Frank L. O'Bannon
Governor

Gregory A. Wilson, M.D.
State Health Commissioner

Indiana State Department of Health

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DATE: June 19, 2001

TO: Adams, Allen, Blackford, DeKalb, Delaware, Grant, Howard, Huntington, Jay, Miami, Noble, Randolph, Steuben, Wabash, Wells, and Whitley Counties

FROM: Howard W. Cundiff, P.E., Director HWC
Consumer Protection
AC (317) 233-7182

SUBJECT: Residential and Commercial On-site Sewage Systems and Recessional Moraines in Northeastern Indiana

The Recessional Moraines in Northeastern Indiana include parts of: Adams, Allen, Blackford, DeKalb, Delaware, Grant, Howard, Huntington, Jay, Miami, Noble, Randolph, Steuben, Wabash, Wells, and Whitley Counties.

The staff of Sanitary Engineering, Indiana State Department of Health (ISDH) has become aware that there are serious problems with the proper function of on-site sewage systems in several, but not all, of the recessional moraines in northeastern Indiana. We have learned that there are on-site sewage systems (OSS) that have failed prematurely in these soils. ISDH staff has observed and studied some of these sites. As it is nearly impossible to repair failed on-site systems in the problem moraine soils, extra measures must be taken when on-site systems are to be installed in these recessional moraine areas. Therefore, this memorandum, and the procedures outlined, must be applied immediately to both residential and commercial projects.

These soil problems were first identified in Wells County, in an area known locally as "Buttermilk Ridge." Similar soil conditions occur in neighboring counties. This area first received attention when the soil absorption field of a newly constructed home failed immediately after installation. The investigations and studies that followed have pointed out that in northeastern Indiana there are soils that have special physical and chemical characteristics that cannot readily be observed in the field. Unfortunately, those characteristics severely limit their use for OSS.

Since that time, extensive studies have been done on this specific recessional moraine, the Wabash Recessional Moraine in Wells County. From the data collected, Wells County has been able to develop a policy and procedures for use in the Wabash Recessional Moraine areas. The policy and procedures appear to be working.

Last fall ISDH staff encountered similar on-site system failures in Allen County on some of their recessional moraine soils. At this time, we are unable to determine if these failures are specifically limited to only these recessional moraine areas. Individuals from ISDH, Natural Resources Conservation Service (NRCS), Indiana Geological Survey (IGS), and consulting soil scientists are studying these areas with the assistance of local health departments and OSS installers. All of the individuals are working on these studies with the ultimate goal of identifying the soil properties that are limiting the performance of on-site systems. When we are able to identify these properties we may then be able to delineate areas in the recessional moraines where OSS will function properly.

A properly conducted soil evaluation by a soil scientist does not adequately detect the specific soil properties or characteristics that are causing the OSS failures in the recessional moraines. Because of these undetected characteristics, backhoe soil pits are necessary so that the professional soil scientists and geologists can more closely study and identify small changes that exist in the soil profile. Local health departments need to be aware that where these soil properties exist, newly installed OSS will nearly always go into immediate failure. Repair of these failing systems becomes a very serious problem because, at the present time, we are not aware of any OSS that will function properly in these soil situations. With additional study and analysis, we hope to provide on-site technologies which will overcome the limitations posed by these soils. Until that time, when any "soil moraine" characteristics are encountered in a soil profile, that specific area should not be used for any type of OSS.

Because of this situation with recessional moraine soils, the following procedure must be implemented when evaluating proposed soil absorption fields for residential and commercial on-site sewage projects in these areas.

A. Use the "*FLOW CHART FOR EVALUATION OF RECESSIONAL MORAINE SOILS FOR ON-SITE SEWAGE SYSTEMS*" published by ISDH.

   A flow chart has been developed to maintain a consistent procedure for the evaluation of sites located in or adjacent to the recessional moraine areas in northeastern Indiana. The flow chart is attached.

B. Soil Series And Geologic Materials Associated With The Recessional Moraines

   The following geologic materials always appear to be involved with these OSS failures:

   1. Glacial till materials
   2. Lacustrine materials
   3. Water reworked combination of both glacial till and lacustrine sediments

   In addition, certain landscape conditions and NRCS soil series are present in areas where these on-site failures have been identified:

   1. Morley
   2. Glynwood
   3. Blount
   4. Pewamo
   5. St. Clair
   6. Nappanee
   7. Hoytville
   8. Montgomery
   9. Sites that contain areas of severely eroded soils that have clay loam, silty clay loam, silty clay, or clay surface textures

C. Locating Potential Moraine Areas

   A general map has been developed using the *Miscellaneous Map 49*, developed by Henry H. Gray, Quaternary Geologic Map of Indiana, 1989. It is used to generally locate those moraine areas in northeast Indiana that have a high potential for OSS failure. This map is included as an attachment.

D. Wabash Recessional Moraine Characteristics

1. These are the characteristics that have been identified in Wells County as being present when premature OSS failures have occurred. At the present time, not all of the characteristics have been identified in the other recessional moraine soils. Only an experienced professional soil scientist can look for these characteristics from an evaluation of the soil using a backhoe soil pit. Therefore, all soils descriptions in these areas must be conducted by a soil scientist, soil specialist, soil classifier, or registered professional soil scientist certified by:

   - the American Registry of Certified Professionals in Agronomy Crops, and Soils (ARCPACS),
   - the Indiana Association of Professional Soil Scientists (IAPSC), or
   - the Indiana Board of Registration for Soil Scientists.

2. A soil pit at least 24 inches wide must be used to closely examine the surface soil and the upper part of the subsoil for the Recessional Moraine characteristics. The soil must be described to a depth of 60 inches or to a layer which cannot be readily penetrated, whichever is shallower.

E. Mechanical Analysis (Particle Size Analysis)

1. When required, soil samples will be collected and mechanical analyses conducted on selected horizons in the individual soil profiles. These analyses will be completed using the Hydrometer Method of particle size analysis developed by Bouyoucos. A facility or laboratory accepted by the local health having jurisdiction must conduct the analyses. Copies of the Hydrometer Method of particle size analysis will be forwarded to local health departments by separate memorandum.

2. Collect soil samples (100 grams each) for mechanical analysis to determine percent clay, sand, and silt for each sample. The following horizons must be sampled:

   a. Surface horizon
   b. Any horizon or horizons that the soil scientist suspects might have problems with permeability or that the horizon has the highest percent clay in the subsoil
   c. If present, the horizon below suspected horizons that appear to be OK for "normal" permeability for these textures

F. Modified Permeability Test for Recessional Moraine Soils

When required, modified permeability tests will be used as a pass/fail test for water movement through the subsoil material. These tests will be required only when indicated by the results of the initial soil evaluation and mechanical analysis. An individual accepted by the local health department having jurisdiction will conduct the tests. A minimum of seven (7) test holes will be required for residential sites. Additional test holes may be required by ISDH for commercial on-site projects. The minimum 7 holes will be located as follows:

1. A minimum of five (5) test holes will be placed in the proposed soil absorption field site. One hole will be located near each inside corner of the site and the fifth hole located near the center of the site.

2. Two (2) additional test holes will be required in the downslope dispersal area for a residential site. These two (2) test holes will be dug so that they are located ten (10) feet below the proposed soil absorption field and located approximately 1/3 of the distance from each of the outside corners of the proposed soil absorption field.

A copy of the Modified Soil Permeability Test for Recessional Moraine Soils is attached.

G. Backhoe Soil Pits Will Be Used To Describe Soil Properties Used To Select System Type And Size OSS Soil Absorption Fields

The ISDH is adopting the procedure developed by the Wells County Health Department for their Wabash Recessional moraine soils to describe soils characteristics for selecting system type and size. During parts of the initial investigation, the soil scientist may have already completed some or all of the following requirements:

1. Minimum of two (2) soil pits.
   a. One soil pit dug ten (10) feet directly upslope of the upslope edge of the proposed soil absorption field.
   b. A second soil pit dug ten (10) feet below the downslope edge of the proposed soil absorption field.
   c. Each soil pit must be at least (six) 6 feet long and two (2) feet wide. The depth of each soil pit must be sufficient to adequately describe the subsoil, but may be no greater than five (5) feet.
2. A minimum of five (5) soil borings taken in the proposed soil absorption field site, with one hole located near each corner of the site and the fifth hole located near the center of the site.

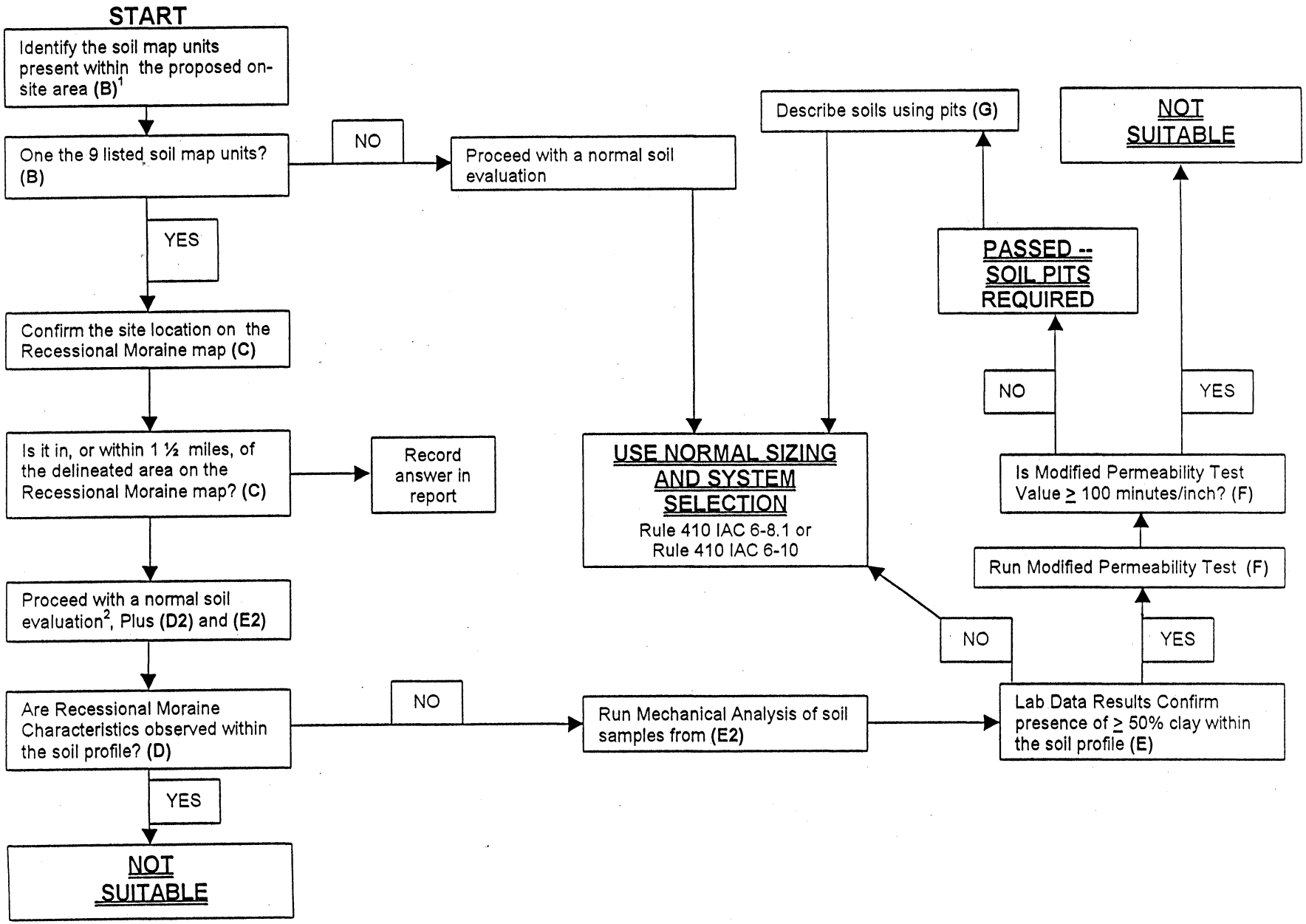
Finally, the following requirements will be applied to sites where on-site sewage systems are installed in soils that are either in the recessional moraine delineation or soils containing more than 50 percent clay:

1. Observation ports will be installed in the absorption trench laterals and, when installed, in the perimeter drainage system.
2. The local health departments and ISDH will have the right to visit and inspect the system to determine the status of the system.
3. The local health departments and ISDH will have the right to conduct dye tests and to collect effluent and perimeter drain water samples for testing.
4. The testing and visits will be at the discretion of the local health departments and ISDH, but will be conducted during normal working hours unless the owner has been notified.

ISDH staff will contact local health departments to schedule workshops in the near future to review this information and address questions. If you have questions or desire assistance prior to the workshops, please contact my on-site sewage staff at (317) 233-7177.

cc: On-Site Sewage Staff
Soil Scientists
Attachments
General Map of Recessional Moraine Soils in northeast Indiana
Flow Chart for Evaluation of Recessional Moraine Soils for On-Site Sewage System
The Modified Soil Permeability Test for Recessional Moraine Soils

FLOW CHART FOR EVALUATION OF RECESSIONAL MORAINE SOILS FOR ON-SITE SEWAGE SYSTEMS



[1]Letter in parenthesis ( ) references corresponding letter in ISDH memorandum of 06/19/01 to local health departments
[2]Special care must be taken in observing and describing the soil horizons; especially the surface layers.

ISDH 06/19/01

The Modified Soil Permeability Test for Recessional Moraine Soils

When required, the Modified Soil Permeability Test will be used as a pass/fail test for water movement through the subsoil material in the Recessional Moraine soils. This test will be required only when indicated by the results of the initial soil evaluation and mechanical analysis. An individual accepted by the local health department having jurisdiction will conduct the tests.

For a variety of reasons, this test is not suitable for use in other applications. Therefore, its use shall be limited to this application.

The surface horizons cannot be included for determining the permeability rate for a specific test hole. The failure test value shall be equal to or greater than 100 minutes/inch.

Procedure for the Modified Soil Permeability Test:

1. A minimum of seven (7) test holes will be required for residential sites. Additional test holes may be required by ISDH for commercial on-site projects. The minimum 7 holes will be located as follows:
   a. A minimum of five (5) test holes will be placed in the proposed soil absorption field site. One hole will be located near each inside corner of the site and the fifth hole located near the center of the site.
   b. Two (2) additional test holes will be required in the downslope dispersal area for a residential site. These two (2) test holes will be dug so that they are located ten (10) feet below the proposed soil absorption field and located approximately 1/3 of the distance from each of the outside corners of the proposed soil absorption field.
2. Notify the local health department of the date and time of the start of the modified soil permeability test at least one working day prior to the start of the test.
3. Dig or bore each hole with horizontal diameter dimension of eight (8) to twelve (12) inches.
4. Each test hole must have a minimum hole depth of at least 36 inches.
5. Remove all loose soil from each test hole.
6. Carefully fill each hole with clean tap water. Keep the hole full of water for at least 12 hours.
7. After the 12-hour saturation period, allow the water in the hole to seep away until it is below any A soil horizons at the site.
8. If needed add additional water until it just reaches the top of the first subsoil (B) horizon.
9. Establish a reference point by use of a nail stuck in the side of the hole at the top of the first subsoil (B) horizon.
10. From this point obtain a measurement to the top of the water level. Record the measurement and the exact time.
11. Continue the measurement to the top of the water surface and time recording until at least three (3) consecutive readings of approximately the same rates are obtained.
12. Convert the time interval obtained in (11) above to minutes and divide this figure by the number of inches of water which has seeped away in that interval to obtain the time for one inch of water to seep away.

If any test hole in the area being tested fails, the area being tested for the proposed absorption field is deemed unsuitable for any type of on-site system. An adjacent area can be evaluated as a new site, as long as the new area is a minimum of fifty (50) feet away from the location of any test hole(s) that have failed. Any of the test holes that previously passed the Modified Permeability Test can be utilized as test holes for the new area, if their location permits. The new proposed area must then be retested using the procedures outlined above.