

Suggested Procedures for Evaluating Non-Uniform Soil Horizons, Comm 83.44(4)(b)

Ross Fugill, Wastewater Specialist, February 5, 2004

The February 01, 2004 revision of the Comm 83 Code continues to recognize three feet of unsaturated soil as adequate for the absorptive treatment of septic tank effluent containing greater than 10^4 CFU/100ml fecal coliform, and two feet as adequate for treating influents of less than 10^4 CFU/100ml fecal coliform. Exception is still made for coarse materials, but the specifications for dealing with this have been revised. In this recent revision, coarse sand is no longer considered limiting by itself, and both Tables 83.44-2 and Tables 83.44-3 have been modified to address the limitations of rock fragment content of sandy soils. To compensate for the volume taken up by rock fragments, the revision now provides a larger volume in the soil treatment zone in three dimensions by specifying both a lower application rate as well as a somewhat greater depth. Rapid, concentrated saturated flow is prevented by requiring pressure distribution for the most severe conditions. Gone is the requirement for 10 feet of unsaturated soil for some materials. Furthermore, certain sandy materials containing a predominance of rock fragments larger than 2.0 mm are now recognized as having a diminished capacity to treat wastewater where previously no treatment capability was recognized.

Many coarse soils are not uniformly composed of the same material, but are made up of horizons, strata, or layers of materials having different textures and rock fragment content. Table 83.44-3 cannot be directly applied to a stratified soil column, but its basic means of establishing a minimum depth of unsaturated soil required for effective treatment can be applied to each described layer. This is done by deriving the depth compensation factor from Table 83.44-3 for the specified **coarse sand, loamy coarse sand, sand, and loamy sand** soil textures having greater than 35 percent rock fragments and applying it to the measured thickness of individual layers in a stratified soil column. The compensation factors that are applied to soil materials to determine the thickness for treatment equivalent to non-coarse soil are presented in the chart below.

% Rock Fragments	Multiply Layer Thickness By	To Get Equivalent Non-Coarse Soil Thickness ^{1/} For:
>35	0.60	Influents $>10^4$ CFU/100ml fecal coliform
35 to \leq 60	0.67	Influents $<10^4$ CFU/100ml fecal coliform
>60 to <90	0.40	Influents $<10^4$ CFU/100ml fecal coliform

^{1/} Determine total equivalency by adding up the equivalent thickness for the various coarse layers in the profile. The minimum standard is 36" for influent $>10^4$ CFU/100ml fecal coliform and 24" for influent $<10^4$ CFU/100ml fecal coliform.

Example: 27" Sand having 45% rock fragments X 0.60 = 16.2" of equivalent thickness for influent $>10^4$ CFU/100ml fecal coliform, or 27" Sand having 45% rock fragments X 0.67 = 18.1" of equivalent thickness for influent $<10^4$ CFU/100ml fecal coliform.

TABLE 83.44-2 CHANGES

1. Special application rate + pressure distribution for sandy materials having 60 to 90 percent rock fragments. These materials were previously not recognized in Table 83.44-3 as having treatment capability.
2. Structure grade and massive structureless state no longer figures in application rates for loamy sand, fine sand, & loamy fine sand.
3. Coarse sandy loam texture is now recognized and is included with sandy loam and assigned the same application rates.
4. Moderate and strong platy structure is independently recognized and assigned an application rate for all textures finer than loamy very fine sand.
5. Weak platy has the same application rates as massive, or as weak 3-dimensional structure, depending on the texture.
6. Fine sandy loam and very fine sandy loam are now independently recognized and assigned an application rate for the various structure types, grades, and conditions.
7. Pressure distribution is now required for silt loam having a weak 3-dimensional structure. Application rate is doubled.
8. Generally, about half of the applications rates have changed. Most have been increased by 0.1 gal/sq.ft./day. Some have been lowered by 0.1 gal/sq.ft./day in massive soil.