest edition of the UPC and UBC standards.

b. Where site conditions are such that individual septic systems are not feasible for the proposed development, the use of a multiple ownership septic system may be used, complying with the San Bernardino County Code, Title 3, Chapter 8, Article 7, and Water Quality Control Board Waste Discharge Requirements.

c. The use of designed (demonstration) sewage disposal systems may be allowed with the concurrent approval of the appropriate Regional Water Quality Control Board, DEHS and the Department of Building & Safety. Designed sewage disposal systems include, but are not limited to: mound systems, evapotranspiration systems, denitrifying systems, and sand filtration systems. These systems shall not be approved for the creation of new lots unless specifically approved first by the Board of Supervisors and California Water Quality Control Board, but as a remediation for otherwise unsuitable existing lots on a case by case basis.

The conditions of approval and any required monitoring shall be part of the property's recorded deed.

d. The use of holding tanks shall not be approved for subdivision purposes except if there is documented evidence that a sewer connection will be available within 24 months and the use of the holding tanks complies with San Bernardino County Code, Title 3, Chapter 8, Article 4.

e. Utilization of advanced wastewater package treatment plants may be utilized on or off site for those developments which do not meet the Regional Board's guidelines for septic systems. A percolation report will be required for all developments. Siting of the system and the design of the disposal system shall meet DEHS and the Department of Building & Safety standards. The plant shall have a Waste Discharge Requirement (WDR) or National Pollutant Discharge Elimination System (NPDES) permit from the Regional Water Quality Control Board. The plant shall be under the control of: 1) a public entity or 2) serviced on a regular basis by qualified, certified wastewater treatment plant personnel.

4. <u>Percolation Report Waiver Criteria</u>

The percolation report requirement for non-critical area development (minor subdivision parcel maps) may be waived by the Division of Environmental Health Services upon presentation of the following:

a. The person or consultant requesting the waiver shall refer to actual approved percolation tests performed on the land in question, or a contiguous parcel, and submit copies of the percolation reports (with the property owner's and consultant's written permission), or,

b. The consultant shall provide a soil horizon identification study per the following criteria.

(1) The study shall be performed by a qualified professional: a Registered Civil Engineer, Certified Engineering Geologist, Registered Environmental Health Specialist, Registered Geologist, or Geotechnical Engineer.

(2) The site evaluation shall include soil descriptions, properties and expected permeabilities per 3.3.1, depth to zones of soil saturation, depth to impermeable material (s), slope, potential for flooding and type(s) of vegetation.

(3) The depth of the soil profile shall be a minimum 8 feet below the proposed depth of the leachline and 10 feet below the proposed depth of a seepage pit, and shall be of sufficient dimension to be accessible for soil evaluation: in addition, a minimum of two excavations for each lot will be required. Use a backhoe for leachlines, use a bucket rig for seepage pits (or sample in place the soils).

c. The consultant shall provide a statement that there are no factors (list mitigation measures) which would adversely affect the installation of a subsurface sewage disposal system. These would include: water table levels (historic, source of information), drainage channels, cuts and fills, rock ledges and outcrops, steep slopes, and the location of any wells.

d. The document shall include the assessor parcel number, size of the parcels in acres or square feet, location of the property, proposed development on the property, and a plot plan showing building pad, sewage disposal area and 100% expansion.

e. The consultant shall state that the proposed sewage disposal system meets RWQCB standards, DEHS standards, shall not cause a public health nuisance nor degrade surface and/or groundwater. The consultant shall sign the document and include his/her stamp with registration number.

f. A fee shall be paid to the Division of Environmental Health Services as determined by the current fee schedule for review.

## DAYLIGHT REQUIREMENTS

Any portion of the disposal field located to the top of a cut or on sloping ground shall maintain a 15 foot horizontal distance from daylight to any portion of the leachline or leach bed. The table gives the minimum cover required versus the percent of slope in the area of the disposal field to meet the 15 foot requirement. This table also gives a factor "f" by which to increase the length of the trench due to the assumed loss in evapotranspiration caused by the added cover.

| Slope of the Ground in the Area of the Disposal System | Minimum Cover Over the Drain Lines | f |
|---|---|---|
| 5% | 1.00 ft | 1.0 |
| 10% | 1.50 ft | 1.0 |
| 15% | 2.25 ft | 1.0 |
| 20% | 3.00 ft | 1.0 |
| 25% | 3.75 ft | 1.1 |
| 30% | 4.50 ft | 1.2 |
| 35% | 5.25 ft | 1.3 |
| 40% | 6.00 ft | 1.4 |
| 45% | 7.00 ft | 1.5 |

(Slopes greater than 30% require CRWQCB approval)

Note: If for design purposes additional cover is required over drain lines (e.g.; below fill), the cover factor is still applicable.

## SPECIAL CONSIDERATIONS FOR ABSORPTION FIELD PLACEMENT IN SLOPING GROUND

1. If ground slope is > 30%, any portion of an absorption field (except solid pipe) shall be a minimum of 10 feet (horizontally) from the downslope property line(s). It is the report preparer's responsibility to certify that this minimum is applied or expanded if the slope is less than or equal to 30%, but the soil conditions are such that a basement or curtain drain already built 5 feet downslope from the lower property line(s) may be affected by sewage effluent. Show setback on plot.
2. The minimum horizontal distance between any portion of an absorption field (except solid pipe) and an exposed downward sloping impermeable stratum or bedrock in "cut" slope shall be 50 feet. It is the report preparers responsibility to make recommendations so that systems do not daylight. It is the owner/contractor(s) responsibility to install systems per the recommendations. The consultant may wish to inspect installations to be assured that recommendations are followed. If so desired by consultant, make it a requirement of approval. Upon presentation of pertinent engineering data, the County Specialist may stipulate this requirement.

## GRAVEL PACKING CORRECTIONS

If gravel packing was used, correct rates for the effect of the gravel volume. Show in detail measurements of the gravel volume and the calculations. The easiest way to calculate per cent gravel voids in the field is as follows:

Fill a 23½ oz. cylindrical tin can "A" with gravel. The gravel should be loose, uncompacted, just like in the test hole. Don't shake the can.* If the gravel is fine (pea size), fill with water and then drain thoroughly. Fill another identical can "B" with water; pour this water into can "A" until water barely drips out of its rim. (No spillages.) Per cent gravel void is equal to height of water missing in B divided by total height of can, times 100. Add formula correction factor to seepage pit or leachline design.

Correction Factor

$$\text{Formula} = [1 + P (C^2 - 1)] / C^2$$

$$C = r_2 / r_1$$

$r_2$ = radius of hole

$r_1$ = radius of pipe

P = % of voids

Another method for gravel packing corrections is by weighing the can with gravel, with gravel+water and with water using the formula below. By using this method, you do not have to assume to have two identical cans.

1. Weigh the can = A
2. Fill can with water to top; weigh = B
3. Empty can and fill with gravel (wet or dry as in other method); weigh = C
4. Fill gravel-packed can with water to top; weigh = D
5. Calculate the gravel correction factor using the following equation:

$$\frac{D - C}{B - A} = \text{Gravel Correction Factor (i.e. - \% voids)}$$

* If during field testing the gravel in the test hole is observed to compact, shake the can.

## PERENNIAL STREAMS OF SAN BERNARDINO COUNTY

The following list of streams has been provided to the Department by the Regional Water Quality Control Boards. These are the streams which they consider to be wholly or in part perennial. The list may be amended from time to time in order to reflect better or more complete information as it becomes known to the Department.

A. California Regional Water Quality Control Board, Lahontan Region (Regional Board No. 6)

1. East Fork of the West Fork of the Mojave River
2. Seeley Canyon Creek
3. Houston Creek
4. Deep Creek
5. Holcomb Creek
6. Hooks Creek
7. Shale Creek
8. Crab Creek
9. Little Bear Creek (Lake Arrowhead Dam to confluence with Deer Creek)
10. Salt Creek (North of Baker, California)
11. Heath Canyon Creek
12. Swarthout Creek
13. Sheep Creek (North of Highway 2)

B. California Regional Water Quality Control Board Colorado River Basin Region (Regional Board No. 7)

1. Colorado River
2. Whitewater River
3. San Gorgonio River
4. Pinto Creek
5. Copper Basin Creek
6. Arrastre Creek

C. California Regional Water Quality Control Board, Santa Ana Region (Regional Board No. 8)

1. Santa Ana River - Reach 6 (Above confluence with Bear Creek)
   a. Deer Creek
   b. Hamilton Creek
   c. Wildhorse Creek
   d. Cienaga Seca Creek
   e. Coon Creek
   f. Fish Creek
   g. Lost Creek
   h. South Fork - Santa Ana River
   i. Frog Creek
   j. Barton Creek (east and west forks)
   k. Forsee Creek
   1. Schneider Creek
   m. Gold Creek

**PERENNIAL STREAMS OF SAN BERNARDINO COUNTY** (Cont'd)

2. Mill Creek (above upper powerhouse)
    a. Mountain Home Creek
    b. Monkey Face Creek
    c. Alger Creek
    d. Falls Creek
    e. Vivian Creek

3. Oak Glen Creek (above Oak Glen)
    a. Birch Creek

4. Bear Creek
    a. North Fork - Bear Creek
    b. Grout Creek
    c. Caribou Creek
    d. Rathbone Creek
    e. Metcalf Creek
    f. Kidd Creek
    g. Siberia Creek

5. Lytle Creek (above upper powerhouse)
    a. Middle Fork - Lytle Creek

6. Devil Canyon Creek (east and west forks above power plant)

7. Cajon Creek (above Keenbrook)

8. Waterman Canyon Creek

9. City Creek (above gaging stations)
    a. West Fork - City Creek
    b. East Fork - City Creek
    c. Middle Fork - City Creek

10. Plunge Creek (above gaging stations)
    a. Little Mill Creek
    b. Fredalba Creek

11. Alder Creek (tributary to Santa Ana Reach 5)
    a. Middle Fork - Alder Creek
    b. Hemlock Creek
    c. Keller Creek

**PERENNIAL STREAMS OF SAN BERNARDINO COUNTY** (Cont'd)

12. East Twin Creek (above gaging stations)
    a. Strawberry Creek
13. East Etiwanda Creek (within National Forest)
14. Day Canyon Creek (above gaging station)
15. Cucamonga Creek (above gaging station)
16. San Antonio Creek (1 mile above community of Mt. Baldy)
    a. Ice House Canyon Creek
17. Chino Creek (from confluence with Santa Ana River to Pine Avenue)
18. Carbon Canyon

## REGIONAL WATER QUALITY CONTROL BOARD (RWQCB)
## MINIMUM ON-SITE SEWAGE DISPOSAL CRITERIA

### SANTA ANA REGION

A. Unless the developer demonstrates by substantial evidence or the local health authority finds that a pollution, nuisance, or contamination will not occur as a result of the discharge of domestic wastes, the following criteria are considered necessary for the protection of water quality objectives, to prevent impairment of beneficial uses, to prevent pollution, nuisance, or contamination, and to prevent unreasonable degradation of water quality:

1. Depth of soil between ground surface and anticipated high groundwater in the disposal area shall not be less than 10 feet.
2. Depth of soil containing at least 10 percent of the particles smaller than 0.08 millimeters between the bottom of the disposal facilities and anticipated high groundwater shall not be less than 5 feet.
3. Depth of soil between the bottom of any leaching system and impermeable strata shall not be less than 8 feet.
4. Natural or finished ground slope in the disposal area shall not be greater than 30 percent.
5. The percolation rate in the disposal area shall not be greater than 60 minutes per inch if the discharge is to be leachfield, and not less than 1.1 gallons of effluent per square foot per day if the discharge is through a seepage pit. If the percolation rates are faster than 5 minutes per inch, additional testing will be required to determine compliance with 2., or if percolation rates are faster than 5 minutes per inch, minimum depth to groundwater between the bottom of ,the disposal facilities and the anticipated high groundwater shall be 40 feet. (The percolation rates shall be determined in accordance with procedures prescribed by the appropriate public agency.)
6. Compliance is required with all applicable local requirements, including but not limited to requirements on lot size, distance from wells, streams, drainage courses, reservoirs, adjoining properties, or other points.

B. Minimum lot size requirements and exemption criteria for new developments using on-site septic tank-subsurface leaching/percolation systems:

1. A minimum lot size of one-half acre (average gross) per dwelling unit is required for new developments in the Region using on-site septic tank-subsurface leaching/percolation systems.
    a. The term “one-half acre” specified as the minimum lot size requirement means an average gross area of land of one-half acre per dwelling unit. In the calculation of the average lot size, areas set aside for streets, curbs, commons, greenbelts, and other easements may be included.

b. A "new" development is defined as a proposed tract, parcel, industrial or commercial development that has not been granted one or more of the following on or prior to September 7, 1989:

   1. Conditional approval or approval of a tentative parcel or tract map by the local agency such as the county/city Planning Commission, City Council, or the Board of Supervisors.
   2. A conditional use permit.
   3. Conditional approval or approval by the San Bernardino County Division of Environmental Health Services, Riverside County Department of Health, Orange County Health Care Agency, or other local agency.

c. The minimum lot size requirement does not apply to existing developments where septic tank-subsurface disposal systems have been installed on or prior to September 7, 1989.

d. Those tracts, parcels, industrial or commercial developments which have received one or more of the approvals listed in "b", above, on or prior to September 7, 1989 are exempt from minimum lot size requirements for use of septic tank-subsurface disposal systems.

e. A residential tract or parcel of five acres or less which is completely surrounded by tract(s) and/or parcel(s) with high density (i.e., less than one-half acre gross average per dwelling unit) residential developments and which has received zoning identical to that of the surrounding developments may be granted an exemption from the minimum lot size requirement, provided that all of the surrounding tract(s) and/or parcel(s) have been granted one or more of the approvals identified in "b", above, on or prior to September 7, 1989. Non-residential property such as schools, churches, public utilities, shopping centers, etc. which border the tracts/parcels in questions are to be disregarded when conformance with this criterion is determined; conformance is to be based solely on the nature of the remaining developments surrounding the property.

This exemption criterion expires after December 31, 1991.

f. For new industrial/commercial developments utilizing septic tank-subsurface disposal systems, the wastewater flow for each one-half acre of land may not exceed that from a three-bedroom, two-bath house as specified in the Uniform Plumbing Code (20 fixture units).

g. This minimum lot size requirement does not affect the lot size criterion for continuing exemptions in prohibition areas (1 acre minimum).

h. This minimum lot size requirement does not preclude the prescription of more stringent lot size requirements in specific areas if it is determined necessary to protect water quality.

i. No exemptions may be granted for new developments on tracts/parcels which are 660 feet or less from a sewer which could serve that tract/parcel, barring legal impediments to such use.

j. New lots of less than one-half acre may be formed by combining two or more lots which have received one of the approvals specified in Section l.bl, above, on or prior to September 7, 1989. Individually, these existing lots would be eligible for an exemption from the minimum lot size requirement. Developments on the combined lots may also be granted an exemption provided that the total number of units proposed for the new parcel is equal to or less than the total number of units proposed for the existing parcel. For the purposes of this subsection, a combined lot of less than one-half acre formed from two or more existing lots shall not be considered a new development.

**COLORADO RIVER BASIN REGION**

1. In areas overlying groundwaters which are usable or potentially usable for domestic purposes:

   a. Depth of soil between ground surface and high groundwater level or impervious strata in the disposal area shall not be less than 10 feet.

   b. Depth of soil between the bottom of the disposal facility and fractured rock or high groundwater level shall be at least five feet for leachlines and 10 feet for seepage pits where the soil strata consists of at least 10 percent of the material passing a No. 200 sieve. Additional soil depth will be required as the effective grain size of the soil increases.

   c. Natural or finished ground slope in the disposal area shall not exceed 30 percent.

   d. The percolation rate in the disposal area shall not be greater than 60 minutes per inch if the discharge is to a leachfield, and not less than 1.1 gallons of effluent per square foot per day if the discharge is through a seepage pit. If the percolation rates are faster than 5 minutes per inch, additional testing will be required to determine compliance with 1-b, or if percolation rates are faster than 5 minutes per inch, minimum depth to groundwater between the bottom of the disposal facilities and the anticipated high groundwater shall be 40 feet. (The percolation rates shall be determined in accordance with procedures prescribed by the appropriate public agency.)

2. Other structural limitations, such as horizontal distance between a sewage leaching facility and a water well used for domestic purposes, a surface water used for domestic purposes or for water-contact sports, or other surface impoundment accessible to the public shall be as specified by the local regulatory agency.

3. In areas overlying groundwaters which are unusable for domestic or agricultural purposes:

   a. Depth of permeable soil between ground surface and groundwater level shall not be less than four feet.

   b. Depth of permeable soil between the bottom of the disposal facility and impervious strata shall not be less than four feet.

   c. The acceptable percolation rate shall be determined by the county regulatory agency in

consideration of the required disposal area and other technical factors, in consultation with the Regional Board's Executive Officer or his designee.

d. Compliance with the above-listed Criteria 1 through 3, as well as compliance with local codes and/or policies regulating sewage disposal, will be as determined technically by the appropriate county regulatory agency, subject to review by the Regional Board as to the provisions of said Criteria 1 through 3.

**LAHONTAN REGION**

1. Maximum Density

Individual waste disposal systems associated with new developments which have a gross density greater than two (2) single family equivalent dwelling units per acre will be required to have secondary-level treatment of wastewater. Equivalent dwelling units (EDUs) are defined as a unit of measure used for sizing a development based on the amount of waste generated from that development; the value used in implementation of these criteria is 250 gallons per day per EDU. For the purposes of these criteria, the discharge from a single family dwelling is equal to one EDU. For the purposes of these amendments, senior citizen dwelling units and second units as defined in Government Code Sections 65852.1 and 65852.2 will not be considered as additional dwelling units. In addition to residential developments, this secondary level treatment policy also applies to wastewater discharges from commercial, industrial, recreational and all other developments with wastewater discharge volumes exceeding two EDU per acre density (500/gal/day/acre based on 250 gal/day/EDU). Use of new septic systems is permitted in existing developments as of June 16, 1988 with lot sizes having a net area greater than or equal to 15,000 square feet. The net area is that contained within the boundaries as set forth in the legal lot description.

2. Minimum Distances

The Board has established the minimum distances (see Table entitled, "Minimum Distances for Siting Individual Waste Disposal Systems") necessary to provide protection to water quality and/or public health.

**RWQCB MINIMUM ON-SITE SEWAGE DISPOSAL CRITERIA** CONT'D

3. Additional Minimum Criteria

   a. The percolation rate in the disposal area shall not be slower than 60 minutes per inch if the discharge is to a leachfield or 30 minutes per inch if discharge is to a seepage pit. If percolation rates are faster than 5 minutes per inch, minimum distance to groundwater between the bottom of the disposal facilities and the anticipated high groundwater shall be 40 feet. (The percolation rates shall be determined in accordance with procedures prescribed by the appropriate local public health agency.)

   b. Clay, bedrock, or other material impermeable to the passage of water shall not be less than 5 feet below the bottom of the leaching trench or less than 10 feet below the bottom of the seepage pit.

   c. Depth to anticipated high groundwater below the bottom of the leaching trench shall not be less than 5 feet. Depth to anticipated high groundwater below the bottom of the seepage pit shall not be less than 10 feet. Greater depths are required if native material does not provide adequate filtration.

   d. Natural ground slope in the disposal area shall not be greater than 30 percent.

**Exemptions to the Criteria for Individual Waste Disposal Systems**

In certain locations and under special circumstances, the Board or its Executive Office may waive individual criteria.

1. Waiver of one or more individual criteria may occur if:

   a. The area beneath the proposed septic system discharge has no significant amount of groundwater having present or future beneficial uses; or

   b. It can be proven that no pollution, nuisance or unreasonable degradation of either surface or groundwaters will occur as a result of the proposed septic system density when considered individually or cumulatively with other discharges in the area; or

   c. Construction of a community collection, treatment, and disposal system is imminent. Short term, interim use of individual waste disposal systems may be allowed.

**MINIMUM DISTANCES FOR SITING INDIVIDUAL WASTE DISPOSAL SYSTEMS (in feet)**

| Facility | Domestic Well | Public Well | Flowing Stream[1] | Drainage Course or Ephermeral Stream[2] |
|---|---|---|---|---|
| Septic tank or sewer line | 50 | 50 | 50 | 25 |
| Leaching field | 100 | 100 | 100 | 50 |
| Seepage pit | 150 | 150 | 100 | 50 |

| Facility | Cut or Fill Bank[3] | Property Line[4] | Lake or Reservoir[5] |
|---|---|---|---|
| Septic tank or sewer line | 10 | 25 | 50 |
| Leaching field | 4h | 50 | 200 |
| Seepage pit | 4h[6] | 75 | 200 |

---

[1] As measured from the line which defines the limit of a 100-year frequency flood.

[2] As measured from the edge of the channel.

[3] Distance in feet equals four times the vertical height of the cut or fill bank. Distance is measured from the top edge of the bank.

[4] When individual wells are used on the same lot. (Distances are to those property lines contiguous with neighboring lots and not street easements.)

[5] As measured from the high water line.

[6] As measured from the high seepage level.

## ADDITIONAL REQUIREMENTS FOR SAN BERNARDINO MOUNTAIN AREAS

## PER BOARD ORDERS 6-84-93, 6-81-3

1. Depth of soil* between ground surface and bedrock or any other material of low permeability shall not be less than 10 feet (3.0 m).

2. Depth of soil* between the bottom of the disposal facilities and groundwater shall not be less than 10 feet (3.0 m).

3. All facilities used for collection, transport, treatment or disposal of waste shall be adequately protected against either structural damage or a significant reduction in efficiency resulting from a storm or flood having a recurrence interval of once in 100 years.

* Soil is defined as a granular or weathered material having an effective porosity of greater than 15 percent.

**Suggested References**


| | |
|---|---|
| EHS | Our Current "Standards" Booklet |
| UPC | Current Edition |
| US EPA | (1980) Design Manual, Onsite Wastewater Treatment and Disposal Systems. EPA 625/1-80-012. Available from NTIS, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22151. |
| Canter & Knox | (1985) Septic Tank Systems Effects on Ground Water Quality - Lewis Publishers |
| Kaplan | (1987) Septic Systems Handbook - Lewis Publishers |
| Winneberger, J.T. | (1984 Septic Tank Systems, Ann Arbor Science (Butterworth Publ.) Boston |

American Society of Agricultural Engineers, On-Site Wastewater Treatment Proceedings of the Third, Fourth, Fifth and Sixth National Symposia on Individual and Small Community Sewage Systems, ASAE Publications 1-82, 07-85, 10-87, 10-91, ASAE, 2950 Niles Road, St. Joseph, Michigan 49085-9659

Perkins (1989) On-site Wastewater Disposal, Lewis Publishers


All of the cited references are of interest, none is the last word on the subject.

# Attachment A - Santa Ana

## MINIMUM LOT SIZE REQUIREMENTS AND EXEMPTION CRITERIA FOR NEW DEVELOPMENTS USING ON-SITE SEPTIC TANK-SUBSURFACE LEACHING PERCOLATION SYSTEMS

On October 13, 1989, the Regional Board adopted Resolution No. 89-157, amending the Water Quality Control Plan to add a one-half acre minimum lot size requirement for new developments using on-site septic tank-subsurface leaching/percolation systems regionwide. Certain exemptions from the minimum lot size requirement were specified in Resolution No. 89-157. On December 7, 1990, the Regional Board adopted Resolution No. 90-158, which revised the exemption criteria. However, on June 7, 1991, the Regional Board adopted Resolution No. 91-51, rescinding Resolution No. 90-158 and revising the exemption criteria in Resolution No. 89-157. On July 16, 1993, the Regional Board adopted Resolution No. 93-40, revising the requirements and exemption criteria in Resolution No. 89-157, as amended by Resolution No. 91-51. Resolution No. 89-157, as amended by Resolution No. 93-40, stipulates the following:

I. A minimum lot size of one-half acre (average gross) per dwelling unit is required for new developments in the Region using on-site septic tank-subsurface leaching/percolation systems.

A. The term “one-half acre” specified as the minimum lot size requirement means an average gross area of land of one-half acre per dwelling unit. Easements (including streets, curbs, commons, and greenbelts), or those portions thereof which are part of the property proposed for development shall be included in the calculation of the average gross area of land.

B. A “new” development is defined as a proposed tract, parcel, industrial or commercial development for which:

1. One or more of the following has not been granted on or prior to September 7, 1989:

a. Conditional approval or approval of a tentative parcel or tract map by the local agency such as the county/city Planning Commission, City Council or the Board of Supervisors.

b. A conditional use permit.

c. Conditional approval or approval by the San Bernardino County Department of Environmental Health Services, Riverside County Department of Health, Orange County Health Care Agency or other local agency; or

2. One or more of the conditional approvals or approvals listed under B.1., above, were granted on or prior to September 7, 1989 but had expired prior to September 7, 1989.

C. The minimum lot size requirement does not apply to existing developments where septic tank-subsurface disposal systems have been installed on or prior to September 7, 1989. Replacement of the existing septic tank-subsurface disposal systems shall be exempt from the minimum lot size requirements under the following conditions.

1. For Residential. Commercial and Industrial Developments

Replacement of the existing septic tank-subsurface disposal systems is necessary to bring the system up to code as required by the local health care agencies and/or the building and safety departments.

2. For Single Family Residential Only

Replacement of the existing septic tank-subsurface disposal systems is proposed to allow additional flows resulting from additions to the existing dwelling unit. (This does not include any free-standing additional structures.)

(Note: Board staff does not consider the number of bedrooms and/or bathrooms for existing or proposed single-family dwelling units in determining compliance with the exemption criteria.)

a. An existing development on land zoned single-family residential will be considered as a new development if the addition of any free-standing structures which will result in additional wastewater flows to the septic system is proposed. Commercial and/or industrial developments will be considered as new development if any additions to the existing structures are proposed which will result in additional wastewater flows to the septic system.

b. For single-family residential developments, if the existing septic system could accommodate additional wastewater flows, then additional installations (rooms/ bathroom) to these developments shall be exempt from the minimum lot size requirements.

D. Those tracts, parcels, industrial or commercial developments which have received one or more of the approvals listed in B.l ., above, on or prior to September 7, 1989 are exempt from minimum lot size requirements for use of septic tank-subsurface disposal systems. However, those tracts, parcels, industrial or commercial developments which had received one or more of the approvals listed in B.1., above, but for which the approval had expired prior to September 7, 1989 are considered as new development and are subject to the minimum lot size requirements.

E. Industrial/commercial developments are developments other than single-family residential developments. For new industrial/commercial developments utilizing septic tank-subsurface disposal systems, the wastewater flow for each one-half acre gross area of land may not exceed that from a three-bedroom, two-bathroom single-family dwelling unit. For determining compliance with this criterion, a flow rate of 300 gallons per day shall be considered as the flow equivalent to that from a 3-bedroom, 2-bathroom single family dwelling. For industrial/commercial developments with lots smaller than one-half acre, this flow rate requirement shall be prorated. (For example, an industrial/commercial development on a one-quarter (1/4) acre parcel will be in compliance with this requirement if the wastewater flow does not exceed 150 gallons per day.)

F. This minimum lot size requirement does not affect the lot size criterion for continuing exemptions in prohibition areas (1-acre minimum).

G. This minimum lot size requirement does not preclude the prescription of more stringent lot size requirements in specific areas if it is determined necessary to protect water quality.

H. No exemptions shall be granted for new developments on lots less than one-half acre which are 200 feet or less from a sewer which could serve that tract/parcel, barring legal impediments to such use.

All other developments shall be considered on a sliding scale, e.g., for each additional unit (any development which is more than a single family dwelling), this requirement should be increased by 100-feet per dwelling unit. For example, a 10-lot subdivision shall be required to connect to a sewer if the sewer is within 1,100 feet (200 + 9 x 100 feet = 1,100 feet) of the proposed development barring legal impediments to connection to the sewer. For this subsection, a commercial/industrial development which produces a wastewater flow of up to 300 gallons per day would be considered equivalent to a single family dwelling unit.

I. New lots of less than one-half acre may be formed by combining two or more lots which have received one of the approvals specified in Section B.1., above, on or prior to September 7, 1989. Individually, these existing lots would be eligible for an exemption from the minimum lot size requirement. Developments on the combined lots may also be granted an exemption provided that the total number of units proposed for the new parcel is equal to or less than the total number of units proposed for the existing parcel. For the purposes of this subsection, a combined lot of less than one-half acre formed from two or more existing lots shall not be considered a new development.

J. Exemptions from the minimum lot size requirements for the use of septic tank-subsurface disposal systems on lots smaller than one-half acre may be granted if the following conditions are met:

1. The project proponent implements an acceptable offset program. Under an offset program, the project proponent can proceed with development using septic systems on lots smaller than one-half acre if the proponent connects an equivalent number of septic systems to the sewer. The unsewered developments must be those which would not otherwise be required to connect to the sewer.

2. If the septic systems (developments) proposed are not identical to the ones connected to the sewer (the offset), an engineering report shall be submitted certifying that the nitrogen loading rate from the proposed development(s) is(are) equivalent to or less than the nitrogen loading rate from the septic systems in the offset program.

3. The proposed use of septic tank-subsurface disposal systems complies with the Regional Board's "Guidelines for Sewage Disposal from Land Developments."

K. The project proponent may propose an alternative treatment system for sewage disposal as the basis for an exemption from the minimum lot size requirement. Each request for use of an alternative treatment system shall be reviewed on a case-by-case basis and submitted to the Regional Board for consideration.

# Attachment B - Lahontan

## *Individual Wastewater Treatment Systems (Septic Systems)*

The following principles and policies will be applied by the Regional Board in review of water quality factors relating to land developments and waste disposal from individual waste disposal systems:

1. The following criteria will be applied as the minimum to ensure continued adequate protection of water quality, protection of present and future beneficial uses, and prevention of pollution, contamination and nuisance conditions. The Regional Board will prohibit the discharge from individual disposal systems which do not conform to these criteria.

2. These criteria prescribe minimum conditions for waste disposal from individual on-site systems and do not preclude the establishment of more stringent criteria by local agencies or the Regional Board. The Regional Board does not intend to preempt the authority of local agencies and wilt support local agencies to the fullest extent possible, particularly in the implementation of more stringent regulations.

3. Detailed procedures to implement these criteria and to process exemptions to these criteria are included in "Regional Board Guidelines for Implementation of Criteria for Individual Waste Disposal Systems" (see Appendix C).

4. The criteria contained herein are applicable to the entire Lahontan Region and pertain to any and all proposed building that involves wastewater discharges to other than a community sewer system. The criteria apply to: (1) proposed building on lots within new subdivisions or parcels, and (2) proposed building on existing subdivided lots or parcels, and (3) proposed subdivisions. The criteria do not apply to: (1) existing individual waste disposal systems, or (2) projects which have final building permits prior to June 16, 1988, unless evidence exists which necessitates retrofit of septic systems to conform with current criteria. The "Regional Board Guidelines for Implementation of Criteria for Individual Waste Disposal Systems" specifies separate exemption procedures for existing developments and for new developments. Existing development includes projects for which final development plans, such as a final tract map, were approved by local agencies prior to June 16, 1988. New development includes subdivisions or individual parcels which do not have final development plans approved by local agencies prior to June 16, 1988.

5. These criteria do not apply to projects within septic system prohibition areas where the criteria are more stringent (for prohibitions, see Section 4.1 of this Chapter); and these criteria will preempt less stringent criteria in septic system prohibition areas.

6. Where community sewer systems are available, the Board will encourage connection to the sewer system in lieu of use of individual disposal systems.

## *Criteria for Individual Waste Disposal Systems*

### 1. *Maximum Density*

Individual waste disposal systems associated with new developments which have a gross density greater than two (2) single family equivalent dwelling units per acre will be required to have secondary level treatment of wastewater. Equivalent dwelling units (EDUs) are defined as a unit of measure used for sizing a development based on the amount of waste generated from that development; the value used in implementation of these criteria is 250 gallons per day per EDU. For the purposes of these criteria, the discharge from a single family dwelling is equal to one EDU. Senior citizen dwelling units and second units as defined in Government Code Sections 65852.1 and 65852.2 will not be considered as additional dwelling units. In addition to residential developments, this secondary level treatment policy also applies to wastewater discharges from commercial, industrial, recreational and all other developments with wastewater discharge volumes exceeding two EDU per acre density (500/gal/day/acre based on 250 gal/day/EDU). Use of new septic systems is permitted in existing developments with lot sizes having a net area greater than or equal to 15,000 square feet. The net area is that contained within the boundaries as set forth in the legal lot description.

### *2. Minimum Distances*

The Regional Board has established the minimum distances (see Table 4.4-1 entitled, "Minimum Distances For Siting Individual Waste Disposal Systems") necessary to provide protection to water quality and/or public health. Local hydrogeological conditions may necessitate greater separation of the sewage disposal system from a well or watercourse for protection of beneficial uses (e.g., drinking supply and water contact recreation).

### *3. Additional Minimum Criteria*

a. The percolation rate in the disposal area shall not be slower than 60 minutes per inch if the discharge is to a leachfield or 30 minutes per inch if discharge is to a seepage pit. If percolation rates are faster than 5 minutes per inch, then the soil for a total thickness of five feet below the bottom of the leaching trench shall contain at least 15% of material passing the No. 200 U.S. Standard Sieve and less than one-fourth of the representative soil cross-section shall be occupied by stones larger than 6 inches in diameter. Where the percolation rates are faster than 5 minutes per inch and the above requirement is not met, the minimum distance to ground water between the bottom of the disposal facilities and the anticipated high ground water shall be 40 feet. (The percolation rates shall be determined in accordance with procedures prescribed by the appropriate local public health agency.)

b. Clay, bedrock, other material impervious to the passage of water, or fractured bedrock, shall not be less than 5 feet below the bottom of the leaching trench or less than 10 feet below the bottom of the seepage pit. Impervious is defined for design purposes as a stratum with percolation times of greater than 120 minutes per inch.

c. Depth to anticipated high ground water below the bottom of the leaching trench shall not be less than 5 feet. Depth to anticipated high ground water below the bottom of the seepage pit shall not be less than 10 feet. Greater depths are required if native material does not provide adequate filtration.

d. Ground slope in the disposal area shall not be greater than 30 percent.

e. Minimum criteria specified above must be met within the area of the proposed system and within the 100% expansion area for the proposed system.

### *Exemptions to the Criteria for Individual Waste Disposal Systems*

In certain locations and under special circumstances, the Board or its Executive Officer may waive individual criteria.

1. Waiver of one or more individual criteria may occur if:
   a. The area beneath the proposed septic system discharge has no significant amount of ground water having present or future beneficial uses; or
   b. It can be proven that no pollution, nuisance or unreasonable degradation of either surface or ground waters will occur as a result of the proposed septic system density when considered individually or cumulatively with other discharges in the area; or
   c. Construction of a community collection, treatment, and disposal system is imminent. Short-term, interim use of individual waste disposal systems may be allowed.

### *Implementation of Criteria for Individual Waste Disposal Systems*

1 . The Regional Board and the local agencies have adopted, through Memoranda of Understanding, criteria which are compatible with or more stringent than these criteria.

2. The Memoranda of Understanding include the procedures of the review and processing of applications for proposed discharge of wastewater from land developments which only discharge domestic waste, including single-family-unit residential, multi-unit residential, commercial, industrial and recreational developments. The Memoranda of Understanding include provisions for Regional Board review and processing of specific application (e.g., for industrial waste discharges).

3. For those local agencies which have adopted these or more stringent criteria, land developments which only discharge domestic waste, including single-family-unit residential, multi-unit residential, commercial, industrial and recreational developments, will be permitted entirely by the local agency. (However, the Regional Board reserves the authority to take action, if necessary, as described in item 6 below.)

4. Whenever the proposed development will not meet the minimum criteria and no Memorandum of Understanding or other equivalent document exists between the Regional Board and the local agency, applications for all projects shall be transmitted to the Regional Board along with a complete report of waste discharge and a filing fee.

5. The Regional Board will review, on a project-by-project basis, proposals for commercial, industrial, recreational and all other types of developments which discharge industrial waste. If required, the report of waste discharge will contain information on estimated wastewater flows, types of wastes, and occupancy rates which will enable the Regional Board to evaluate the discharge in terms of EDUs.

6. In any case, the Regional Board will prohibit the discharge of wastes from land developments which will result in violation of water quality objectives, will impair present or future beneficial uses of water, or will cause pollution, nuisance, or contamination, or will unreasonably degrade quality of any waters of the State.

### *Implementation for Other Types of Waste Disposal from Land Developments*

1. Severe impact on water quality can result from failure to implement adequate measures to control storm drainage and erosion. Land developers must provide plans for the control of such runoff from initial construction up to the complete build-out of the development. (See “Land Development” section.)

2. The disposal of solid waste can have adverse impacts on water quality and public health. Land developers must submit a plan which conforms to the regional or county master plan and contains adequate provisions for solid waste disposal for complete build-out of the development.

3. The disposal of septic tank sludge is an important part of any area-wide master plan for waste disposal. Land developers must submit a plan which conforms to the regional or county master plan and contains adequate provisions for septic tank sludge disposal for complete build-out of the development.
4. The responsibility for the timely submittal of information necessary for the Board to determine compliance with these guidelines rests with persons submitting proposals for development or discharge. The Porter-Cologne Water Quality Control Act provides that no person shall initiate discharges of waste prior to filing a report of waste discharge and prior to (1) issuance of waste discharge requirements, (2) the expiration of 120 days after submittal of an adequate report of waste discharge, or (3) the issuance of a waiver by the Regional Board.

### *Alternative Individual Waste Disposal Systems*

In areas where conditions do not support the use of conventional individual subsurface waste disposal systems (e.g., septic systems), the use of engineered alternative systems can be considered. Alternative waste disposal systems include, but are not limited to, mound systems, evapotranspiration beds, sand filters (intermittent and/or recirculating), and lined evaporation ponds. The Regional Board supports the use of engineered alternative systems for waste disposal as a remedy for otherwise unsuitable existing lots. However, the Regional Board discourages the use of engineered alternative systems for new construction, lots, or subdivisions.

Several factors the Local Health Officer and/or the Regional Board staff will consider when evaluating a proposal for the use of an alternative system include, but are not limited to:

1. **size of parcel**
2. **density of surrounding development**
3. **depth to ground water and bedrock**
4. **depth of soils** suitable for waste disposal as classified under the USDA classification system
5. **climate**
6. **access**
   (a) for maintenance and pumping year-round
   (b) control to prevent public contact
7. **emergency contingency plans** (including plans for expansion, replacement or repair)
8. **operation and maintenance requirements**
9. **distance to sewer**

### *Criteria for Alternative Systems*

1. The conditions (soils, ground water, slope) which limit the use of conventional septic tank systems may also apply to alternative systems which rely on soil absorption for treatment and/or disposal of all or most of the wastewater generated (see Criteria for Individual Waste Disposal Systems).
2. **Mound Systems**. Mound systems shall be installed in accordance with criteria established in the State Board's Guidelines for Mound Systems (1980) or other criteria acceptable to the Executive Officer in conformance with standard engineering practices.
3. **Evapotranspiration Systems**. Evapotranspiration systems shall be installed in accordance with criteria contained in the State Board's Guidelines for Evapotranspiration Systems (1980) or other criteria acceptable to the Executive Officer in conformance with standard engineering practices.
4. **Sand Filters**. Sand filters shall be installed in accordance with the specifications for sand fitters in the State of Oregon, Department of Environmental Quality's On-site Sewage Disposal Rules (July 1, 1991) or other criteria acceptable to the Executive Officer in conformance with standard engineering practices.

5. **Grey Water Systems**. Under certain circumstances, grey water systems may be an acceptable method of disposal in conjunction with a composting toilet or holding tank to handle black water. Examples of appropriate applications include recreational areas such as campgrounds, day use facilities, and trailheads. Grey water systems shall be installed in accordance with the California Plumbing Code (24 Cal. Code of Regs., Part 5) and the local administrative authority. If properly constructed and operated, grey water systems are not expected to create a nuisance or pollution.
6. Other proposals for alternative systems shall be evaluated jointly by the local regulatory agency and Regional Board staff on a case-by-case basis. Some engineered systems may be considered experimental by the Regional Board. Experimental systems will be handled with caution. A trial period of at least one year should be established whereby proper system operation must be demonstrated. Under such an approach, experimental systems are granted a one-year conditional approval.
7. All proposals for alternative systems shall be designed by a Civil Engineer, Engineering Geologist or Sanitarian licensed to practice in California.

### *Maintenance Requirements*

System designers should be responsible for developing specifications and procedures for proper system operation. Designers should provide to system owners an informational operation and maintenance document that includes: (1) clear and concise procedures for operation and maintenance, and (2) instructions for repair and/or replacement of critical items within forty-eight hours following failure. Engineered systems should be inspected by a licensed Civil Engineer, Engineering Geologist or Sanitarian during installation to insure conformance with approved plans.

### *Permitting Authority*

The County Health Officer may approve alternative systems when **all** of the following conditions are met:

1. The Health Officer has found the system to be in compliance with criteria approved by the Regional Board Executive Officer (see Criteria for Individual Waste Disposal Systems and Criteria for Alternative Systems above); and
2. The Health Officer has either: (1) informed the Regional Board Executive Officer of the proposal to use the alternative system and the Executive Officer agrees that it complies with the finding in (a) above; or (2) a written agreement that the Executive Officer has delegated approval authority to the County Health Officer; ***and***
3. A public or private entity has agreed in writing to assume responsibility for the inspection, monitoring, maintenance, and eventual decommissioning/reclamation of the system.

If all of the above conditions cannot be met, the Regional Board will consider issuing waste discharge requirements for alternative systems.