



STATE OF NORTH CAROLINA

DEPARTMENT OF HUMAN RESOURCES

*Division of Health Services*

P. O. Box 2091

Raleigh 27602

February 4, 1975

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GOVERNOR

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SECRETARY

JACOB KOOMEN, M.D., M.P.H.  
DIRECTOR

MEMORANDUM

TO: Local Health Directors and Sanitarians

FROM: Marshall Staton, Chief *M. Staton*  
Sanitary Engineering Section

SUBJECTS: (1) Revised "Rules and Regulations Governing the Disposal of Sewage From Any Residence, Place of Business or Place of Public Assembly in North Carolina"

(2) "Technical Guide for the Evaluation of Proposed Sites for Soil Absorption Systems of Sewage Disposal"

The subject documents (copies attached) were developed subsequent to the Memorandum of Understanding between the Department of Human Resources (DHR) and the Department of Natural and Economic Resources (DNER), a copy of which was sent to you by our memo of September 16, 1974. The principal purpose of these documents is to provide uniformity in the requirements enforced by the staffs of the Division of Environmental Management (formerly, Office of Water and Air Resources), DNER, and of the Division of Health Services, DHR, and the local health departments. Identical requirements were adopted by the Environmental Management Commission (formerly, Board of Water and Air Resources) on January 16, 1975, and by the Commission for Health Services on January 29, 1975, effective January 29, 1975.

The rules and regulations apply to soil absorption systems of sewage disposal which do not result in a discharge to the surface waters of the State. Local health departments would handle those systems of 3,000 gallons or less design capacity, and the Division of Environmental Management (DEM) would be responsible for systems of larger than 3,000 gallons design capacity, in accordance with the Memorandum of Understanding. In addition, health departments wishing to handle these larger systems (up to 10,000 gallons) can be authorized by DEM to do so in accordance with DEM policies and procedures for delegation of authority. The Division of Environmental Management will advise Local Health Directors of its plan for cooperative processing of permit applications, and will provide for informal discussions with Directors who are considering participation.

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Before the documents were completed, a draft of the regulations (which then included the technical guide material) was reviewed on December 2 and 3 by a committee of local sanitarians and representatives of the N. C. Association of Local Health Directors.

The new rules and regulations include revisions and additions to the old regulations which were originally adopted in 1958. Changes include increases in the required capacities of septic tanks and a reduced reliance on the significance of percolation test results for site approval for ground absorption sewage disposal systems. Additions include minimum requirements for distances to water supplies, streams, and shellfish waters; a requirement that septic tank installers and pumpers must register with the health departments; and others.

The technical guide provides a considerable amount of information which should be valuable in determining whether or not particular sites are acceptable. Extensive help in developing this material was provided by personnel of the Soil Science Department, N. C. State University.

We wish to emphasize that these regulations, like the Ground Absorption Sewage Disposal System Act of 1973, include the requirement for a field investigation. The technical guide provides assistance in fulfilling the field investigation requirement.

It is planned to schedule discussion sessions over the State and to repeat the Soils and Health Short Course, and you will be notified of such sessions in your area. Also, it has been suggested that local sanitarians arrange for a few days "one-on-one" instruction in soil science by local Soil Conservation Service personnel.

We believe the new regulations and technical guide will be of significant help in making correct decisions regarding sites for soil absorption systems of sewage disposal.

Attachment

cc: Mr. David T. Flaherty  
Mr. Everett Knight  
Mr. Darwin L. Coburn  
Dr. Ronald H. Levine  
Dr. Isa C. Grant  
Regional Directors  
SES Personnel

DEPARTMENT OF HUMAN RESOURCES  
DIVISION OF HEALTH SERVICES  
SANITARY ENGINEERING SECTION

- - - - -  
RULES AND REGULATIONS

GOVERNING THE

DISPOSAL OF SEWAGE FROM ANY RESIDENCE, PLACE OF BUSINESS  
OR PLACE OF PUBLIC ASSEMBLY IN NORTH CAROLINA

For the purpose of carrying out the provisions of Section 130-160 of Chapter 130 of the General Statutes of North Carolina, the Commission for Health Services hereby adopts the following rules and regulations governing the disposal of sewage from any single or multiple-family residence, place of business or place of public assembly in North Carolina, which does not result in a discharge to the surface waters of the State.

SECTION I - Definitions - For the purpose of these regulations, the following definitions shall apply:

- A. APPROVED - The term "approved" shall mean that which has been considered acceptable to the State or local agency.
- B. APPROVED PRIVY - The term "approved privy" shall mean a fly-tight structure consisting of a pit, floor slab, and seat riser constructed in accordance with Division of Health Services Bulletin No. 454, approved by the State Board of Health July 17, 1958.
- C. APPROVED SEWERAGE SYSTEM - The term "approved sewerage system" shall mean a public, community or institutional sewerage system for the collection and treatment of sewage or other liquid wastes constructed and operated in compliance with applicable requirements of the State or local agency.
- D. LOCAL HEALTH DIRECTOR - The term "Local Health Director" shall mean the local health director as defined in Section 3(g), Chapter 130 of the General Statutes of North Carolina, or his authorized representative.
- E. NITRIFICATION FIELD - The term "nitrification field" shall mean the system of nitrification lines or field lateral lines which receive the septic tank effluent.
- F. NITRIFICATION LINES OR FIELD LATERAL LINES - The terms "nitrification lines" or "field lateral lines" shall mean the open-jointed pipe, drain lines, or especially designed porous blocks which receive the septic tank effluent for nitrification, distribution and absorption into the soil beneath the ground surface.
- G. PERSON - The term "person" shall mean any individual, firm, association, organization, partnership, business trust, corporation or company.
- H. PLACE OF BUSINESS - The term "place of business" shall mean and include any store, warehouse, manufacturing establishment, place of amusement or recreation,

service station, office building, or other places where people work.

- I. PLACE OF PUBLIC ASSEMBLY - The term "place of public assembly" shall mean and include fair grounds, auditoriums, stadiums, churches, camp grounds, theaters, and other places where people assemble.
- J. PRIVY BUILDING - The term "privy building" shall mean and include any and all buildings which are used for affording privacy in acts of urination and defecation which are not connected to a residential septic tank or community type sewerage system.
- K. RESIDENCE - The term "single or multiple-family residence" shall mean and include any private home, tenant house, hotel, motel, summer camp, labor work camp, mobile home, institution, or places where people reside for any period of time.
- L. SEPTIC TANK - The term "septic tank" shall mean a water-tight, covered receptacle designed and constructed to receive the discharge of sewage from a building sewer; separate settleable and floating solids from the liquid; digest organic matter by anaerobic bacterial action; store digested solids through a period of detention; and allow clarified liquids to discharge for final disposal.
- M. SEPTIC TANK SYSTEM - The term "septic tank system" shall mean a ground absorption sewage disposal system consisting of a holding or settling tank and a ground absorption field.
- N. SEWAGE - The term "sewage" shall mean the waste water and its contents from any single or multiple-family residence, place of business, or place of public assembly.
- O. SEWER CONNECTION - The term "sewer connection" shall mean a connection with an approved community or public sewerage system which provides for the collection and disposal of sewage or other liquid wastes.
- P. SITE - The term "site" shall be that area in which the septic tank system is to be located, and the area required to accommodate and permit proper functioning of the system.
- Q. SOIL - The term "soil", for the purposes of subsurface sewage disposal, shall mean the unconsolidated mineral and organic material on the land surface. It consists of sand, silt, and clay minerals and variable amounts of organic materials. It exists as natural undisturbed material or as disturbed material (such as cut and fill).
- R. SOIL ABSORPTION SYSTEM - The term "soil absorption system" shall mean a system that utilizes the soil for absorption of treated sewage.
- S. STATE OR LOCAL AGENCY - The term "State or local agency" shall mean the State or local agency having jurisdiction, or its authorized representative.
- T. SUBSURFACE DISPOSAL - The term "subsurface disposal" shall mean the process of sewage treatment in which sewage effluent is applied to land by distribution beneath the surface of the ground through open-jointed pipes, approved drains or approved specially designed porous block.

SECTION II - Sanitary Sewage Disposal Requirements

Every residence, place of business or place of public assembly as defined herein, shall be provided with either a privy constructed in accordance with the requirements of the Commission for Health Services, a septic tank system constructed in accordance with the provisions of these regulations, or connection to an approved sewer system.

SECTION III - Construction

A. Approved Privy

The "approved privy" shall consist of a pit, floor slab and seat assembly housed in a building which affords privacy and reasonable protection from the weather.

Nothing in these regulations shall prohibit the State or local agency from permitting the use of portable toilets at construction sites or at mass gathering events of a temporary nature, provided such use shall be contingent upon the provision of adequate cleaning and disposal service in accordance with the directions of the State or local agency.

Under special circumstances where an approved privy, an approved septic tank system, or a connection to an approved sewer system is impossible or impractical, these regulations shall not prohibit the State or local agency from permitting vault type privies, or mechanical toilet facilities utilizing heat or other means for reducing the toilet contents to an inert or stabilized residue or to an otherwise harmless condition, rendering such contents non-infectious or non-contaminating.

1. The pit shall consist of an excavation at least 42 inches square and 5 feet deep; but in no case shall the depth be such that contamination of ground water will occur.
2. The pit shall be properly curbed to prevent caving. In sandy or loose soil the curb should extend the full depth of the pit. In tight soils partial curbing is acceptable if it prevents caving.
3. The privy floor slab shall be constructed of reinforced concrete as specified in Division of Health Services Bulletin No. 454, approved by the State Board of Health on July 17, 1958. Where it is impractical to secure or construct reinforced concrete floor assemblies, wood construction will be accepted provided the floor slab is made of rough sub-flooring and covered with tight tongue - and - groove flooring or other type flooring materials to provide strength and prevent entrance of flies and mosquitoes to the privy pit. Where wood construction is used, floors shall be anchored to at least 4 x 4 sills.
4. Wood used for riser and seat assemblies shall be tongue - and - groove or waterproof plywood material.

B. Septic Tank

1. The "septic tank" shall be of watertight construction, structurally sound and not subject to excessive corrosion or decay. Tanks of rectangular design, similar to that specified in Division of Health Services Bulletin

No. 519, approved by the State Board of Health March 17, 1960, are recommended. Prefabricated tanks or tanks of other design, which have been constructed in accordance with plans approved by the State agency may be used, provided they comply with all other requirements of this Section.

Septic tanks of 1,600 gallon liquid capacity or larger shall be of two-compartment design and construction. The inlet compartment of a two-compartment tank shall be between  $2/3$  and  $3/4$  of the total tank capacity. Two-compartment septic tanks are recommended for tanks of less than 1,600 gallon capacity.

A dosing syphon or pump shall be used for discharging septic effluent into nitrification lines when the volume of the tank is more than 3,000 gallons and the total length of such lines is 500 feet or more. When the total length of such lines is 1,000 feet or more, alternating syphons or pumps shall be used. Discharges from syphon or pump systems shall be of such design so as to fill the nitrification lines 60% to 75% of their capacity at each discharge.

2. Minimum liquid capacities for septic tanks shall be in accordance with the following:

- a. Residential Septic Tanks

<u>Number of Bedrooms</u>	<u>Minimum Liquid Capacity</u>	<u>Equivalent Capacity per Bedroom</u>
2 or less	750 gallons	375 gallons
3	900 gallons	300 gallons
4	1,000 gallons	250 gallons

For each additional bedroom, add 250 gallons. These figures provide for use of garbage grinders, automatic clothes washers, and other household appliances.

- b. Septic Tank Other Than Residential

Septic tanks for commercial or institutional installations shall be sized according to accepted engineering practice and the size of each installation shall be determined on the basis of specific needs. For determining required minimum capacities for installations serving other than residences, use the daily flows in Table I in the "Technical Guide for the Evaluation of Proposed Sites for Soil Absorption Systems of Sewage Disposal", adopted by the Commission for Health Services on January 29, 1975 (Technical Guide).

- c. The minimum capacity of any septic tank shall be 750 gallons.

- C. Sites for Soil Absorption Systems

1. Site Evaluation

The State or local agency shall investigate each proposed site. The investigation shall include the evaluation of the following factors:

- a. Topography
- b. Soil Characteristics
  - (1) Texture
  - (2) Structure
  - (3) Depth
  - (4) Restrictive Horizons
  - (5) Drainage
- c. Ground Water Elevation
- d. Depth to Impervious Strata
- e. Percolation Tests
- f. Available Space

Evaluations shall be made in accordance with the "Technical Guide", and other accepted public health principles. Based on this evaluation, each of the factors (a. - f.) shall be classified as SUITABLE, MARGINAL, or UNSUITABLE. If any one of the above factors is unsuitable, a site shall not be used for a soil absorption system.

2. Application Rates

- a. Sites classified as SUITABLE may receive application of septic tank effluents up to 1 gallon per square foot per day.
- b. Sites classified as MARGINAL may receive septic tank effluents up to 0.5 gallons per square foot per day. Flow rates shall be determined from Table I, except that in the case of residences, the rate shall be 100 gallons per person per day. Each bedroom shall be considered as 2 persons.
- c. Sites classified as UNSUITABLE shall not be used for ground absorption disposal systems, unless engineering, hydrogeologic, and soil studies indicate to the State or local agency that a suitable alternative to a septic tank system can reasonably be expected to function satisfactorily.

In calculating the amount of square feet of area needed for the nitrification field, the maximum trench width used in the calculations shall be 36 inches, even though the actual trench width may be constructed larger.

SECTION IV - Location of Septic Tank Systems and Privies

A. Every septic tank system and privy shall be located at least the minimum distance from the following:

- 1. Any private water supply - - - - - 100 feet, or maximum feasible distance, but in no case, less than 50 feet.
- 2. Any community water supply - - - - - 100 feet
- 3. Streams classified as A-II - - - - - 50 feet
- 4. Waters classified as S. A. - - - - - 100 feet from normal high tide mark.
- 5. Any other stream, canal, marsh or coastal waters - - - - - 50 feet

6. High-water mark of any Class I or Class II impounded reservoir as a source of drinking water - - - - - 100 feet
7. Any other or impoundment lake - - - - - 50 feet from high water line.
8. Any building foundation - - - - - 10 feet
9. Any basement - - - - - 15 feet
10. Any property line - - - - - 10 feet
11. Any water line - - - - - 10 feet

- B. Septic tank systems and privies shall not be installed in fill ground unless the site complies essentially with the requirements of these regulations, and is specifically approved by the State or local agency.
- C. Septic tank systems and privies shall not be installed in swampy areas.
- D. Septic tank systems and privies shall be located downhill from wells or springs, if possible.
- E. Septic tank systems and privies shall not be located in areas subject to frequent flooding.
- F. Septic tank systems and privies shall not be located where ground water may become contaminated.
- G. Septic tank systems shall not be located under paved areas.

SECTION V - Maintenance

A. Approved Privies

Any person owning or controlling the property upon which a privy is located, shall be responsible for Item Numbers A. 1, 6, and 7, as listed below regarding the maintenance of approved privies. The tenant or person occupying the property shall be responsible for Item Numbers A. 2, 3, 4, 5, and 8 regarding the maintenance of approved privies.

1. The privy building shall afford a reasonable degree of protection from bad weather conditions.
2. The walls, floor and seat of the privy and the grounds immediately adjacent to the building must be kept in a clean and decent condition.
3. Chickens and other animals shall not be harbored in the privy building.
4. Seat cover shall be hinged and closed at all times when privy is not in use.
5. Flies shall be excluded from the pit at all times. The application of a cup full of kerosene or used oil once each week will assist in controlling mosquito breeding and keep down odors.
6. When the pit becomes filled to within 18 inches of the top of the ground, the privy building must be moved to a new pit and the old pit completely covered with earth.



7. If the pit should cave in, a new pit shall be provided.
8. Ashes, garbage and trash shall be kept out of the pit.

B. Septic Tanks

Any person owning or controlling the property upon which a septic tank system is installed shall be responsible for the following items regarding the maintenance of the system.

1. Septic tanks shall be maintained at all times to prevent seepage of sewage or effluents to the surface of the ground.
2. Septic tanks need occasional cleaning and should be checked at least each three years to determine if sludge needs removing (Once a year if garbage grinders are discharging to the tank).
3. Contents removed from septic tanks shall be discharged into an approved sewer system, buried or plowed under at an approved location within 24 hours, or otherwise disposed of at a location and in a manner approved by the State or local agency.

SECTION VI - Permits

- A. No person shall install or cause to be installed any sewage disposal system or privy without first having obtained a written permit from the State or local agency.
- B. Any person other than the owner, tenant or manager of a residence, place of business, or place of public assembly, who engages in the business of constructing or installing septic tank systems, or the cleaning of septic tanks, shall register with the local health director in the county where he operates before constructing or installing septic tank systems, or collecting and disposing of septic tank contents.

SECTION VII - Violations

If any person shall willfully violate any rule or regulations adopted by the Commission for Health Services or shall willfully fail to perform any acts required by, or shall willfully do any act prohibited by such rules and regulations, he shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed \$50.00 or by imprisonment for a period not to exceed 30 days as provided in Article 22 of Chapter 130 of the General Statutes of North Carolina.

SECTION VIII - Conflicting Rules and Regulations Repealed

All rules and regulations heretofore adopted by the State Board of Health or the Commission for Health Services which are in conflict with the provisions of these rules and regulations are hereby repealed.

SECTION IX - Severability

If any provision of these rules and regulations or the application thereof to any person or circumstance is held invalid, the remainder of the rules and regulations

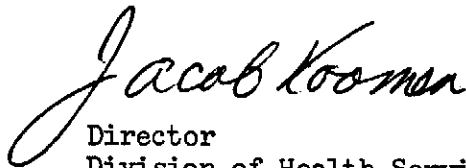
or the application of such provisions to other persons or circumstances shall not be affected thereby.

SECTION X - Effective Date

These rules and regulations shall be in full force and effect from and after January 29, 1975.

The foregoing rules and regulations governing the disposal of domestic sewage from residences, places of business and places of public assembly by the use of septic tanks, privies or sewer connections, were rewritten and adopted by the Commission for Health Services on January 29, 1975 at Raleigh, North Carolina.

Certified as a true copy

A handwritten signature in cursive script that reads "Jacob Korman". The signature is written in dark ink and is positioned above the printed title.

Director  
Division of Health Services  
Department of Human Resources

DEPARTMENT OF HUMAN RESOURCES  
DIVISION OF HEALTH SERVICES  
SANITARY ENGINEERING SECTION

- - - - -  
TECHNICAL GUIDE

FOR THE

EVALUATION OF PROPOSED SITES FOR SOIL ABSORPTION SYSTEMS OF SEWAGE DISPOSAL

For the purpose of providing for uniformity in the enforcement of the "Rules and Regulations Governing the Disposal of Sewage From Any Residence, Place of Business or Place of Public Assembly", adopted by the Commission for Health Services on January 29, 1975, the Commission for Health Services hereby adopts the following Technical Guide for the Evaluation of Proposed Sites for Soil Absorption Systems of Sewage Disposal.

This Technical Guide shall be considered as a description of good public health practice and as not having the effect of law. This Technical Guide shall be used in the evaluation of proposed sites for soil absorption systems except where the State or local agency determine that peculiar or unusual circumstances justify the use of other criteria which shall be consistent with good public health practice.

SECTION I - Definitions - In addition to the definitions provided in Section I of the above cited Rules and Regulations, the following definitions shall apply for the purposes of this Technical Guide:

- A. ALLUVIAL SOILS - The term "alluvial soils" shall mean stratified soils without distinct horizons, deposited by flood waters.
- B. AREAS SUBJECT TO FREQUENT FLOODING - The term "areas subject to frequent flooding" shall mean those areas consisting of alluvial soils, indicating soils deposited from flooding of less than a 10 year frequency.
- C. HORIZON - The term "horizon" shall mean a layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.
- D. ORGANIC SOILS - The term "organic soils" shall mean those organic mucks and peats consisting of more than 20% organic matter to depths of 18 inches or greater.
- E. PED - The term "ped" shall mean a unit of soil structure such as an aggregate, crumb, prism, block, or granule, formed by natural processes.
- F. PERCH - The term "perch" shall mean restricting vertical movement of liquids.
- G. STRUCTURE - The term "structure" shall mean the arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles.

## SECTION II - Site Factors

In order to determine whether a site can be used for disposing of a septic tank effluent, a number of factors shall be taken into consideration. These factors include topography, soil characteristics, ground water elevation, depth to impervious strata, and percolation tests. If any one of the above factors is unsuitable, a site shall not be used for a soil absorption system.

### A. TOPOGRAPHY

1. Uniform slopes under 12% shall be considered SUITABLE with respect to topography. When slopes are less than 2%, provisions shall be made to insure good surface drainage of rainfall or runoff from buildings or paved areas. Complex slope patterns and slopes dissected by deep gullies and ravines are not suitable. The surface area on or around a soil absorption system shall be graded to provide adequate drainage; and such a system shall not be located in a depressed area. Good surface drainage is essential and shall be provided to prevent soil saturation around the system during rainy periods.
2. Uniform slopes between 12% and 20% shall be considered MARGINAL with respect to topography, if the soils are deep and there are no restrictive horizons. Complex slope patterns and slopes dissected by deep gullies and ravines are not suitable. Slopes within this range may require installation of drainage lines up-slope from the soil absorption system to remove all excess water that might be moving laterally through the soil during wet periods of the year. The interception of lateral ground water movement shall be provided where necessary to prevent soil saturation around the soil absorption system. Usable areas larger than minimum are ordinarily required in this slope range.
3. Slopes greater than 20% shall be considered UNSUITABLE, unless a thorough study of the soil characteristics indicate that a soil absorption system will function satisfactorily and sufficient ground area is available to properly install such a system.

### B. SOIL CHARACTERISTICS

Unless soil characteristics have been previously established, soil borings shall be taken in the area to be used for soil absorption systems. Such borings shall be taken to depths of at least 48 inches. From these soil borings and observation of core samples, most of the significant soil characteristics can be evaluated; and a determination can be made as to the suitability of the soil to absorb septic tank effluent. The important soil characteristics which shall be determined are as follows:

1. Texture - The relative amounts of the different sizes of mineral particles in a soil is referred to as soil texture. All soils are composed of sand, (2.0 - 0.05 mm in size); silt, which includes intermediate-sized particles that cannot be seen with the naked eye, but feels like flour when pressed between the fingers, (0.05 - 0.002 mm in size); and clay, which is extremely small in size and is the mineral particle that gives cohesion to a soil (less than 0.002 mm in size). The texture of the different horizons of soils may be classified into three general classes.

- a. Sandy textures - Soils that exhibit a gritty feel when rubbed between the fingers, that crumble when moist or wet, and that will not leaf out when pressed between the thumb and index finger, should be classified as sandy textures. Sandy soils contain more than 70% sand sized particles in the soil mass. These soils do not have enough clay to be cohesive. Sandy soils have favorable percolation rates, but may have a low filtering capacity and may possibly contaminate ground water. Sandy soils shall be considered MARGINAL with respect to texture.
- b. Loamy soils - When moist or wet, loamy soils may be rolled into a ball that will stick together but is easily crushed. When pressed between the fingers, loamy soils will leaf from between the fingers to 1/4 to 1/2 inch before breaking. Loamy soils contain less than 70% sand sized particles and more than 18% clay sized particles in the soil mass. They exhibit little or no stickiness. Loamy soils generally have favorable percolation rates and are excellent filters. Loamy soils are the most desirable for effluent treatment and shall be considered SUITABLE with respect to texture.
- c. Clayey soils - These are soils with more than 40% of the soil mass made up of clay particles. Clayey soils, when moist or wet, may be rolled into a compact, smooth ball and resist pressure when crushed between the fingers. When wet and pressed between the fingers, clayey soils will leaf out to 1/2 inch or more in length before breaking.

The type or kind of clay in soils is very significant. There are two major types of clays: the 1:1 clays (Kaolinite) which does not shrink when dry or swell when wet; and the 2:1 clays (Montmorillonite) that will shrink when dry and swells when wet. The 2:1 clays crack when dry and allow water or septic tank effluent to move freely through the soil for 48 to 72 hours. They then become saturated and swell, resulting in no movement of liquids through the soil. 2:1 clays may sometimes be identified by the presence of cracks in the soil when dry, and are plastic and sticky when wet. These clays will have an olive and greyish mottled appearance, or splotches intermingled with the yellow and red clay colors.

1:1 clay soils shall be considered MARGINAL as to texture; 2:1 clays shall be considered UNSUITABLE as to texture. Organic soils shall be considered UNSUITABLE as to texture.

2. Soil Structure - In many soils, the sand, silt, and clay particles tend to cling or stick to one another to form a ped or a clump of soil. This is known as soil structure. Soil structure may have a significant effect on the movement of effluent through a soil. The structure may determine the rate of movement of liquids through clayey soils. Structure is not very important in sandy-textured soils or in loamy-textured soils, and these types of soils shall be considered SUITABLE as to structure.

The three kinds of soil structure that are most significant in movement of sewage effluent through soils are blocky, platy, and the absence of soil structure or massive conditions.

a. Blocky soil structure

- (1) In clayey soils, if the soil exhibits many peds of angular and subrounded peds, then the soils have blocky structure. The sewage effluent may move between the cracks of these blocky types of peds. Blocky soil structure in clayey soils is frequently destroyed by mechanical equipment manipulating the soil when it is too wet. Trenches for nitrification lines being placed in clayey soils with blocky structure should only be dug when soils are moist or dry. Blocky soil structure in clayey soils shall be considered MARGINAL as to structure.
- (2) Some rocks, even though weathered, such as slates or creviced or fractured rocks, exhibit blocky structure, which is not changed by moving water, thereby allowing fluids to move downward without filtration. Such soils shall be considered UNSUITABLE as to structure.

- b. Platy soil structure - If clayey soils fall out into platelike sheets, then the soils would have platy structure; and water or effluent movement through these horizons would be extremely slow, and the structure shall be considered UNSUITABLE.
- c. Absence of soil structure - Some clayey soils exhibit no structure aggregates; and in these kinds of soils, percolation would be zero or extremely slow. Such structure shall be considered UNSUITABLE.

3. Soil Depth - The depth of soils classified as SUITABLE or MARGINAL as to texture and structure shall be at least 48 inches when conventional ground absorption systems are to be utilized.

4. Restrictive Horizons - Restrictive layers or horizons in soils may generally be recognized by the resistance offered in digging a hole or in using a soil auger. Restrictive horizons are variable in their characteristics. Massive or solid bedrock may be classed as a restrictive horizon. Where this bedrock lies shallower than 48 inches to the surface, it will perch sewage effluent and in many instances will allow sewage effluent to move laterally and seep to the surface on a lower part of the landscape. Another restrictive horizon may be caused by iron pans or plinthite. These horizons may generally be recognized by their brittleness and by the presence of red and grey colored soil materials. The red materials quite frequently will be in the form of nodules of very brittle fragments. These kinds of horizons will also perch sewage effluent and limit the storage capacity of a soil being used for disposition of effluent. The third common restrictive horizon is a cemented iron-aluminum-organic hardpan. This is very brittle when dry and will perch sewage effluent. Soils in which restrictive horizons are less than 48 inches below the ground surface or less than 12 inches below the trench bottom of subsurface

nitrification lines shall be considered UNSUITABLE, except in cases where restrictive horizons occurring close to the ground surface have underlying soil stratas suitable for subsurface disposal, and the ground water table is at least 48 inches below the restrictive horizon. In these cases, the soil shall be considered SUITABLE with respect to restrictive horizons, provided the restrictive horizon is penetrated.

5. Soil Drainage - Soils with seasonally high water tables are of major concern in evaluating sites for sewage effluent disposal. These are the soil areas that give good percolation rates during dry seasons of the year but force sewage effluent to the surface during the wetter seasons. The depth of the seasonal high water table can commonly be recognized by those examining soil profiles. The criteria for recognition of high water tables is that of soil color. Subsurface horizons that are in colors of reds, yellows and browns indicate good soil aeration and drainage throughout the year. Subsurface horizons that are in colors of grey, olive or bluish colors indicate poor aeration and poor soil drainage. These dull or greyish colors may occur as a solid mass of soil or may be in mottles of localized spots. The volume of greyish colors is indicative of the length of time that free water stands in that soil profile. There are soils that have light-colored mottles which are relic from the light-colored rock from which the soils have weathered. These soils would not have high water tables, so one must distinguish between a true soil composed of sand, silts and clays, or the rock material that may still exist in the soil profile. Any soil profile that has the greyish colors; indicative of high water tables, or is subject to tidal or periodic high water, within 36 inches of the surface shall generally be considered UNSUITABLE as to drainage. Where the soil is considered suitable as to structure and texture, and modifications can be made to keep the ground water table at least 12 inches below the bottom of the trench, such soils shall be considered MARGINAL as to drainage.

#### C. PERCOLATION TESTS

Unless soil characteristics have been previously established, at least three percolation tests shall be made in the exact area where the nitrification lines are to be installed. Such percolation tests shall be conducted in accordance with procedures outlined in DHS Bulletin No. 519, approved by the State Board of Health on March 17, 1960. If the average time for the water to fall 1 inch in the test hole is 30 minutes or less, the percolation test shall be considered SUITABLE; between 30 minutes and 60 minutes, MARGINAL; and over 60 minutes, UNSUITABLE. However, if the soil texture and structure are classified as suitable or marginal, percolation rates up to 120 minutes may be considered MARGINAL.

There is dissension over the validity of percolation tests. It is certain that one percolation hole on a site does not indicate the ability of a soil area to handle sewage effluent. Where percolation tests are used, three percolation tests should be conducted in the exact area that nitrification fields will be installed. Variability in percolation tests result for the following reasons: percolation test holes represent only a small portion of the filter field; root channels and worm holes intercepting the percolation hole will give erroneous percolation results;

moisture conditions at the time of the percolation test will give wide variability in results; mechanical digging or auger boring for the percolation hole will often destroy soil structure; dry clays, with shrink-swell potential, will give good percolation rates for as long as 48 to 72 hours; the characteristics of sewage effluent are different from those of the water used in percolation tests. Soils with sandy or loamy textured profiles, without restrictive horizons, or in the absence of high water tables will give percolation rates of less than 60 minutes per inch. Soils with clayey profiles will commonly have percolation rates of greater than 60 minutes per inch, dependent on soil structure, kind of clay, and past land use.

#### D. DETERMINATION OF SOIL SUITABILITY

All of the above criteria under topography, soil characteristics and percolation tests shall be determined to be SUITABLE, MARGINAL or UNSUITABLE as indicated. If all criteria are classified the same, that classification will prevail. However, it is unlikely that all criteria will be classified the same in all situations. Where there is a variation in classification of the several criteria, the following shall be used in making the overall determination, and is summarized in Table II.

1. If the soil structure is classified as unsuitable, the overall classification will be UNSUITABLE, regardless of the classification of the other criteria.
2. If the soil texture is classified as unsuitable, and the soil structure is marginal, the soil texture may be reclassified as MARGINAL.
3. When soil depth is classified as unsuitable, it may be reclassified as MARGINAL if shallower trenches or a mound system can be constructed.
4. When the restrictive horizon is classified unsuitable, it may be reclassified as SUITABLE under the conditions outlined in B. 4.
5. When drainage (ground water level) is unsuitable, it may be reclassified as MARGINAL under the conditions outlined in B. 5.
6. Percolation rates in excess of 60 minutes, but not exceeding 120 minutes may be classified as MARGINAL under conditions outlined in C.

#### E. AVAILABLE SPACE

1. Sites shall have sufficient available space to permit the installation and proper functioning of ground absorption sewage disposal systems, and such sites may be classified as MARGINAL; sites without sufficient available space shall be classified as UNSUITABLE. Sites having sufficient available space to accommodate a replacement nitrification field shall be classified as SUITABLE.

#### F. APPLICATION RATES

1. Sites classified as SUITABLE may receive application of septic tank effluents up to 1 gallon per square foot per day.



2. Sites classified as MARGINAL may receive septic tank effluents up to 0.5 gallons per square foot per day. Flow rates shall be determined from Table I, except that in the case of residences, the rate shall be 100 gallons per person per day. Each bedroom shall be considered as 2 persons.
3. Sites classified as UNSUITABLE shall not be used for ground absorption disposal systems, unless engineering, hydrogeologic, and soil studies indicate to the State or local agency that a suitable alternative to a septic tank system can reasonably be expected to function satisfactorily.

In calculating the amount of square feet of area needed for the nitrification field, the maximum trench width used in the calculations shall be 36 inches, even though the actual trench width may be constructed larger.

G. OTHER APPLICABLE FACTORS INVOLVING ACCEPTED PUBLIC HEALTH PRINCIPLES.

The site evaluation should include consideration of any other applicable factors involving accepted public health principles, such as:

1. The proximity of a large-capacity water-supply well, the cone of influence of which would dictate a larger separation distance than the minimum distance specified in Section IV of the Regulations.
2. The potential public health hazard of possible failures of soil absorption systems involving large quantities of sewage, which would dictate larger separation distances than the minimums specified in Section IV of the Regulations.
3. The potential public health hazard of possible massive failures of soil absorption systems proposed to serve large numbers of residences, as in residential subdivisions or mobile home parks.
4. Other circumstances peculiar to individual situations.

TABLE I

The following estimates of sewage quantities are the minimums required for use in determining the volume of septic tanks being designed to serve selected types of establishments. The figures include volume necessary to handle the sewage flow and provide sludge storage, and may differ from estimated sewage flows used in the design of municipal or community sewerage systems.

<u>TYPE OF ESTABLISHMENT</u>	<u>DAILY FLOW FOR DESIGN</u>
Airports (also R. R. stations, bus terminals) . . . . . (not including food service facilities)	5 gal/passenger
Barber Shops . . . . .	100 gal/chair
Beauty Shops . . . . .	125 gal/booth or bowl
Bowling Alleys . . . . .	50 gal/lane
Camps	
Construction or work camps . . . . .	50 gal/person
Summer Camps . . . . .	50 gal/person
Camp grounds . . . . .	150 gal/campsite
Churches . . . . .	5 gal/member
Country Clubs - Resident members . . . . .	100 gal/person
Non-resident members . . . . .	20 gal/person
Day Care Facilities. . . . .	15 gal/person
Factories (exclusive of industrial wastes) - per shift . . . . .	25 gal/person
Hospitals . . . . .	300 gal/bed
Laundries (self-service) . . . . .	500 gal/machine
Motels/Hotels. . . . .	100 gal/room
with cooking facilities in room. . . . .	125 gal/room
Resort . . . . .	200 gal/room
Offices - per shift. . . . .	25 gal/person.
Nursing/Rest Homes - with laundry . . . . .	150 gal/bed
without laundry . . . . .	100 gal/bed
Residential Care Facilities . . . . .	100 gal/person
Restaurants . . . . .	40 gal/seat
Schools: Day schools . . . . .	15 gal/person
NOTE: Use 20 gal/person if aerobic treatment is proposed.	
Boarding schools . . . . .	100 gal/person
Day workers . . . . .	25 gal/person
Service Stations. . . . .	250 gal/water closet or urinal
Stores . . . . .	250 gal/water closet or urinal
NOTE: If food service is included, add 40 gal/seat.	
Swimming pools and Bathhouses . . . . .	10 gal/person
Theaters - Auditoriums. . . . .	3 gal/seat
Drive-In. . . . .	5 gal/car space
Travel Trailer Parks . . . . .	150 gal/space

TABLE II

- POSSIBLE MODIFICATIONS OF INITIAL CLASSIFICATIONS -

(This table does not include all possible combinations, but includes those which could result in up-grading the initial classification).

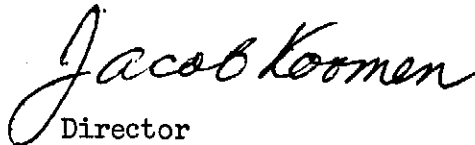
<u>Criteria</u>	<u>Initial Classification</u>	<u>Modifying Factors</u>	<u>Final Classification</u>
Soil Structure	UNSUITABLE	None	UNSUITABLE
Soil Texture	UNSUITABLE	Soil Structure Marginal, Soil Depth, Restrictive Horizon and Drainage Suitable	MARGINAL
Soil Depth	UNSUITABLE	Use of Shallow Trench Use of Mound System	MARGINAL
Restrictive Horizon	UNSUITABLE	Restrictive Horizon Close to Surface; Underlying Soil Strata Suitable; Water Table 1' or More Below Bottom of Trench	SUITABLE
Drainage	UNSUITABLE	Lower Ground Water Table to at Least 1' Below Bottom of Trench	MARGINAL
Percolation Test	UNSUITABLE (60-120 min/inch)	Soil Structure and Texture Suitable or Marginal	MARGINAL

SECTION III - Interpretation and Technical Assistance

- A. INTERPRETATION - The provisions of this Technical Guide shall be interpreted, as applicable, in accordance with the recognized principles and practices of soil science.
- B. TECHNICAL ASSISTANCE - State agencies will provide technical assistance whenever possible. Local agencies are encouraged to obtain technical assistance from local soil science personnel, and local soil survey information.

The foregoing Technical Guide for the Evaluation of Proposed Sites for Soil Absorption Systems of Sewage Disposal was adopted by the Commission for Health Services on January 29, 1975, at Raleigh, North Carolina.

Certified as a true copy



Director  
Division of Health Services  
Department of Human Resources