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A R evaluation of th "Illinoian Till Plain" and .he Origin of the Gritty Loess Substratum of Avonburg and Clermont Soils in Southeastern Indiana

SOIL SURVEY INVESTIGATIONS REPORT NO. 41

A R valuation of the "Illinoian Till Plain" and the Origin of the Gritty Loess Substratum of Avonburg and Clermont Soils in Southeastern Indiana

by

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Ab tract

The original objective of the study reported here was to determine the origin, nature, and significance of the "gritty loess" substratum of Avonburg and Clermont (Cobbsfork) soils in southeastern Indiana. During the course of the study, however, significant new information about the glacial stratigraphy and landforms of the area was obtained. This new information forms the major part of this report.

The general area selected for study of the "gritty loess" was in Decatur and Ripley Counties, Indiana, where Avonburg and Clermont soils are found on what has been traditionally called Illinoian till (or drift) plain. The area is on the major north to south drainage divide that traverses the Wisconsin drift border and the "Illinoian till plain." Drainage to the east enters the Ohio River via Laughery Creek and the Whitewater River. Drainage to the west is to the Wabash River via the East Fork of the White and Muscatatuck Rivers.

Detailed coring traverses in three study areas began on the crest of the Wisconsin moraine in Decatur County and extended to the southeast onto the so-called Illinoian till plain in Ripley County. The two areas on the "till plain" each included one of the low hills found on the drainage divide. A stratigraphic section and topographic profile was developed along the divide from the coring data and from distance and elevations determined by transit survey and topographic map measurements.

The coring transects along the divide cross a sequence of landscapes. The Wisconsin moraine crest stands at elevations ranging from 1,090 to 1,100 feet (332-335 m). The moraine front descends to a loess-mantled dissected drift surface at an elevation of 1,050 to 1,060 feet (320-323 m), herein called the St. Maurice upland. The noncalcareous loess mantle consists of an upper silty unit and a lower gritty or sandy unit. The upland surface is of limited extent and is bounded on the southeast by an "escarpment" that has a toe elevation of 1,015 feet (309.5 m), herein called the Mechanicsburg scarp. This scarp descends to a lower plain, which continues south along the divide and is characterized by an occasional low hill.

Cores taken on the moraine crest show thin silt at the surface, Wisconsin till, thin silt over a paleosol, leached till, calcareous till, and a second paleosol. The first paleosol is considered Sangamon and the till below it is thus Illinoian. This paleosol and till are traced across the St. Maurice upland beneath the silty over gritty loess cover to the Mechanicsburg scarp. Cores reveal a complex stratigraphy beneath the upland with at least three paleosols and three tills resting on bedrock.

The St. Maurice upland, the Illinoian till, and the stratigraphy beneath it are all truncated by the Mechanicsburg scarp. The noncalcareous silty over gritty loess sequence continues down the scarp and onto the lower plain. At the scarp toe the loess rests on a truncated paleosol over bedrock. The scarp is interpreted as an erosion feature and is apparently the outer or southern limit of Illinoian till on the divide. The erosion surface is marked by the base of the gritty loess and in some cores and sampling pits by a stone line. This loess covered erosion surface forms the major part of the lower plain or surface to the south of the Mechanicsburg scarp.

South on the lower surface, coring transects along and normal to the divide axis cross two of the low hills. At the crest of both hills, the stratigraphic sequence is silty over gritty loess underlain by a red (2.5YR 4/6) paleosol developed primarily in probable sands and gravel over till. In both hills, the entire section beneath the loess is leached to bedrock. At one site, this part of the section was 29.5 feet (9 m) thick. Down the flanks

of the hills, the red paleosol thins and disappears from beneath the silty over gritty loess. Thus, it has been truncated by the loess covered erosion surface. The low hills are eroded outliers of a more extensive former land surface. This is the same erosion surface that cut the Mechanicsburg scarp.

The presence of the erosion surface beneath the silty over gritty loess sequence provides a ready explanation of the origin of the gritty loess. The sands in the gritty loess were mixed into the early loess increments by various surface and near surface processes that took place on the erosion surface during early stages of loess deposition. Linear regression analyses show that the amount of sand in the lower part of the gritty loess is directly related to the amount of sand in the erosion surface. Similarly, the geometric mean size of sands in the lower increments of the gritty loess is directly related to the size of sands in the erosion surface.

Other analyses show that the silty over gritty loess tends to be thicker on lower elevations of the erosion surface and the silts tend to be finer on the higher elevations.

Ackn wl dgm nts

The field work reported in this study was carried out by R.V. Ruhe, director, Water Resources Research Center and professor of geology, Indiana University, and his assistants. The work was done for the Soil Conservation Service in Indiana, under contract number USDA-SCS-58-5B13-2-198, effective September 8, 1982. H.R. Sinclair, state soil scientist, was instrumental in setting up the project. Ruhe retired and withdrew from the project in midyear 1985. He turned over to the authors voluminous data including core descriptions, drafts of stratigraphic cross sections, particle size analyses, X-ray diffraction analyses, and chemical data. In addition, he provided a resume of his interpretations of the glacial stratigraphy and other data. This resume and the progress reports written during the course of the investigation were drawn upon heavily in the preparation of this Soil Survey Investigations Report. The authors are indebted to R.V. Ruhe and his assistants for their contributions.

W.D. Nettleton, soil scientist, National Soil Survey Laboratory, provided micromorphological information and interpretation of the clay mineral data for the red paleosol encountered in this study.

The manuscript benefited from reviews by C.G. Olson, U.S. Geological Survey, Reston, Virginia; W.D. Nettleton, National Soil Survey Laboratory, Lincoln, Nebraska; M.W. Meyer, Soil Conservation Service, Washington, D.C.; and R.V. Ruhe, retired, Bloomington, Indiana.

C nt nts

Introducti n

A common problem in the soils of the loess-mantled so-called till plains in southeastern Indiana is a loam sediment that is between the surficial silty loess and the underlying paleosol. The paleosol is formed in presumed Illinoian glacial till. The loam sediment is known as "gritty loess" (McWilliams, 1985) and "sandy loess" (Harlan and Franzmeier, 1977). Its similarity to the "Loess II" of Barnhisel, and others, in Kentucky and to "Roxana Loess" in Illinois has been noted by Harlan and Franzmeier. Fragipans usually occur near the contact of the silty and gritty loess (Harlan and Franzmeier, 1977) and may extend down into the paleosol.

The original objective of the study reported here was to focus directly on the problem of the origin, nature, and significance of the gritty loess in the area of Avonburg and Clermont (Cobbsfork) soils in southeastern Indiana. The fit of this sediment to the landscape, both locally and regionally was to be determined. Its influence on the soils that are formed was intended as the ultimate objective. During the course of the study, however, significant new information about the glacial stratigraphy and landforms of the area was uncovered. The new concepts that have resulted are of such importance that they tend to overshadow the original problem. These ideas do provide an explanation of the origin of the gritty loess, however.

The objectives of this report are to present this new information and discuss its impact on the concept of an Illinoian till plain to the south of the Wisconsinan moraine in Decatur and Ripley Counties, Indiana. In addition, the origin of the gritty loess and some loess-landscape-soil relations are considered.

M th ds and Mat rial

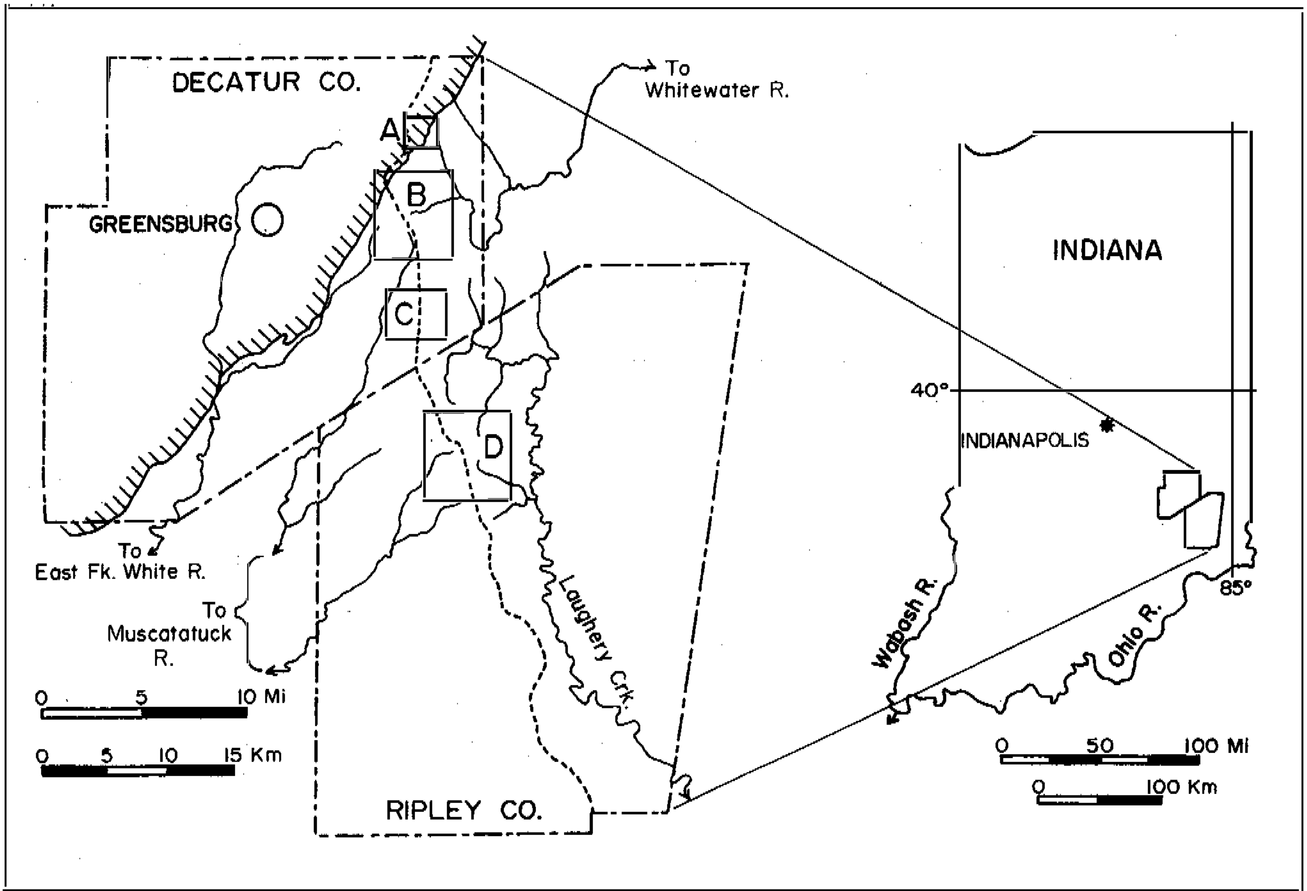

Figure 1.—*The four study areas are on a major north-south drainage divide of the Ohio and Wabash Rivers. Clarksburg Area A, Mechanicsburg Area B, and New Pennington Area C are in Decatur County, Indiana, and Napoleon Area D is in Ripley County. The drainage divide is shown as a dashed line. The Wisconsin moraine front is shown as a hachured line.*

The location of the study areas

The area selected for this study is on the north to south drainage divide of the Wabash and Ohio Rivers in Decatur and Ripley Counties in southeastern Indiana (Figure 1). In these two counties, drainage to the east enters the Ohio River via Laughery Creek and the Whitewater River. To the west, drainage is to the Wabash River via the East Fork of the White River and the Muscatatuck River. This divide extends uninterrupted from north of the Wisconsin drift border in Decatur County southward through Ripley County to the Ohio River in Jefferson County. It traverses the Wisconsin drift border and the area to the southeast that is traditionally considered part of the "Illinoian till plain" (Gray and others, 1972; Wayne and Zumberge, 1965; Steinhardt and Franzmeier, 1979; Teller, 1972). These authors present maps and other material using Illinoian till plain to describe an area presumed to be predominantly glacial till overlain by a surficial loess deposit.

Four areas along or near the divide were chosen for study: Clarksburg Area A, Mechanicsburg Area B, New Pennington Area C, and Napoleon Area D (Figure 1). Clarksburg Area A was the site of a preliminary study located just east of the divide about 2.5 miles (4 km) south of Clarksburg, in Decatur County (Clarksburg Quadrangle: sec. 13 and 14, T11N, R10E; sec. 18 and 19, T11N, R11E). It crosses the Wisconsin drift border (Gray and others, 1972) onto the older loess-mantled Illinoian drift. Continuous cores were extracted from 22 deep borings in order to establish the stratigraphy of the Quaternary material in this area. Three cores were on the summit of the Wisconsin moraine, and three were on the terminal or outer slope. Sixteen sites were on the lower loess-mantled Illinoian drift plain.

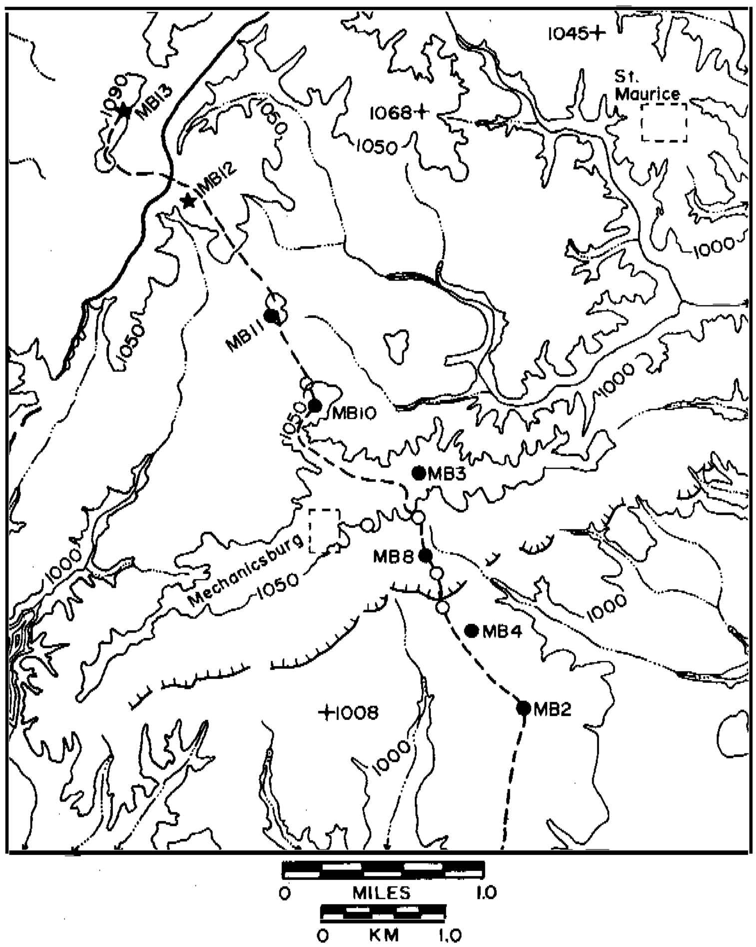

Figure 2.—*Mechanicsburg Area B with 1,000 (304.9 m) and 1,050-foot (320.1 m) contour lines. The filled circles and stars show core sites used in the geologic section diagrams. Some are labeled to aid in locating the section. Open circles show the other cores used in developing stratigraphic interpretations. Stars indicate a stone line present under the loess. The dashed line represents the major divide. The heavy line shows the Wisconsin moraine front, and the 1,090-foot (332.3 m) contour defines the crest. The hachured line (hachures upslope) shows the toe of the Mechanicsburg scarp, elevation 1,015 to 1,020 feet (309.5 to 311.0 m). Map based on the New Point and Greensburg, Indiana, 7.5 minute topographic quadrangles.*

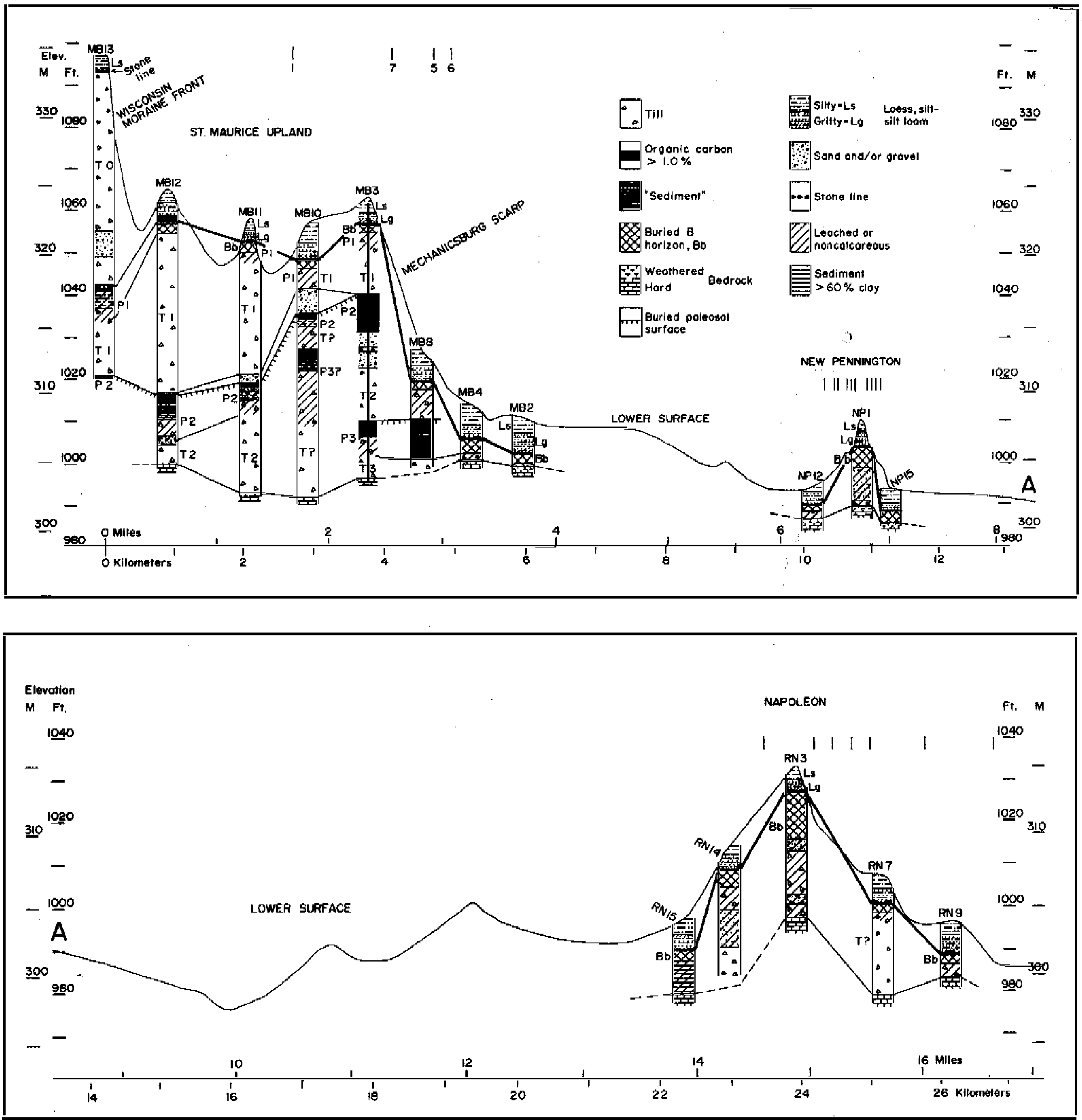

Figure 3.—*Topographic profile and geologic section along the major divide in Decatur and Ripley Counties, Indiana. Topography is from the Greensburg, New Point, and Osgood 7.5 minute topographic quadrangles, supplemented by transit survey. See figure 1 for the general location. Stratigraphy is from core hole data. Figure is in two parts, segments join at A. Tic marks at top locate core sites not shown by vertical section. The erosion surface is shown by the heavier line. Vertical exaggeration is 200X.*

Mechanicsburg Area B, also in Decatur County, crosses from the Wisconsin drift to the lower, older, loess-mantled Illinoian drift in the vicinity of the small village of Mechanicsburg. Thirteen deep core holes were made along the major divide. Eight stratigraphic sections developed from 12 of the continuous cores are shown in Figure 3, miles 0-4 (km 0-6). The location of the 13 coring sites is shown in Figure 2.

To the south, isolated hills of low relief are located along the drainage divide and stand slightly above the lower-lying plain. Deep core holes were made along and across the divide and these hills in two areas. New Pennington Area C in Decatur County is on the divide about 2 miles (3.2 km) west of the village of New Pennington. Twenty-seven continuous cores were extracted (Figure 4). The stratigraphic section along the divide is shown in Figure 3 (miles 6 and 7, km 10-12), and the section across the divide is shown inFigure 5.

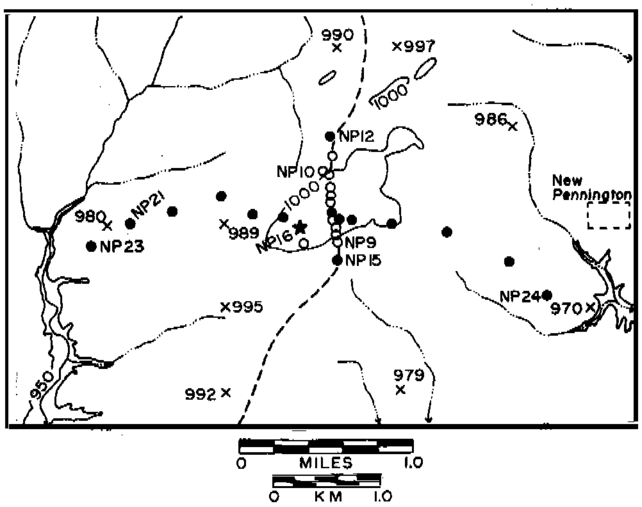

Figure 4.—*New Pennington Area C with the 950- and 1,000-foot (289.6 and 304.9m) contour lines and spot elevations in feet marked by "X." Filled circles and stars show cores used in the geologic section diagrams. Some are labeled to aid in locating the sections. Open circles show other cores used in developing stratigraphic interpretations. A star indicates a site that has a stone line under the gritty loess. Pedon characterization sites S84IN-031-001, 002, 003, and 004 are at sites NP21, 16, 9, and 10, respectively. The dashed line represents the major divide. The map is based on the New Point and Greensburg, Indiana, 7.5 minute topographic quadrangles.*

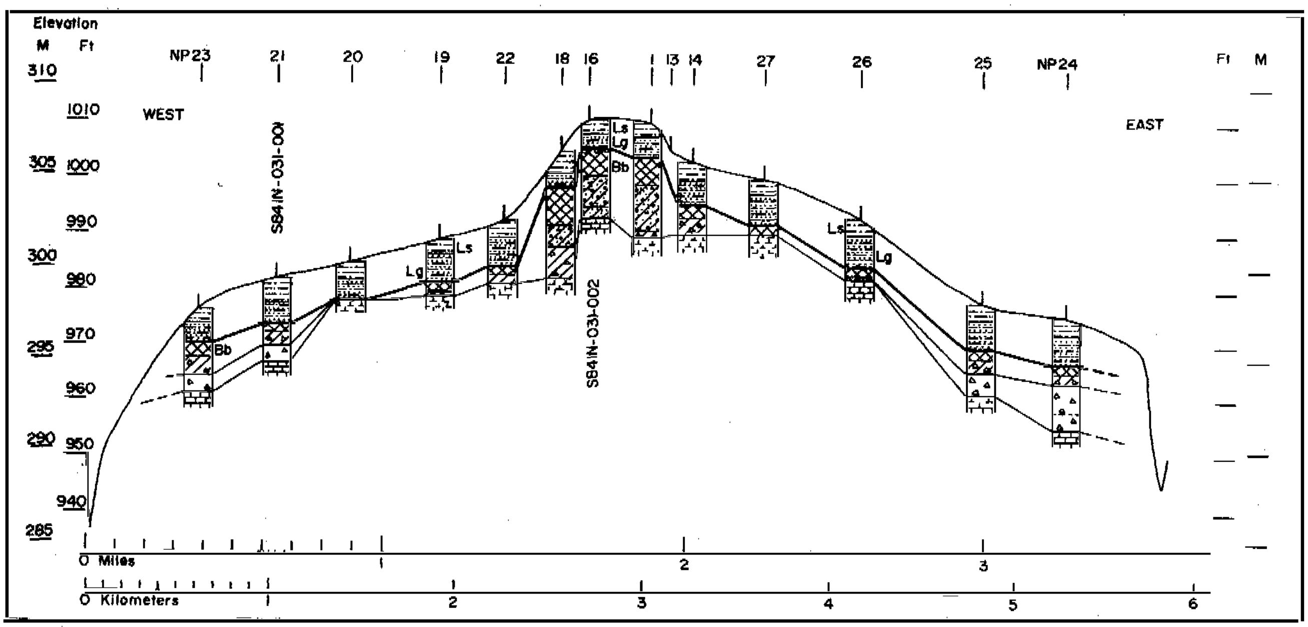

Figure 5.—*New Pennington Area C, stratigraphic section west to east across the low hill and drainage divide between the Vernon Fork of the Muscatatuck River to the west and a tributary of Laughery Creek to the east. See Figure 4 for core locations. The erosion surface is shown by a heavy line. See Figure 3 legend for symbol identification. Vertical exaggeration is 100X.*

The second low hill area was Napoleon Area D, which is 1.5 miles (2.4 km) southeast of Napoleon in Ripley County. Twenty-six continuous cores were taken in this area (Figure 6). The stratigraphic section along the divide is shown in Figure 2. A section along a minor interfluve trending southwest from the divide is shown in Figure 7.

Field methods

Coring was done using a truck-mounted power auger, "E" drill-rod, and a set of coring tubes with the inside diameters telescoping down from 2 1/2 inches (6.4 cm) to 1 1/4 inches (3.2 cm). Four inch (10.2 cm) O.D. flight auger was available for drilling to 80 feet (24.4 m). Coring tubes were pushed in hydraulically, withdrawn, and the core extracted. The procedure was repeated until refusal was encountered at some depth. The flight auger was then used to clear the hole to the refusal depth. Then the next smaller coring tube was lowered to the bottom of the cleaned hole, pushed in, and the core retrieved. The hole was again cleared to the new cored depth, and the coring process was repeated. The coring was always one length below the bottom of the drilled hole. This procedure was repeated until final refusal with the smallest core tube was encountered. The last 5 to 10 feet (1.5-3.0 m) of some of the deeper holes were finished with the flight augers. Holes were terminated in weathered or hard bedrock if it could be reached. Cores were described and taken to the laboratory for particle size, chemical, and mineralogic studies.

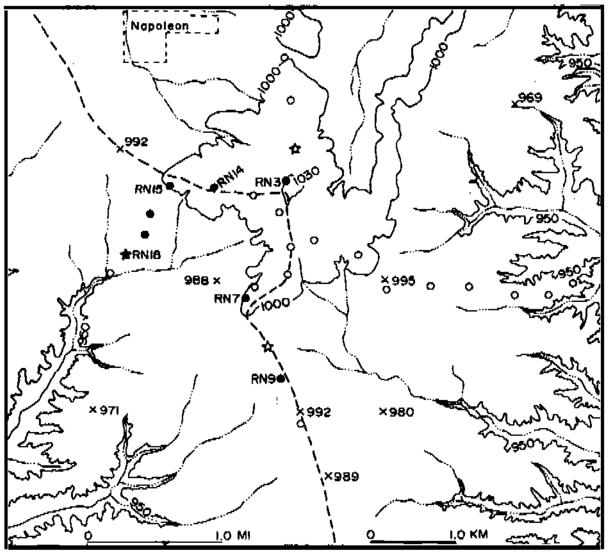

Figure 6.—*Napoleon Area D with 950- (289.6 m), 1,000- (304.9 m), and 1,030-foot (314.0 m) contour lines and spot elevations in feet marked by "X." The filled circles and stars show cores used in the geologic section diagrams. Some are labeled to aid in locating the section. Open circles show other cores used in developing stratigraphic interpretations. The stars indicate sites where a stone line occurs under the gritty loess. The dashed line represents the main divide. Base map is the Osgood, Indiana, 7.5 minute topographic quadrangle.*

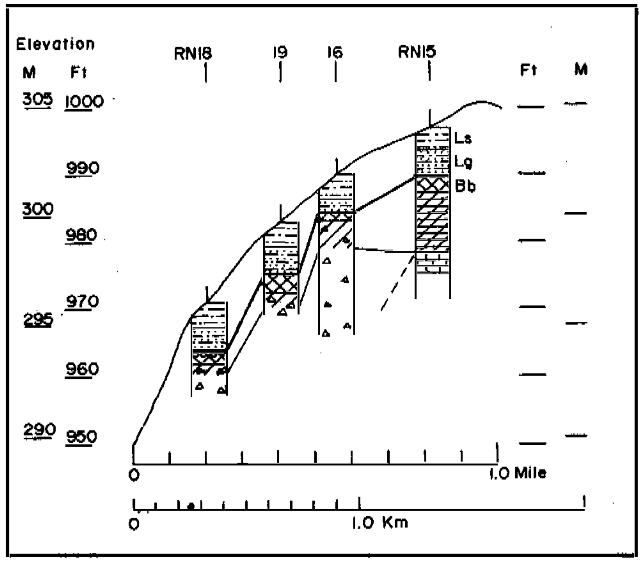

Figure 7.—*Stratigraphic section along the axis of a minor interfluve in the Napoleon Area D. The section intersects the major Ohio and Wabash River divide at RN15 on Figure 3 and trends southwest. See the sequence of three filled circles and the star on the west side of figure 6. The erosion surface is shown by the heavy line. See Figure 3 legend for symbol identification. Vertical exaggeration is 100X.*

Elevation and distance control for construction of the topographic profiles and stratigraphic sections was by transit survey and by measurements from 7.5 minute topographic maps. Geomorphic mapping was by topographic map interpretation and direct field observation and tracing.

Laboratory methods

Particle size analysis (pipette), various chemical determinations, and the data reported in Appendix A and B followed National Soil Survey Laboratory methods (Soil Survey Staff, 1982). Some estimates of the clay mineral content were made by the method of additions of proportions of soil clay to a constant standard (Ruhe and Olson, 1979).

R ults and dis u i n

Quaternary Geology and Geomorphology

Clarksburg Area A

A preliminary study of the Quaternary stratigraphy of the Wisconsin moraine and adjacent Illinoian drift plain was made in Clarksburg Area A (Figure 1). This study area is discussed only briefly because it was preliminary and is not on the main Wabash-Ohio River divide. Topographic profiles and stratigraphic sections were not constructed.

The summits of the Wisconsin moraine in this area are 1,080 to 1,090 feet (329-332 m) in elevation. The Illinoian drift surface (Gray and others, 1972) to the east is at an elevation of about 1,040 feet (317 m). The moraine thus stands about 40 feet (12 m) higher.

Deep coring on the moraine completely penetrated thin silty loess, a calcareous Wisconsin till (T0), a gleyed buried soil (P1) at an elevation of about 1,030 feet (314 m) and a lower second till (T1) which is calcareous in the lower part. At six sites the loess on the Wisconsin drift ranges from 27 to 45 inches (69-114 cm) in thickness and averages 37 inches (94 cm).

Immediately to the east, outside or beyond the moraine, deep coring penetrated first a thin silty loess, then a thicker "gritty loess." Next was a buried soil (P1) again at an elevation of 1,030 feet (314 m) as was found under the moraine, a till (T1) in which the lower part is calcareous, a second buried soil (P2), and another till (T2) that is also calcareous in its lower part. The loess (silty over gritty) ranged from 85 to 120 inches (216-305 cm) in thickness and averages 98 inches (249 cm). There is an abrupt difference of 61 inches (155 cm) in the average total loess thickness at the transition from the Illinoian to the Wisconsin drift. That difference is equivalent to the thickness of the gritty zone on the Illinoian terrain.

According to previous work (Gray and others, 1972; Wayne, 1963), the Illinoian till is beneath the loess beyond the Wisconsin moraine, so the paleosol (P1) between the loess and the till beyond the moraine should be the Sangamon soil. The next paleosol downward (P2) and its weathering profile are leached of carbonates in a zone that is almost 12 feet (3.7 m) thick. By previous standards, this leaching thickness requires an interglacial rank, so P2 should be the Yarmouth soil and the lower till (T2) should be Kansan or older (Teller, 1972; Gooding, 1966).

The gritty loess, beyond the moraine, lies between the uppermost silty loess and the Sangamon soil. The Wisconsin till (T0) is between the silty loess and the Sangamon soil. So, in the Clarksburg Area A, the gritty loess is stratigraphically equivalent to the Wisconsin till T0.

Landforms of the Major Divide

The major divide between drainage to the Ohio River and to the Wabash River in Decatur and Ripley Counties (Figure 1) crosses a sequence of landscapes from north to south. This sequence includes the Wisconsin moraine, the moraine front, a somewhat dissected upland, and a lower "plain" characterized by a few low hills. The three study areas, Mechanicsburg Area B (MB), New Pennington Area C (NP), and Napoleon Area D (RN) represent various parts of this sequence. Coring transects were made along and across the divide in these areas. The terrain along this divide can be examined by reference to the Greensburg, New Point, and Osgood, Indiana, 7.5 minute topographic quadrangles.

In the Mechanicsburg Area B the crest of the Wisconsin moraine is at elevations of 1,090 to 1,100 feet or 332 to 335 meters (Figure 2: MB13; Figure 3). The outer slope or front of the moraine descends to the loess-mantled Illinoian drift surface (Gray and others, 1972) at elevations of

1,050 to 1,060 feet (320-323 m). This drift surface at the immediate moraine front is now dissected and exists as remnants on the interstream divides. Its mapped extent in the study area is shown in Figure 8. This surface is bounded on the northwest by the moraine and on the southeast by an escarpment that has a toe elevation of about 1,015 feet (309.5 m). To the northeast it appears to be truncated by the deeply incised tributaries to the Whitewater River. This surface is referred to here as the St. Maurice upland. The topographic profile is shown in Figure 3, and contour line and spot elevations are shown in Figure 2.

The St. Maurice upland is separated from an even lower-lying surface, also called the Illinoian drift or till plain (Gray and others, 1972), by an "escarpment" that has relief of 40 to 50 feet (12-15 m) and slopes of 1.0 to 2.5 percent. It is shown on the New Point 7.5 minute quadrangle as four or five relatively closely spaced contour lines trending northeast to southwest across the divide just southeast of Mechanicsburg.

This escarpment is mapped across the study area as shown in Figures 2 and 8 and is shown in profile on the divide in Figure 3. As mentioned, it is the southeastern limit of the St. Maurice upland and thus truncates the St. Maurice upland surface. In this paper. this escarpment is called the Mechanicsburg scarp.

The lower-lying so-called Illinoian drift plain traversed by the divide south through the New Pennington Area C and the Napoleon Area D has low relief with general elevation of 980 to 1,000 feet (299-305 m) and slopes of less than 1.0 percent. Low hills stand above the plain at several points on the divide. Such hills form the nucleus of study areas C and D. At New Pennington Area C (Figure 4) the hill summit is slightly above 1,010 feet (308 m). At Napoleon Area D (Figure 6) the summit is slightly above 1,030 feet (314 m). The topographic profile along the divide showing the plain and the low hills is shown in Figure 3.

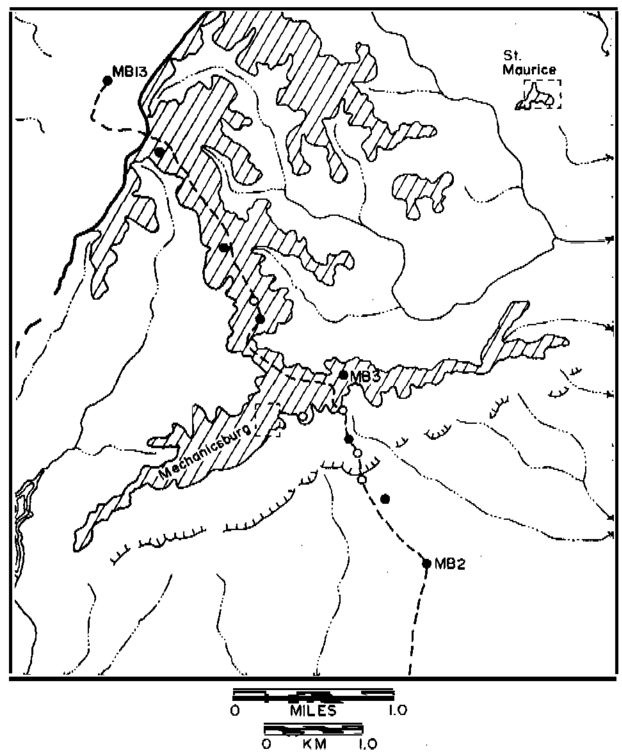

Figure 8.—*Mechanicsburg Area B detail shows the St. Maurice upland surface (crosshatched) lying between the crest of the Mechanicsburg scarp at an elevation of 1,050 feet (320.1 m) and the Wisconsin moraine front. The elevation of the surface ranges from about 1,040 feet (317.1 m) to slightly more than 1,060 feet (323.2 m). Mapping is based on topographic map interpretation and limited field observation. The hachured line (hachures upslope) is the toe (1,015 feet, 309.5 m) of the Mechanicsburg scarp with the lower surface to the south. The heavy solid line is the Wisconsin moraine front. The dashed line is the major divide. Core sites are shown by small open and filled circles.*

This lower lying surface is generally about 2 miles (3.2 km) wide and is incised on the east by tributaries of Laughery Creek and the Whitewater River. On the west it is incised by tributaries of the East Fork of the White River and the Muscatatuck River (Figures 4 and 6).

Mechanicsburg Area B stratigraphy

The coring transect along the major divide begins in Mechanicsburg Area B at the crest of the Wisconsin moraine (Figures 1, 2, and 3). It crosses the St. Maurice upland, drops down the Mechanicsburg scarp, and thence out onto the so-called Illinoian drift plain.

On the moraine crest, (elevation 1,097 feet 334.5 m), (Figure 3: MB13; Appendix A), thin loess (20 inches, 51 cm) overlies pedisediment and a stone line on calcareous Wisconsin till (T0). The till buries a calcareous silt at a depth of 54 feet (16.5 m) and an elevation of 1,043 feet (318 m). This silt contains pulmonate terrestrial gastropods and is the lowest or first increment of Peoria loess (Peoria loess member of Atherton Formation, Wayne, 1963; Morton loess of Illinois, Frye, et al., 1965 and McKay, 1979). The next lower unit is a noncalcareous silt at an elevation of about 1,037 to 1,042 feet (316.2-317.7 m) with abundant organic matter. This organic silt probably correlates with similar units in western Indiana where conifer wood or organic carbon in the silt has 14C dates of 20,660 ± 180; 20,110 ± 360; 22,700 ± 500; 23,700 ± 1000; 23,690 ± 980; and 25,480 ± 420 (Ruhe and Olson, 1980). These dates correspond to the recognized Farmdale-Tazewell time transgression in Iowa (Ruhe, 1969), to the Farmdale-Woodfordian time transgression in Illinois (Follmer et al., 1979) and to Gooding's Sydney interval in southeastern Indiana (Gooding, 1975). The Wisconsin till (T0) in Decatur County is equivalent to the Tazewell till of old or the outermost Woodfordian till in Illinois (Lineback, 1979). It is also equivalent to the Fayette Stade of Gooding (1963, 1975) and/or his Shelbyville drift. The Fayette till boundary and the Shelbyville boundary are nearly coincident (Gooding, 1975).

The noncalcareous, organic silt is nearly 5 feet (1.5 m) thick and overlies a 4-foot-thick leached zone in till. This combined buried soil and till weathering profile is paleosol P1 (Figure 3: MB13). Downward for 13 feet (4 m) calcareous till (T1), in turn, overlies another organic silt that is at an elevation of about 1,020 feet (311 m). This is the uppermost part of another paleosol, P2. The 77 foot (23.5 m) depth is the maximum practical drilling/coring depth for the available equipment; therefore, the thickness of P2 and depth to bedrock were not determined.

The stratigraphy on the moraine, in "older terminology" from the surface downward, is post-Tazewell loess, Tazewell till (T0), pre-Tazewell loess, Farmdale silt plus Sangamon soil (total leaching 9 feet or 2.7 m), Illinoian till (T1), and pre-Illinoian paleosol (P2). Table 1 relates these terms to terminology used in Indiana and Illinois. This sequence is the same as that already described for the moraine in the Clarksburg Area A.

The moraine crest stands about 40 feet (12 m) above the general level of the St. Maurice upland surface. Coring a series of holes to bedrock on the divide axis across the St. Maurice upland shows a sequence of deposits similar to those already described for this upland in Clarksburg Area A. Sections MB12, MB11, MB10, and MB3 (Figures 2 and 3) all have silty loess overlying a "gritty" loess (Figure 9), which in turn rests on a paleosol (P1, Bb) developed in the upper part of till T1. These sections show the gritty loess to be the stratigraphic equivalent of the Wisconsin till T0. The paleosol P1 at MB13 is equivalent to the paleosol under the gritty loess at MB12, MB11, MB10, and MB3. P1 under the loess on the St. Maurice upland is the Sangamon soil. Till T1 is thus Illinoian till and is traceable across the upland to section MB3. All cores on the moraine and on the upland penetrate to or through a second paleosol, P2. This paleosol is 12 feet (3.7 m) thick in Clarksburg Area A and 8 to 10 feet (2.4 to 3 m) thick in this transect. As in the Clarksburg area, P2 should be pre-Illinoian, probably the Yarmouth soil, and the till below (T2) should be Kansan or older (Teller, 1972; Gooding, 1966).

Table 1.—*Correlation of terminology used in describing the stratigraphic sequence of the Wisconsin moraine in Decatur County, Indiana.*

"Old Terms" (Iowa) Ruhe (1969)		Indiana Wayne (1963)		Illinois Follmer et al. (1979)
Post-Tazewell Loess	Woodfordian	Peoria Loess Mbr., Atherton Fm.	Woodfordian	Richland Loess
Tazewell Till		Center Grove Till Mbr., Trafalgar Fm.		Fairgrange, Tiskilwa, Delavan Tills, Wedron Fm.
Pre-Tazewell Loess		Morton Loess Tongue Peoria Loess Mbr. Atherton Fm.		Morton Loess
Farmdale Silt		Farmdale Loess Mbr., Atherton Fm.	Farmdalian	Robein Silt
Sangamon Soil	Sangamon	paleosol	Sangamonian	Sangamon Soil
Illinoian Till		Butlerville Till Mbr., Jessup Fm.		Various members Glasford Fm.
Pre-Illinoian Paleosol	Illinoian	?	Illinoian	?

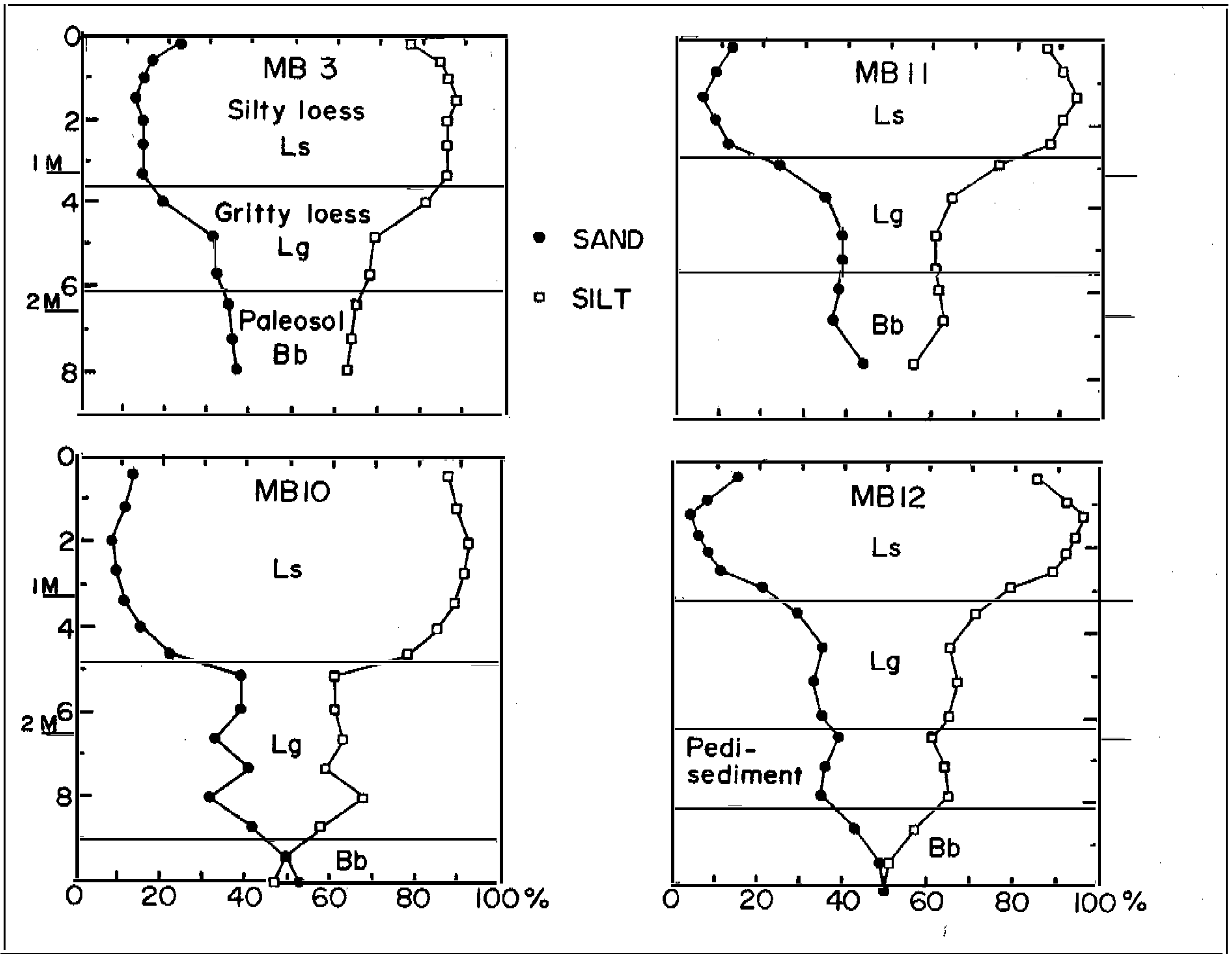

Figure 9.—*Content of sand and silt on a clay-free basis, of the Peoria loess at core sites MB3, MB10, MB11, and MB12 on the St. Maurice upland. See Figure 2 for locations.*

Stratigraphic complexity enters the picture at section MB3 (Appendix A). A third paleosol (P3) is under calcareous till (T2) at an elevation of 1,010 feet (308 m). It consists of 4 feet (1.2 m) of organic rich noncalcareous silt and 4.5 feet (1.4 m) of Bt horizon and leached till, for a total thickness of 8.5 feet (2.6 m). A third calcareous till T3 extends to bedrock. At MB3, the stratigraphy in "old terms" (Flint, 1957), counting down by paleosol and till sequence, is Peoria loess, Sangamon soil (Bb, P1), Illinoian till (T1), Yarmouth soil (P2), Kansan till (T2), Aftonian soil (P3), Nebraskan till (T3), and finally Devonian limestone and dolomite bedrock (Gray and others, 1972).

Further stratigraphic perplexity occurs at MB10 (Appendix A). The upper sequence of Peoria loess (silty loess over gritty loess) over a paleosol (P1) developed in part in Illinoian till (T1) is similar to the sequence at sites MB3, MB11, and MB12. However, the T1 till is leached throughout at this site. Beneath this uppermost till (T1) is a sand

and gravel layer. Next, at an elevation 1,035 feet (315.5 m) is a noncalcareous organic silt 3 feet (0.9 m) thick. The silt overlies 5.3 feet (1.6 m) of noncalcareous till (T?). This organic silt plus leached till (T?) can readily be correlated with paleosol P2 at sites MB13, MB12, MB11, and MB3. A second organic silty bed, 5.3 feet (1.6 m) thick, is under the leached till of P2 at an elevation of 1,027 feet (313 m) and is over 13 feet (4 m) of noncalcareous till. This organic silt plus leached till is designated as paleosol P3?. The leached till of paleosol P3? overlies 16.6 feet (5.1 m) of calcareous unoxidized till (the second T?), which rests on bedrock. The combined total thickness of noncalcareous or leached sediment in apparent vertical continuity is 27 feet (8.2 m). It is tempting to suggest that this is the merged total of the weathering profiles of paleosols P2 and P3?.

Other interpretations for MB10 may be suggested. The description of the core showed a 1 inch (2.5 cm) thick calcareous, gravelly layer just above the second organic silt (P3?) at an elevation of 1,027 feet (313 m). Laboratory data showed that this layer contained 21 percent > 2 mm material and 23 percent CaCO3. Small amounts of carbonate, nominally 2 to 4 percent, were reported in the sampling units within 1 foot (30 cm) immediately above and below the gravelly layer. The small carbonate content tailing off above and below suggests the possibility of recharge of formerly noncalcareous materials via ground water moving through the presumably permeable thin gravelly layer. If this is the case, then it would be reasonable to consider this as the merged total of P2 and P3?. Another possibility is that the weathering associated with the formation of P2 was interrupted by deposition of till T1 and associated materials before carbonate removal from the gravelly layer and the overlying till was completed. If this is the case, the two weathering profiles have not yet merged. In any event, the relations among tills and paleosols below P2 are not clear.

To summarize, the St. Maurice upland stratigraphy is a sequence of Peoria loess (silty over gritty) over the Sangamon paleosol (P1) developed in Illinoian till (T1). Till T1 overlies the continuously traceable pre-Illinoian paleosol (P2) plus at least two pre-Illinoian tills. The pre-Illinoian stratigraphy is complicated by the occurrence of a third paleosol (P3) at two sites. The entire sequence rests directly on bedrock. The application of the classical glacial stratigraphy to this complex pre-Illinoian sequence may not be appropriate.

The Mechanicsburg scarp, referred to in a previous section, is an important feature of this divide transect (Figures 2, 3, and 8). It has a relief of about 50 feet (15 m), and it truncates or cuts across the stratigraphic column of the St. Maurice upland in its descent to the lower-lying surface. It is, therefore, younger than the stratigraphic features beneath the upland. Six holes were cored down the scarp and out onto the lower-lying surface. Three of the sections, MB8, MB4, and MB2, are shown on the Mechanicsburg scarp part of Figure 3. Sites 7, 5, and 6 are not shown because of space limitations. The silty over gritty loess sequence is the surficial unit at all six of these sites. Beneath it, down the scarp from MB3 to MB7 and MB8, there is a progressive loss of the Illinoian till T1 and the "Yarmouth" soil P2. "Kansan" till T2 and "Aftonian" soil P3 are gone at sites 6 and 4. The Mechanicsburg scarp appears to be the outer or southern limit of Illinoian till on this divide.

The lower surface at an elevation of about 1,000 feet (305 m) is mantled by silty over gritty loess similar to that on the St. Maurice upland and the Mechanicsburg scarp. On the lower surface, the only till above the bedrock (Figure 3: MB4) is probably equivalent to T3. Even this till is apparently cut out at MB2 so that the silty over gritty loess overlies a weak paleosol developed in probable pedisediment that in turn overlies weathered bedrock. The lower surface continues south along the divide to the New Pennington Area C and the Napoleon Area D (Figures 1 and 3). The weak paleosol B horizon (Bb) is found under the silty over gritty loess throughout the extent of the lower surface except on the summits of the isolated low hills.

The pre-Wisconsin materials of the St. Maurice upland are cut out by an erosion surface marked by the base of the gritty loess and the top of the paleosol B horizon (Bb). The stratigraphy of the lower surface at MB2 is silty loess over gritty loess (Peoria loess), Bb developed in pedisediment resting on weathered bedrock. Note the absence of recognizable till on the traditional Illinoian till plain.

New Pennington Area C and Napoleon Area D

The lower surface continues south along the divide between the Wabash and Ohio River drainages from the toe of the Mechanicsburg scarp to New Pennington Area C and Napoleon Area D (Figures 1 and 3). Both areas are characterized by a low hill on this divide (Figures 3, 4, and 6). In both areas the silty over gritty loess sequence is the surficial stratigraphic unit in all of the cored sites. On the crest of the low hills, the silty over gritty loess rests on a thick, red (2.5YR 4/6) paleosol that formed in sand and gravel (Appendix A: NP1, NP16, RN3; Appendix B: S84IN-031-002).

In the New Pennington area (Figure 3: NP1), this sand and gravel overlies a thin (1.25 feet, 0.38 m), oxidized and leached till, which in turn rests on weathered bedrock. The entire 14 foot (4.3 m) sequence from the base of the gritty loess to the bedrock is noncalcareous. In the Napoleon area (Figure 3: RN3), the red paleosol Bb rests on leached gravelly sand, which in turn overlies about 10 feet (3 m) of leached and oxidized till. Next downward is 2.5 feet (0.76 m) of leached sand and gravel. Finally 3 feet (0.9 m) of oxidized and leached till overlie bedrock. The entire leached sequence under the silty over gritty loess is 29.5 feet (9 m) thick. This red paleosol appears to have much stronger development than any other soil or paleosol in the region. Some of its characteristics will be discussed in a later section.

The stratigraphic sections (Figures 3, 5, and 7) show that this red paleosol is truncated by an erosion surface, marked by the base of the gritty loess, that descends in all directions from these low hills and forms the main part of the lower surface. The erosion surface is younger than any surface or material that it truncates. The low hills are erosional remnants of a former higher and older surface and associated underlying material. They are similar to the "Paha" of the Iowan erosion surface of northeastern Iowa (Ruhe et al., 1968; Ruhe, 1969; Ruhe, 1983).

The erosion surface cuts to bedrock in a few places (Figure 5: NP20 and possibly NP27) so that even the oldest tills have been cut out. It even truncates material that is not till, such as the lacustrine clay (64 to 88 percent clay, no gravel) at site RN15 (Figure 3: Napoleon; Figure 7) that rests on weathered bedrock. Forty-seven core holes on this surface south of the Mechanicsburg scarp provide enough data for some estimates of the composition of materials beneath the loess. Four categories of materials in which the loess-covered paleosol B horizon (Bb) is developed were considered. These, along with their percent frequency of occurrence, are given in table 2. In the table, Bb refers to both the red paleosol of the low hill summits and the weak paleosol found on the erosion surface below the summits. Till refers to material clearly identified in the core descriptions as glacial till. "Sediment" refers to material identified as sediment but not till. Bedrock was generally characterized as weathered.

Table 2.— *Material found under the silty over gritty loess in 47 cores from "Illinoian plain" south of the Mechanicsburg scarp, summarized by percent frequency. Values rounded to nearest whole percent.*

Bb "Sediment"		Bb Till		Bb "Sediment" Till		Bb Bedrock	
MB	1	MB	2				
NP	14	NP	5	NP	2	NP	4
RN	6	RN	10	RN	2	RN	1
	21		17		4		5
45%		36%		9%		11%	

MB = Mechanicsburg Area B
NP = New Pennington Area C
RN = Napoleon Area D

The silty over gritty loess and paleosol (Bb) are underlain by "sediment" in 45 percent of the observations. In 36 percent, the Bb is developed in, or underlain by, material identified as till. The paleosol under the gritty loess is in "sediment" over till in 9 percent of the holes. It rests on rock (weathered or otherwise) in 11 percent. In the areas studied, 65 percent of the observations show that the material underlying the gritty loess and the Bb is something other than till. Thus, this surface is not accurately described when it is called a till plain. Loess-covered erosion surface would be a more appropriate term.

The Red Paleosol

The red paleosol is beneath the silty over gritty loess on the summits of the low hills, or erosional remnants, along the main divide of the Wabash and Ohio Rivers in the New Pennington (NP) and Napoleon (RN) areas (Figures 3, 4, 5, and 6). This paleosol is described in cores NP1, NP16, and RN3 (see Appendix A). Soil characterization sampling of the paleosol was done in a large, deep pit at the NP16 site (Figures 4 and 5). Complete data and accompanying pedological descriptions, horizon by horizon, are available to a depth of nearly 18 feet or 5.5 m (Appendix B: Pedon S84IN-031-002).

Parent material of the paleosol appears to have been primarily bedded sediment, probably outwash, overlying till of variable thickness. At site NP16, the sediment is described as resting on bedrock. The section is leached throughout the 17.5 feet (5.3 m) from ground surface to the rock. The loess overlay is 5.2 feet (1.6 m) thick. At site NP1, about 13 feet (4 m) of leached sediment rests on 1.25 feet (0.4 m) of oxidized and leached till over bedrock. The loess is 6.25 feet (1.9 m) thick. At site RN3, the loess is 6.1 feet (1.9 m) thick. The rest of the section to rock is 29.5 feet (9 m) thick and is leached throughout. The lower 15.5 feet (4.7 m) is composed of 10 feet (3 m) of till, 2.5 feet (0.76 m) of sand and gravel, and 3 feet (0.9 m) of till resting on bedrock. At the characterization site near NP16, the entire sampled sequence under 5.9 feet (1.8 m) of loess is apparently bedded outwash material. It is leached throughout.

Stratigraphically, the upper limit of the red paleosol is the gritty (sandy) phase or lower textural zone of the Peoria loess (Olson and Ruhe, 1979). A maximum radiocarbon age of 20 to 25 thousand years is given by Ruhe and Olson (1980) for the Peoria loess in southern Indiana. The lower limit of the paleosol, the material in which it is developed, is the probable outwash and associated till or tills. The age and stratigraphic relations of these materials under the low hills have not been determined. Direct tracing from the St. Maurice upland sequence is not possible because this sequence has been cut out down to bedrock near the toe of the Mechanicsburg scarp (Figure 3). The possible stratigraphic range of the lower limit would appear to include T3, P3, T2, P2, T1, and P1, as found under the St. Maurice upland.

The outstanding visible feature of the paleosol is its red (2.5YR 4/6) color which occurs throughout the major part of the buried solum at all of the described sites. Characterization data suggests the color is because of the free iron content, which ranges from 2 to 4 percent in the red horizons. The red color and free iron oxide content suggest a significant degree of weathering (Jackson, 1968).

Even though the red paleosol was preserved under the loess cover on the highest parts of the main divide, it has been truncated to some extent by the erosion surface. In the New Pennington area, the stone line reported at the loess-paleosol contact in core NP16 and the S84IN-031-002 descriptions (Appendix A and B) is evidence of truncation. Thus, at these sites only part of the paleosol remains. The leached section under the loess at NP16 is 12.3 feet (3.8 m) thick. By contrast, a much thicker and probably a more complete red paleosol section remains at site RN3. A stone line was not reported here, and the leached section under the loess is 29.5 feet (9 m) thick, which is a closer approximation of the original thickness.

The available evidence suggests the red paleosol is highly weathered. The X-ray diffraction patterns of the horizons formed in the silty over gritty loess overlay show a mixture of clay minerals that includes significant but not dominant amounts of smectite, vermiculite, clay-sized mica, and kaolinite. In the paleosol, the clay fraction loses about one-third of its cation exchange capacity, and there are several important changes in the X-ray patterns. The 7.2 Å peaks are lower than those in the profile above. The trailing edge of the peak rises almost directly into a broad rounded pattern that has a maximum reflection near 7.6 Å. Diffraction peaks in this range have been attributed to air-dried halloysite (Dixon, 1977). The 7.2Å peak is reinforced upon K saturation and heating to 450 C and most of the rounded part of the trailing edge disappears. At 600 C the 7.2 Å peak is lost. Differential thermal analysis (DTA) (Figure 10; Appendix B: pedon S84IN-031-002)

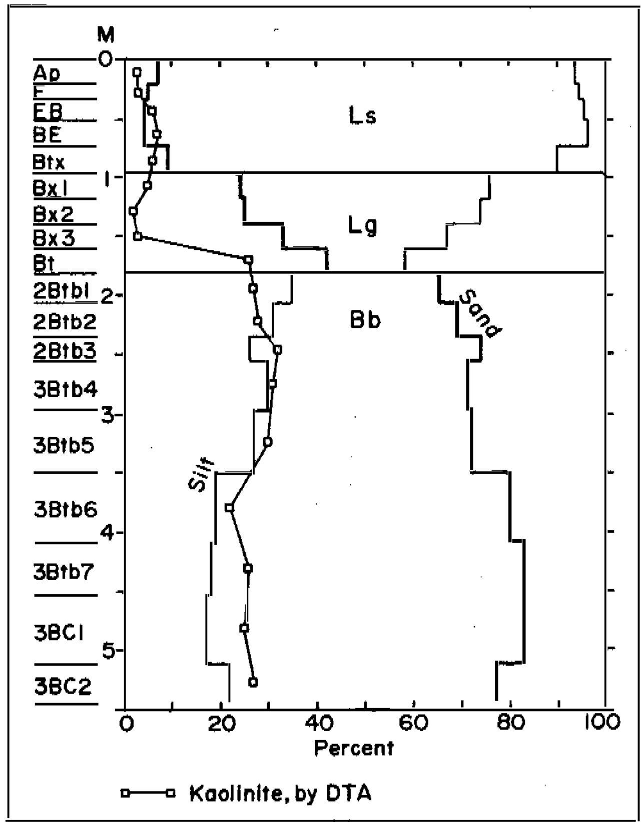

Figure 10.—*Content of clay-free sand (heavy line) and silt (light line) in the red paleosol site S84IN-031-002. The square symbols show the kaolinite content as determined by DTA. Ls = silty loess, Lg = gritty loess, Bb = red paleosol.*

shows that the paleosol Bb horizon contains 25 to 32 percent kaolinite (probably halloysite) throughout the sampled depth (181-543 cm, 6.8-17.8 feet). This is in contrast to the 2 to 7 percent reported for the silty over gritty loess unit. The high (26 percent) kaolinite content of the Bt horizon in the lower part of the gritty loess (Lg) is probably caused by the mixing in of material derived from the erosion surface and uppermost part of the Bb horizon. Evidence for such mixing is discussed in detail later. The content of kaolinite or halloysite, or both, and the content of iron oxide are indicators of a highly weathered soil (Dixon, 1977; Jackson, 1968).

Table 3. —*Analysis of the degree of weathering of sand-sized feldspar grains in the Bb horizon of the red paleosol (Appendix B: S84IN-031-002). Results are the mean of 5 grains (X) and give the percent of grain area that appears isotropic. Kaolinite content is also shown.*

Horizon	Depth	Weathered Feldspar		Kaolinite by DTA
	cm	$\bar{X}$ %	SD %	%
2Btb1	181-207	41	21.3	27
2Btb1	207-235	39	15.7	28
2Btb3	235-256	43	2.3	32
3Btb4	256-296	41	21.4	31
3Btb5	296-350	19	17.4	30

Micromorphology confirms the weathered aspect of the paleosol. Study of thin sections suggests that weathering of feldspars is the source of the halloysite or kaolinite (Huang, 1977). Many of the feldspars have a perthite texture. The weathering products, for the most part, appear isotropic. Thus, the degree of weathering of the feldspars could be studied by use of an image analyser with the image acquired in either plain light or under crossed polarizers, depending on the presence or absence of albite twinning in the feldspars. The results are presented in table 3. The sand-sized grains examined were about 40 percent weathered.

The red paleosol B horizon is highly illuviated. The paleosol fabrics have porphyric-related distribution patterns in which sand grains are imbedded in a fine-grained matrix high in clay. The capacity of the clay to shrink and swell is relatively low, as the mineralogy would suggest. Linear extensibilities are less than 4 percent. Nearly continuous red clay skins are in channels, and line voids. They occur as bridges between sand grains in areas that have less clay. The clay skins are thick, especially in voids, and many papules are present. The papules are laminated, red, and appear to be illuviated clay. Illuviation of some clay from the overlying loess deposit is evident in the upper part of the paleosol. In contrast to the general red color, the last clay deposited in some voids and channels is yellowish brown. Further, an accumulation of silt fills some channels, which suggests the movement of silt into the paleosol.

The lithologic discontinuity at the loess-paleosol contact has already been alluded to. The stone line is prima facie evidence of truncation (Ruhe, 1975) and discontinuity. The content of sand and silt shows significant changes at this boundary (Figure 10). The increase in silt marks the beginning of loess deposition. The upward decrease of sand in the gritty loess (Lg) suggests mixing of sands from the Bb into the Lg that became less as the loess deposit became thicker.

Discontinuity in pedogenesis associated with the two lithologic units is also evident. The mineralogical changes have already been discussed. Clay distributions show a significant break at this boundary. Coarse clay content (Figure 11) is fairly constant and nearly linear from the Ap down through the silty loess and well into the gritty. This indicates little movement of

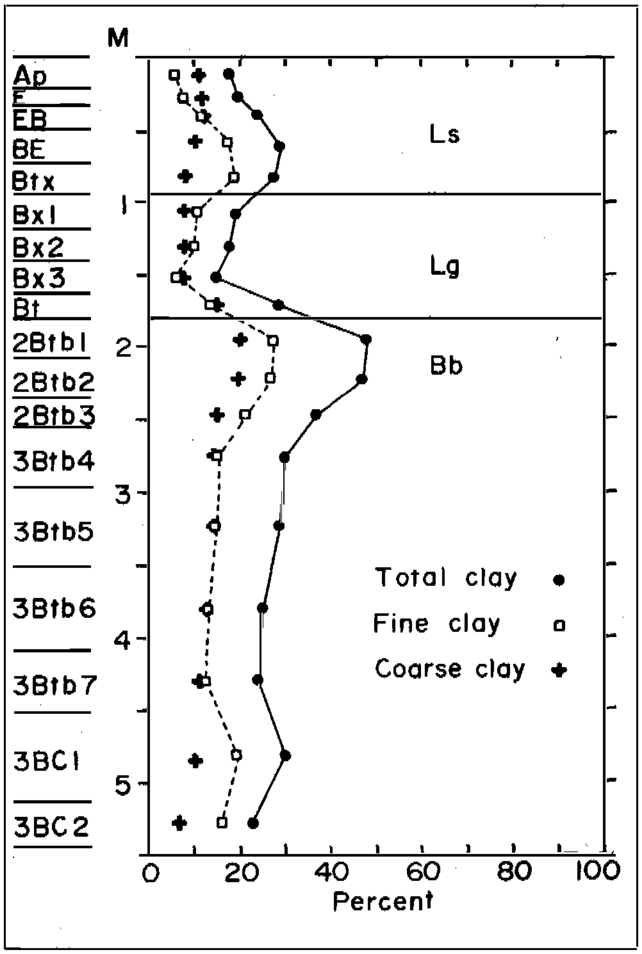

Figure 11.—*Fine clay (less than 0.0002 mm), coarse clay (0.0002-0.002 mm), and total clay depth distributions of the red paleosol site NP16, pedon S84IN-031-002. Ls = silty loess, Lg = gritty loess, Bb = red paleosol.*

this fraction in the loess since the end of deposition. The prominent bulge in fine clay, compared to coarse clay, shows that the argillic horizon and the shape of the total clay curve in the loess is caused almost entirely by the movement of fine clay. The decrease of total and fine clay content in the gritty loess suggests little or no effect of post-loess illuviation in this part of the sequence.

The discontinuity in the three clay curves (Figure 11) associated with the Lg-Bb boundary and their shape within the Bb suggests that the Bb is a truncated argillic horizon. The stone line confirms truncation. The bulge in both the coarse clay and the fine clay (horizons 2Btb1 and 2Btb2) shows illuviation of both clay fractions. The 19 percent increase in clay content from the base of the Lg to the top of the paleosol suggests a permeability discontinuity that will restrict soil water movement at this point in the profile.

The absence of a coarse clay bulge in the loess part of this profile shows that coarse clay is slower to move. The coarse clay bulge in the Bb suggests that the paleosol was subjected to pedogenesis before truncation for a longer time than the interval since loess deposition. In this regard, the thin section study shows some illuviation of clay and silt from the loess into the upper part of the Bb. It is not known whether there was enough material moved to have a measurable effect on particle-size distribution in the upper part of the Bb.

Soil Development on the Ero i n Surface

In contrast to the red paleosol on the summits of the low hills, relatively little soil development is associated with the rest of the buried erosion surface. This suggests either nearly complete truncation of the former soil or a relatively short time between cutting of the erosion surface and the beginning of gritty loess deposition. Four pedons were sampled in the New Pennington Area C for characterization study. Descriptions and data are presented in Appendix B (S84IN-031-001, 002, 003, 004). Three of these, 001, 003, and 004, were located below the summit of the low hill, at sites NP21, NP9, and NP10, respectively (Figure 4). Only pedon 001 (Figure 5: NP21) showed a modest amount of development of the paleosol Bb. In this pedon (Appendix B: S84IN-031-001) distribution of total clay and fine clay indicates a Bt horizon in the silty loess at a depth of less than 132 cm and a truncated Btb horizon at a depth of 254 to 290 cm

(3Btb). A definite increase in kaolinite content in the clay mineralogy of the 3Btb suggests some soil weathering. Structure in the 3Btb is weak, which is in contrast to moderate structure in the Bt4 horizon in the silty loess. This suggests the presence of only the lower part of the paleosol B horizon. Clay-free sand and silt distributions clearly show a discontinuity at a depth of 254 cm, confirming a stratigraphic break and truncation of the paleosol at this point.

In pedons 003 and 004, the paleosol has either been truncated to a greater extent than in pedon 001 or it represents a much shorter time interval. Clay distributions show little or no increase in total or fine clay associated with the Bb. The increase in kaolinite content in the clay mineralogy is not as evident as in 001. The content of clay-free sand and silt suggests a discontinuity at the top of the Bb, but it is not as clear as in 001. The best evidence of pedogenesis is the presence of weak structure in the 3Btb horizon of pedons 003 and 004 compared to the massive character of the immediate underlying horizon.

The weathering of the feldspars in pedon 004 tends to support the idea of relatively little soil weathering or development in the paleosol as found below the summits of the low hills. Table 4 gives the results from an image analyser analysis of the weathering of feldspars in pedon 004. Compared to the red paleosol (table 3), sand-sized grains in the Bb horizon are relatively unaffected. This suggests that we are dealing with the roots of the paleosol and that most of the original solum has been removed. However, in pedon 004 feldspar weathering in the silty over gritty loess deposit is similar to that in the Bb horizon. The question is when or how were these grains weathered? Is their weathering related to present soil genesis in the loess and is the weathering in the Bb in pedon 004 a part of this?

Table 4.—*Analysis of the degree of weathering of sand-sized feldspar grains in the Bb horizon of the truncated paleosol in pedon S84IN-031-004 (Appendix B). Results are the mean of 5grains (X) and give the percent of grain area that appears isotropic. Kaolinite content is also shown.*

	Horizon	Depth	Weathered Feldspar		Kaolinite by DTA
		Cm	$\bar{X}$ %	SD %	%
Silty	E2	26-51	12	16.8	
	E3	51-64	12	6.7	1
	E4	64-82	20	2.6	
	E5	82-93	9	8.0	2
Gritty	2Bx1	93-127	16	17.7	3
	2Bx2	127-154	18	10.1	3
	2Bx3	154-184	15	17.7	
	2Bx4	184-216	10	6.3	6
Bb	3Btb1	216-249	14	8.1	14
	3Btb2	249-279	9	6.2	13

It was suggested in the preceding section that much of the kaolinite or halloysite or both in the red paleosol Bb (pedon S84IN-031-002) was from weathered feldspar. Note the large discontinuity in kaolinite content at the loess-Bb boundary in pedon 004 (table 4), with only a few percent in the silty over gritty loess compared to the 13 or 14 percent in the Bb. This suggests that the grains in the loess were already weathered when deposited and have not produced much kaolinite since that time. The kaolinite in the Bb would be the result of whatever weathering occurred in the lower part of the original solum prior to truncation.

Correlation and Age of the Erosion Surface

The recognition of an erosion surface that descends from the summits of the low hills and truncates the red paleosol and underlying stratigraphic units raises the question of stratigraphic correlation between these hills and the sequence of the St. Maurice upland, especially section MB3. Three tills and three paleosols are at this site. The problem is the relationship of this sequence to the sand and gravel and the single, thick, red, weathering sequence at New Pennington and Napoleon. The correlation of the erosion surface that forms the Mechanicsburg scarp with the one that descends the New Pennington and Napoleon low hills and forms the lower surface is easily done because both are immediately beneath the gritty member of the silty over gritty surficial sequence. This unit forms a continuous cover from the Wisconsin moraine south across the three study areas; Mechanicsburg Area B, New Pennington Area C, and Napoleon Area D.

A further problem is the time of cutting of this erosion surface. All or part of it may equate with the Iowan erosion surface episodes known in Iowa (Ruhe, 1969). These correlate by 14C dating with the previously noted (see discussion of Mechanicsburg Area B stratigraphy) time transgression from the Farmdale into the Tazewell, or as termed in Illinois, the Woodfordian. In Iowa, major cutting occurred from 22,000 to 18,000 years ago and younger. This time span in southeastern Indiana includes the time of maximum Wisconsin glaciation and also postdates it (Gooding, 1963, 1975). Thus the erosion surface may also cut across the Wisconsin drift.

The Iowan erosion surface in northeastern Iowa is marked in many places by a stone line, the famous "Iowan pebble band" (Kay, 1931; Ruhe, 1969). This feature is also found under the loess on the Tazewell till of northwestern Iowa. In this study, a stone line is present under the thin loess on the crest of the Wisconsin moraine (Figures 2 and 3: MB13) indicating that an erosion surface does cut across Wisconsin drift as suggested in the preceding paragraph. Core descriptions and particle size data show that the erosion surface is marked by a stone line at five other sites scattered throughout the general study area. Three of these sites are shown on the stratigraphic sections (Figure 3: MB12; Figure 5: NP16; and Figure 7: RN18). These sites are also shown on the area maps (Figures 2, 4, and 6). The stone line is shown to occur under the silty over gritty loess sequence on the St. Maurice upland, on or near the crest of the New Pennington low hill and on the low surface. The remaining two stone line sites are shown by open stars on Figure 6. The similarity of the southeastern Indiana erosion surface to the Iowan erosion surface is remarkable.

Origin of the "Gritty Loess" Substratum

Previous Studies

The problem of the nature and origin of the gritty loess has been studied previously, but usually as a by-product of other work in other parts of the state. For example, Steinhardt and Franzmeier (1979) studied the chemical and mineralogical properties of fragipans in the Clermont toposequence on the Illinoian till plain in southern Indiana. They noted three parent materials: I, an upper silty unit, which they called Peoria loess; II, an intermediate unit, lower in silt and higher in sand and clay; III, the underlying Sangamon paleosol in Illinoian till. They commented that the origin of these materials was not clear, but the II material may be pedisediment or a mix of loess and lower (paleosol) material. An earlier study by Harlan and Franzmeier (1977) dealt with loess stratigraphy and soil morphology in southwestern Indiana. While the relationship of sandy or gritty loess to the silty surficial loess was discussed, the main emphasis was on soil morphology and fragipan genesis in particular. Harlan and Franzmeier recognized the silty loess, sandy loess, paleosol sequence. They also pointed out that the paleosol could be developed in residuum from sedimentary rock, Illinoian glacial till, or outwash.

A more direct confrontation of the problem was reported by Olson and Ruhe (1979) in a southwestern Indiana study. They noted a lower sandy phase and an upper silty phase in the loess to the leeward (east) of the thick loess belt along the Wabash River. While total thickness of the two units decreased systematically with distance from the river, they showed that the thickness of the sandy phase was not related to total loess thickness and did not conform to the thinning pattern of their dispersion model. They found that the sand content of the lower part of the sand phase related directly to the sand content of the substratum, usually the Sangamon paleosol, except where the paleosol formed in an underlying loess such as the Loveland of Illinoian age. In this latter case, the sandier phase was often not detected. The sand content also decreased systematically with distance above the paleosol. This was interpreted as showing local mixing of substratum sand into the earlier eolian silt increments. Later silt increments ultimately capped the lower sandy zone. The authors consider the sandy phase to be a lower textural zone of the Peoria loess.

More recently Ransom and others, (1987) studied the surficial stratigraphy and genesis of Clermont and Avonburg soils on the Illinoian till plain of southwestern Ohio. They reported the same general three-tiered sequence of materials as the other cited investigators. They concluded that these soils were formed in a surficial deposit of Late Wisconsinan (Peorian) loess over an intermediate material composed of Early Wisconsinan loess and Illinoian till, mixed by bioturbation. The underlying material is a paleosol developed in Illinoian till.

Most of these studies have been concerned with the genesis of the soils and certain specific aspects of their morphology, such as the fragipan. The Olson and Ruhe (1979) study was concerned with factors that tend to complicate the loess dispersion pattern in southwestern Indiana. One factor is the effect of two major sources, the Ohio River and the Wabash River valleys. The second is the presence of the sandy phase or gritty loess. Their study was the most direct and definitive with regard to the probable origin of the gritty loess.

The Erosion Surface as a Sand Source

The sandy nature of the "gritty loess" is illustrated by the sand and silt distributions for four core sites plotted in Figure 9 and by the sand and silt plot shown for pedon S84IN-031-002 in Figure 10. Note the low sand and high silt content of the "silty loess" (Ls) and the large increase in sand content of the "gritty loess" (Lg) in Figure 9. The clay-free basis removes the confounding effects of pedogenesis. Note also the decrease in sand and the increase in silt content from the paleosol (Bb) up through the gritty loess (Lg) in Figure 10. These are typical of what occurs throughout the three study areas on the main divide. See also the particle-size data for the other 3 characterization sites in Appendix B.

Recognition of the erosion surface phenomenon yields a mechanism for understanding the origin of this gritty loess. The cutting of the erosion surface makes sand readily available for transport and deposition on the surface in the zone of the gritty loess. If this southeastern Indiana surface is equivalent to the Iowan erosion surface that was cut during the deposition of the Peorian loess (Ruhe, 1983), then silts from loess deposition could mix concurrently with sandy erosional debris and form the "gritty loess." Olson and Ruhe (1979), quoting several references, mention a number of ways in which such mixing might occur, for example, frost congeliturbation, bioturbation, winnowing by wind, and other surface and near surface processes. Mixing of sand derived from underlying material into the earlier increments of the loess has also been suggested as a probable mechanism by other authors (Steinhardt and Franzmeier, 1979; Ransom and others, 1987; Miller and others, 1988).

In their study of loess in southwestern Indiana, Olson and Ruhe (1979) note a lower sandy phase of the Peoria loess and an upper silty phase. They show, by correlation analysis, that the amount of sand in the lower part of the sandy phase relates directly to the amount of sand in the uppermost part of the substratum (Sangamon soil) on which the loess was deposited. In addition, they show that sand content in the sandy phase systematically decreases with increasing height above the paleosol. They conclude that this clearly indicates a local mixing of sand from the underlying palesol into the earlier eolian silt increments as they were being deposited. Younger silt increments ultimately capped the lower sandy zone.

Bb Horizon Sand Content vs Gritty Loess (Lg) Sand Content

Following the approach of Olson and Ruhe (1979) a similar linear correlation analysis was made to relate the sand content of the paleosol (Bb horizon) as found immediately beneath the erosion surface to the sand content of the lowest increment of the gritty loess (Lg). Data from core sites in the three study areas in this investigation were used. Figures 12, 13, and 14 show the results for Mechanicsburg Area B, New Pennington Area C, and Napoleon Area D, respectively.

For the Mechanicsburg area (Figure 12), correlation at the 95 percent level is indicated when all 10 sites are used. Thus, the amount of sand in the lower gritty loess is influenced by the amount of sand in the paleosol Bb horizon. However, note that one site, MB2, plots well away from the others. With the removal of this site from the analysis, correlation improves significantly to the 99 percent level.

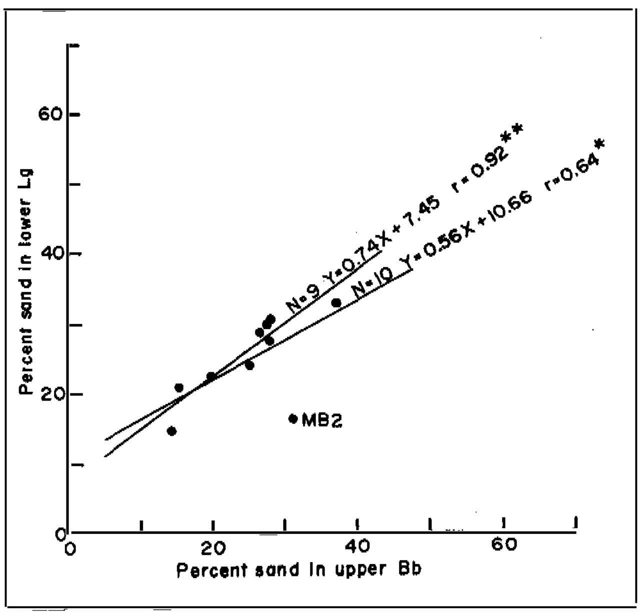

Figure 12.—*Mechanicsburg Area B, linear correlation between the sand content of the upper part of the paleosol (Bb) and the sand content of the first increment of gritty loess (Lg) at 10 sites. For 9 sites correlation improves with removal of MB2. * = 95 percent significance, ** = 99 percent significance.*

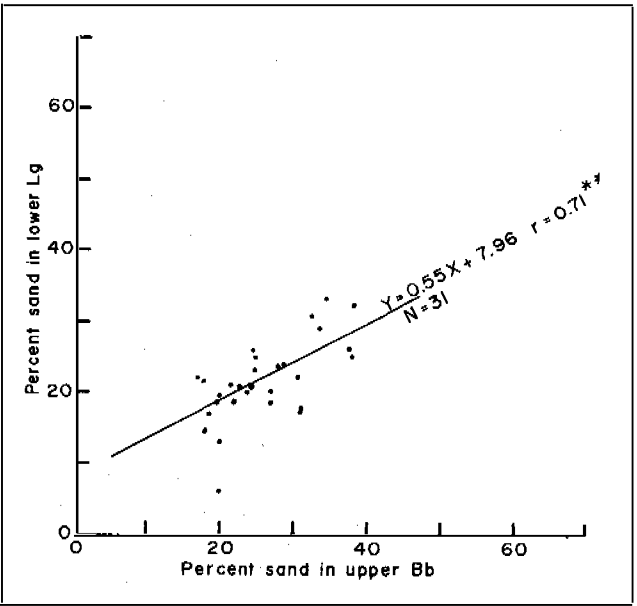

Figure 13.—*New Pennington Area C, linear correlation between the sand content of the upper part of the paleosol (Bb) and the sand content of the first increment of gritty loess (Lg) at 31 sites. ** = 99 percent significance.*

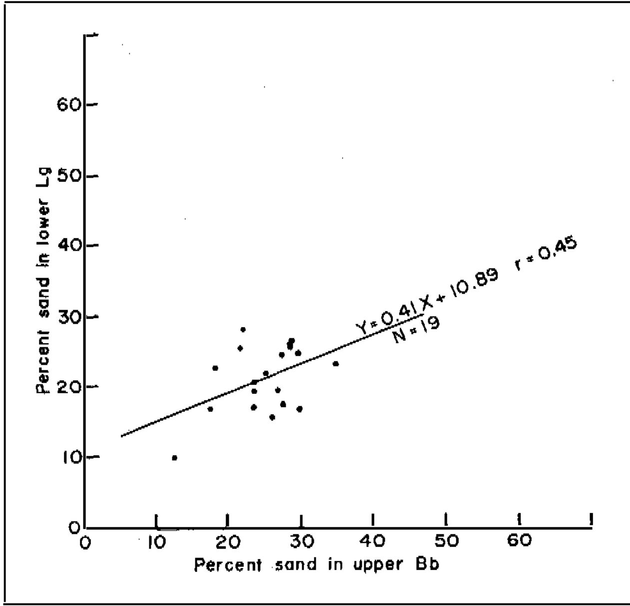

Figure 14.—*Napoleon Area D, linear correlation between the sand content of the upper part of the paleosol (Bb) and the sand content of the first increment of gritty loess (Lg) at 19 sites. Significance is at the 90 to 95 percent level.*

Twenty seven core sites and four soil characterization sampling sites were used in the New Pennington area correlation (Figure 13). The correlation coefficient is significant at the 99 percent level. This indicates that the amount of sand in the first increment of gritty loess is related to the amount of sand in the Bb horizon.

Nineteen core sites were used in the regression for the Napoleon Area D (Figure 14). The results suggest that in this area content of sand in the Bb horizon exerts less control over the gritty loess than in the other two areas. The correlation coefficient r is only 0.45 with significance at the 90 to 95 percent level, close to 95 percent. This shows that the influence of the Bb substratum is relatively low.

In summary, the results from these three areas do show that the amount of sand in the first gritty loess increment is related to the amount of sand in the paleosol Bb horizon. This tends to verify local mixing, by various processes, as the mechanism producing the gritty loess unit.

Bb - Lg Linear Correlations Using Geometric Mean Sand Size

Sand size has long been used for making comparisons and evaluating similarities and differences between and among sedimentary units. If the gritty loess zone results from the mixing in of material derived locally from the material immediately below the erosion surface, then there should be some relationship between size of the underlying sand and the size of the sand in the gritty zone, especially in the lower increments. The size of the sand in the lower increments of gritty loess at a site should be controlled by the size of sand on the erosion surface at that site. As the size of the sand becomes larger or smaller from site to site, the size of the sand in the gritty loess should behave similarly. This lends itself to linear correlation analysis using mean sand size, with the paleosol Bb sand size as the independent variable (X) and a gritty loess increment sand size as the dependent variable (Y).

Geometric mean sand size was used. It lies to the right of the arithmetic mean in the cluster of grains near the higher part of the frequency curve. It is thus associated with the most abundant grains in an asymmetrical distribution (Krumbein and Pettijohn, 1938). It is easily calculated by the Krumbein and Pettijohn method.

Figure 15 summarizes and compares the correlation of six increments of gritty loess with the Bb horizon beneath the erosion surface in terms of geometric mean sand size for the New Pennington Area C. Note the relatively wide range of sand size in the Bb (0.212 to 0.402 mm = 0.190 mm). The size relationship between the first increment and the Bb is significant at the 99 percent level. The r^2 value indicates that in the first increment of Lg the substratum explains 64 percent of the size variation from site to site. This confirms the idea that the sand component of the gritty loess is derived from the paleosol Bb horizon immediately beneath the erosion surface.

The correlation coefficient r tends to decrease upward through the added increments, and r^2 behaves similarly, dropping to negligible values in the 5th and 6th increments. This is interpreted as showing the declining influence of the paleosol Bb on the Lg sand as the loess accumulated. The Lg sand of the 5th and 6th increments was probably

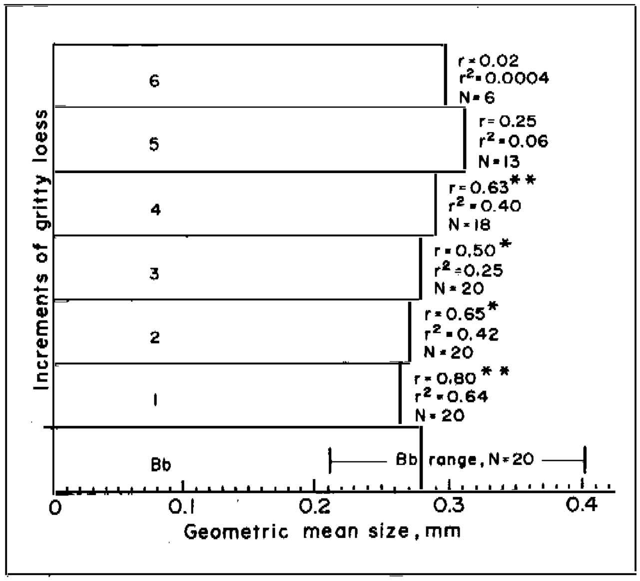

Figure 15.—*New Pennington Area C, summary of linear correlations between the of Bb horizon geometric mean sand size and the geometric mean sand size of gritty loess (Lg) increments overlying the Bb. Average increment thickness is 9 inches (23 cm). The mean size, correlation coefficient r, r^2, and the number of data pairs (N) are shown for each increment. The range of geometric mean sand size, the mean, and the number of sites are shown for the Bb horizon. * = 95 percent significance, ** = 99 percent significance.*

from some source other than the Bb in the immediate vicinity of a site.

Figure 16 summarizes and compares the correlation for the Napoleon Area D. The results are generally similar to those for the New Pennington Area even though the relationship is not as clear. The influence of the Bb substratum is significant in the first increments and decreases in the upper ones. The size range of sand available in the Bb (0.180 to 0.293 mm) is less than that of the New Pennington area, being 0.113 mm compared to 0.190 mm.

Figure 17 summarizes and compares the

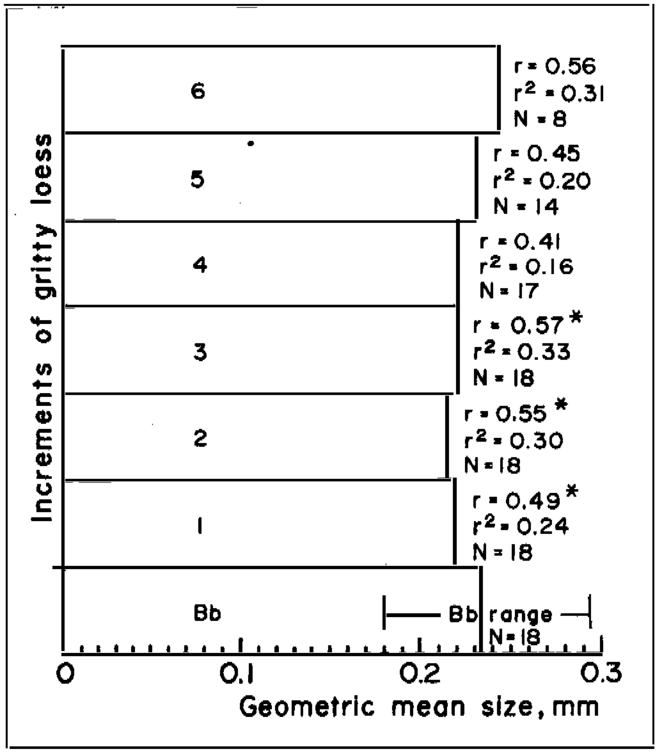

Figure 16.—*Napoleon Area D, summary of linear correlations between the Bb horizon geometric mean sand size and the geometric mean sand size of gritty loess (Lg) increments overlying the Bb. Average increment thickness is 8 inches (20 cm). The mean size, correlation coefficient r, r², and the number of sites (N) are shown for each increment. The range of geometric mean sand size, the mean, and the number of sites are shown for the Bb. * = 95 percent significance.*

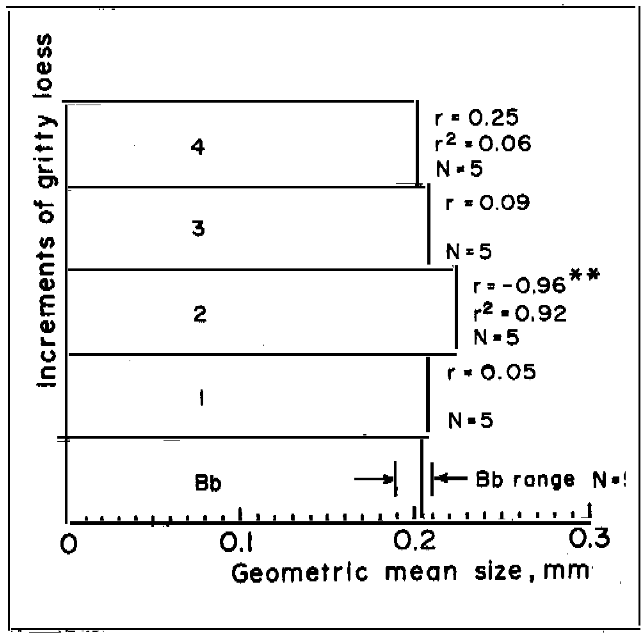

Figure 17.—*Mechanicsburg Area B, summary of linear correlations between the Bb horizon geometric mean sand size and the geometric mean sand size of gritty loess (Lg) increments overlying the Bb. Average increment thickness is 10 inches (26 cm). The mean size, correlation coefficient r, r², and the number of sites (N) are shown. The range of geometric mean sand size, the mean, and the number of sites are shown for the Bb. ** = 99 percent significance.*

correlations for the Mechanicsburg Area B. The results are quite different from those of the other two areas. In general, there is no relationship between the Bb and the overlying increments of gritty loess. There appears to be two reasons for this: the small number of sites available to use in the regression; and the very narrow range of sizes in the Bb (0.189 to 0.211 mm). The range is only 0.022 mm compared to 0.113 for the Napoleon area and 0.190 for the New Pennington area. For a linear correlation to work, the independent variable needs to vary over a significant range. When the values for the Bb size and the corresponding first increment size for the five sites are plotted, they fall in a tight, little, essentially circular area as shown in Figure 18. No tendency for linearity is indicated primarily because of the nearly constant Bb horizon sand size from site to site. However, a significant but negative correlation is shown for the second increment (Figure 17). All other correlations in all the sample areas are positive. In addition, when values for the second increment are plotted similar to Figure 18, four of the points fall on essentially one point. The fifth falls only a short distance away, above and to the left, causing the apparent negative correlation. The tight clustering of the four points suggests a spurious correlation. The

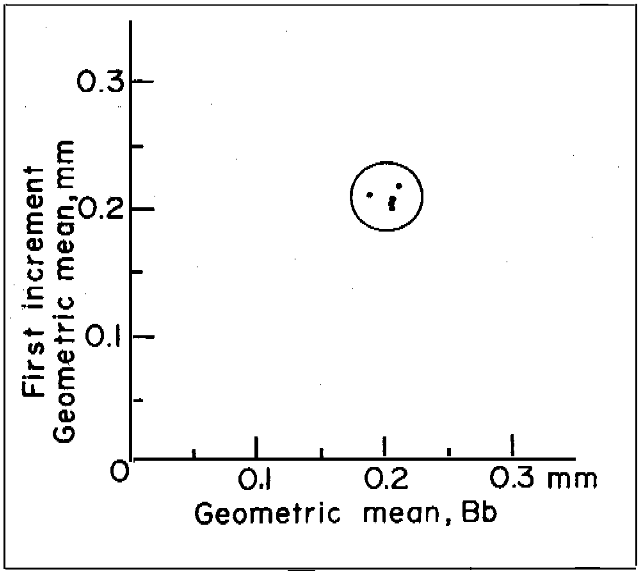

Figure 18.—*Mechanicsburg Area B, plot of the geometric mean sand size for the Bb and the corresponding first Lg increment for the five available sites.*

clustering is characteristic of data plots for all four increments.

Rather than concluding that no relationship exits between Bb sand and sand in the overlying increments, another interpretation is suggested. The clustering can be interpreted as showing a close relationship between gritty loess sand sizes and Bb sand sizes. The gritty loess sizes and the Bb sizes are nearly the same over the very small Bb range, suggesting the Lg sand could have come from the Bb, especially the first increment. If the plots showed widely scattered points without linearity, this would indicate sand sizes quite different from the Bb and thus from another source.

In summary, for the three study areas, geometric mean sand size in the Bb horizon appears to control the geometric mean sand size of the first gritty loess increment. This is further verification of the idea that local mixing of Bb material into the early loess increments is the mechanism producing the gritty loess unit. The influence of the Bb horizon decreases upward in the gritty loess to the point where there is no significant relationship in the upper increments.

This study shows that both the amount of sand in the lower gritty loess increment and the size of the sand are directly related to the amount and size of sand in the Bb horizon immediately beneath the erosion surface.

Loess Distribution on the L al Landscape

Fine Silt to Coarse silt Ratios

The particle-size data available for 47 cores includes two silt fractions, fine, 2-16 μm, and coarse, 16-62 μm. Silt fractions have been used by Rutledge and others, (1975, 1985) to determine changes of source area in studies of multiple loess deposits. Plotting the depth distribution of the two silt fractions shows which is dominant. A change, such as a shift from fine silt dominance to coarse silt dominance, was considered indicative of a different source by these authors. It may also suggest some local alteration of the depositional environment.

Ratios of the two silt fractions, calculated for each horizon sampled down through the silt deposit, can be used in place of the graphical presentation. When the ratio of fine silt to coarse silt (F/C) is greater than 1, fine silt is dominant. A ratio of 1 shows equal quantities, and a ratio of less than 1 indicates dominance of coarse silt. The ratio is thus also indicative of the relative particle size of the silt; i.e., finer or coarser. For this study, the F/C ratio was calculated using the available percentages of fine and coarse silt from the standard sand-silt-clay analyses of the less than 2 millimeter material. At several sites, comparisons down through the loess sequence showed negligible differences between this basis and the clay-free or

Table 5.—*Summary of fine silt to coarse silt ratios (F/C) for all horizons of the silty over gritty loess in cores subdivided by study area and geomorphic unit. Fine silt is 2-16 μm, coarse silt is 16-62 μm.*

Study Area North—>South	Mechanicsburg (fig. 8)			New Pennington		Napoleon		
Geomorphic Unit	St. Maurice Upland	Mechanicsburg Scarp	Lower Surface	West-East Interfluve (fig. 5)	Main Divide (fig. 4)	North Interfluve (fig. 6)	Main Divide (fig. 6)	NE-SW Interfluve (figs. 6 & 7)
Mean F/C for sites in a geomorphic unit	1.05	1.04	1.10	1.23	1.24	1.41	1.35	1.26
Number of sites	3	3	3	14	12	5	11	4
Mean standard deviation of F/C for sites in a geomorphic unit	0.15	0.12	0.22	0.11	0.15	0.14	0.13	0.12

the sand and clay-free (silt only) basis.

The F/C ratios are summarized in table 5. They are subdivided by study area from north to south along the main divide and by geomorphic units within a study area.

In the Mechanicsburg area, mean ratios for the St. Maurice upland and the Mechanicsburg scarp are 1.05 and 1.04, respectively. This indicates nearly equal fine and coarse silt for these units. Figure 19A is a depth distribution plot of fine silt, coarse silt, and sand for core MB10 in the St. Maurice upland. The alternating dominance of fine and coarse silt, with four crossover points, shows sorting differences in the silt found throughout the loess deposit. This alternation occurs in all but one site in the Mechanicsburg area. Three to five "beds" are present. The F/C ratio increases to 1.10 on the lower surface south of the scarp, (table 5) indicating an increase in fine silt.

The New Pennington and Napoleon areas are farther south along the main divide and have geomorphic unit mean F/C ratios ranging from 1.23 to 1.41 (table 5). This indicates a predominance of fine silt and a generally finer silt particle size. The alternating predominance of fine and coarse silt noted in the Mechanicsburg area is a minor occurrence here. Figure 19B shows a fine silt, coarse silt, and sand depth distribution plot for core RN3. This is typical of the New Pennington and Napoleon areas. The irregularities suggest some variations in the sorting. In this regard, the mean standard deviations (table 5) for the individual geomorphic units are similar. This suggests similar variations in sorting in all units.

In summary, the silts in the Mechanicsburg area are coarsest, as shown by the lower F/C ratios on the St. Maurice upland and the Mechanicsburg scarp of 1.05 and 1.04, respectively. A transition to finer silt, F/C ratio of 1.10, begins on the lower surface adjacent to the scarp toe. Ratios ranging from 1.23 to 1.41 show even finer silts farther south on the lower plain in the New Pennington and Napoleon areas.

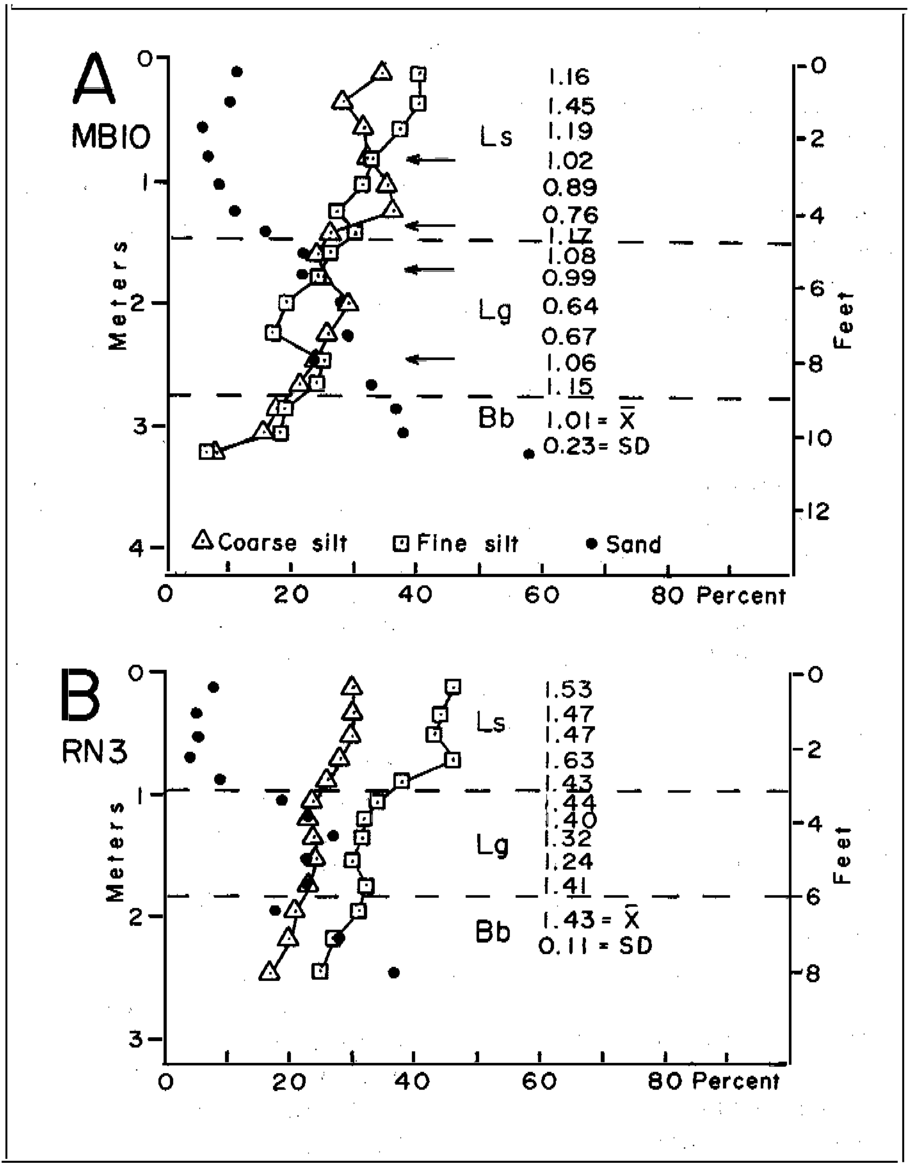

Figure 19.—*Content of fine silt, coarse silt, and sand in the silty (Ls) over gritty (Lg) loess and the truncated paleosol Bb in two cores. The numbers in vertical column are the fine silt/coarse silt ratio for each layer in the loess with their mean (X) and standard deviation (SD) listed beneath. (A) MB10 represents the St. Maurice upland, Mechanicsburg Area. (B) RN3 represents the north interfluve, Napoleon Area. Horizontal arrows show the crossover points.*

Lo ss Thickness Related to Elevation

The existence of a significant amount of loess thickness data from systematic transects across local landscape units prompted the examination of thickness-elevation relations in a manner similar to that described by Ruhe and Cady (1967) for work in southwestern Iowa. Linear correlations were run on elevation and loess thickness, based on the three study areas and on individual landscape units within study areas. The erosion surface elevation was taken as the initial surface of deposition and as the independent variable X. The silty over gritty loess thickness was the dependent variable Y.

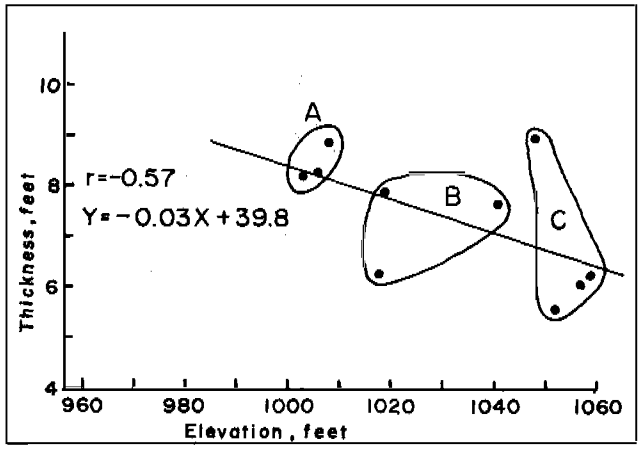

Figure20.—*Mechanicsburg Area B, linear correlation between the erosion surface elevation (X) and the loess (silty over gritty) thickness (Y). All sites with data are used except MB13 on the Wisconsin moraine. The three geomorphic units are: (A) the lower surface; (B) Mechanicsburg scarp; and (C) the St. Maurice upland. Significance of r is at the 90-95 percent level.*

The three geomorphic units of the Mechanicsburg area (Figures 1, 3, and 8; table 5) were combined because of the small number of sites in each unit. The Wisconsin moraine site was not used because only part of the Peoria loess accumulation is present. The correlation coefficient r was -0.57, significant at the 90-95 percent level (Figure 20). This suggests thicker loess on the lower elevations of the erosion surface.

The New Pennington area is next south on the main divide. When all sites are considered together, r = -0.43* (Figure 21, A). The negative correlation suggests that the thickest loess may occur on the lower elevations. The sites were divided into two units as shown in table 5. One was the west to east sequence of cores that crosses the main divide on the crests of flanking interfluves as shown in Figures 4 and 5. The correlation coefficient for this unit is r = -0.57* (Figure 21, B). The negative correlation again suggests that the thickest loess occurs on the lower elevations of the erosion surface. The second unit was the sequence of 12 sites aligned north and south along the main divide (Figure 4). A correlation coefficient of 0.10 (not illustrated) indicates no relationship between thickness and erosion surface elevation along this part of the divide. The significant "all sites" correlation (Figure 21, A) appears to be because of the influence of the west to east transect.

Two correlations (not illustrated) were run on the west to east transect to examine the relationship between erosion surface elevation and thickness of gritty loess and erosion surface elevation and thickness of silty loess. For the gritty loess r = -0.20, and for the silty loess r = -0.18. This indicates no significant relationship. The total thickness of silty plus gritty loess is required for significance, at least on this transect.

The Napoleon area is farthest south on the main divide (Figure 1). When all sites are used,

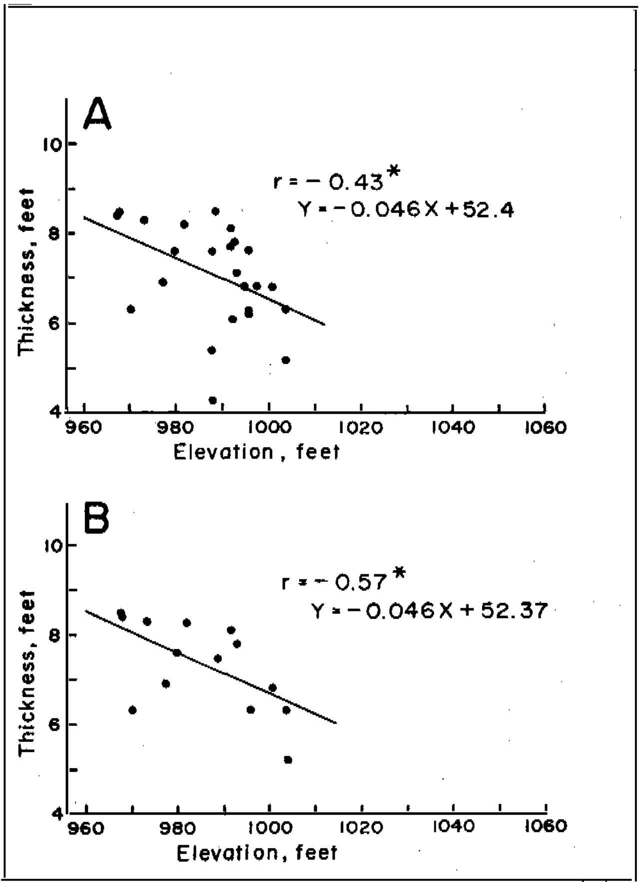

Figure 21.—*New Pennington Area C, linear correlations between erosion surface elevation (X) and loess (silty over gritty) thickness (Y). (A) Correlation using all sites. (B) Correlation for a west to east transect on minor interfluves that cross the main divide. * = 95 percent significance.*

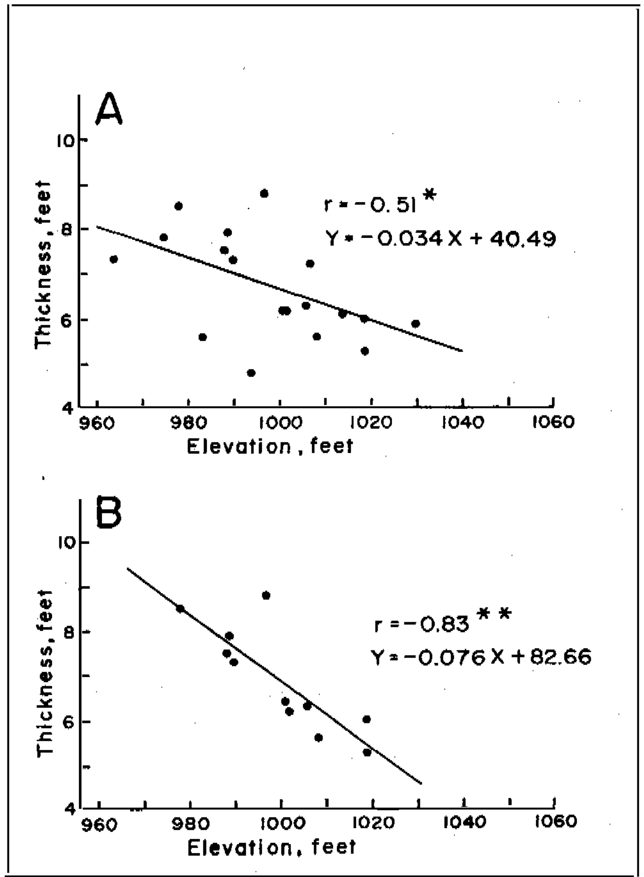

Figure 22.—*Napoleon Area D, linear correlations between erosion surface elevation (X) and loess (silty over gritty) thickness (Y). (A) Correlation using all sites. (B) Correlation using sites along the main divide. * = 95 percent significance. ** = 99 percent significance.*

r = -0.51* (Figure 22, A). This shows the accumulation of silty over gritty loess to be thickest on the lower elevations of the erosion surface.

Division into geomorphic units produced the following results. The north trending interfluve (Figure 6: 5 sites) shows no significant relation, r = 0.37. There is no significant relation for the Northeast-Southwest oriented interfluve (4 sites) shown in stratigraphic section in Figure 7, r = -0.32. As these units each have a small number of sites, they were combined and the resulting r = -0.40 is only suggestive of thicker loess on the lower elevations.

The third geomorphic unit in the Napoleon area consists of the 11 sites along the main divide (Figure 6). A highly significant relationship, r = -0.83** (Figure 22, B), shows loess thickness to be greatest at the lower elevations of the erosion surface. This unit is apparently the cause of the significant relationship in the "all sites" correlation (Figure 22, A).

Two correlations (not illustrated) were run on this main-divide third unit to examine the relationship between erosion surface elevation and the thickness of gritty loess and the erosion surface elevation and the thickness of silty loess. The gritty loess tends to be thickest on the lower elevations, $r = -0.53$, significant at the 90 to 95 percent level. Silty loess is also thicker on the lower elevations, $r = -0.69^{*}$, significant at the 95 percent level. The highly significant correlation of gritty plus silty loess with elevation, $r = -0.83^{**}$ (Figure 22, B) is because of the additive effect of gritty and silty on this part of the divide.

Ruhe and Cady (1967) in a study of Wisconsin loess in southwestern Iowa commented that factors other than distance from the source exert some control on the thickness distribution of loess. They showed that on a local basis, elevation of the surface of deposition was a significant factor. Thicker loess was shown to be on the higher elevations of divide units, and thinning occurred on the flanks at lower elevations. The results of this present southeastern Indiana study, while limited in extent, confirm that such local factors as elevation exert some control on the thickness distribution of loess. In general, the silty over gritty loess is thinner at higher elevations of the surface of deposition and thicker at lower elevations. This relationship is apparently not because of the individual thickness of the gritty loess or the silty loess. The total thickness of the two as a unit is the significant item.

Some questions need to be resolved before this relationship can be fully evaluated. One is that the source of the loess is not really known. Thus, it is difficult to know in which direction the loess should be thinning. A second question or complication is that the orientation of the main divide to the loess source direction is not known. A third factor might be local landscape aerodynamics; i.e., the effect of local landform shape on airflow patterns, wind velocity, and distribution of areas of laminar flow and turbulence.

Elevation and Silt Size as Indicated by the Fine Silt to Coarse Silt Ratio

The relationship between elevation of the surface of deposition (the erosion surface) as the independent variable (X) and silt particle size, represented by the mean F/C ratio, for a core site was examined using linear correlation. The mean F/C ratio is illustrated for two sites in Figure 19.

No relationship between elevation and site mean F/C in the Mechanicsburg area was evident. The combined 10 sites were used, $r = -0.10$. A significant relationship exists in the New Pennington area, $r = 0.49^{*}$ (Figure 23, A), indicating finer silt on the higher elevations. An analysis of the west to east transect was made because of the significant elevation-loess thickness relation already discussed (Figure 21, B). An r of 0.72^{**} (Figure 23, B) shows F/C to be larger; thus the silt is finer on the higher parts of the transect where the loess is thinner.

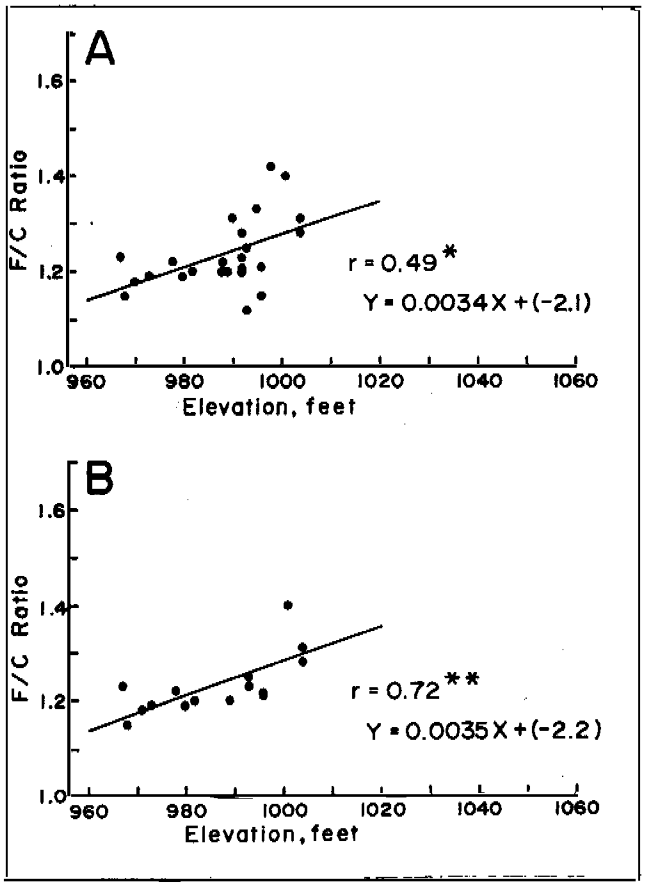

Figure 23.—*New Pennington Area C, linear correlation between the erosion surface elevation (X) and the site mean fine silt/coarse silt (F/C) ratio (Y). (A) Correlation using all core sites, (B) Correlation using the west to east transect across the main divide. * = 95 percent significance. ** = 99 percent significance.*

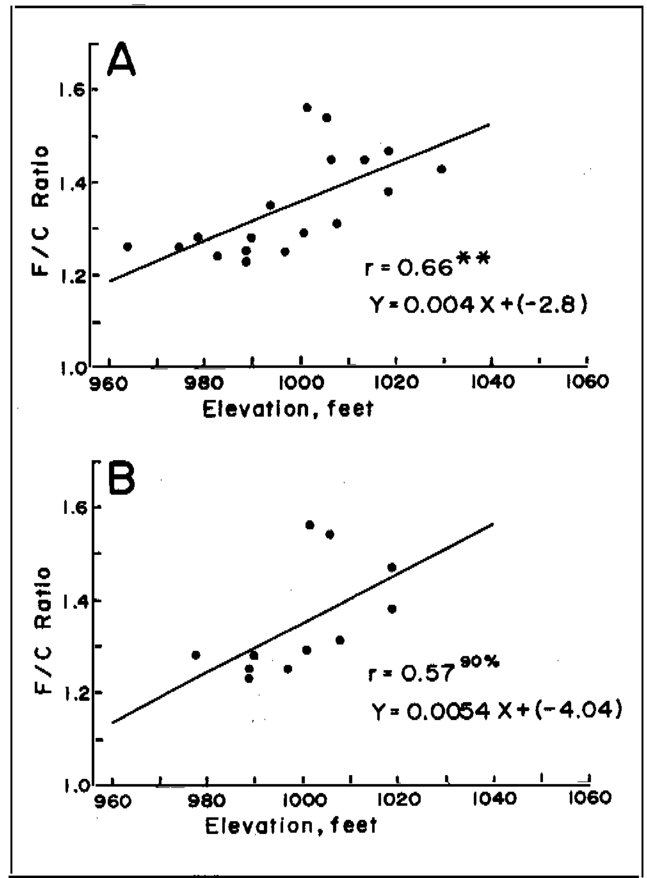

Figure 24.—*Napoleon Area D, linear correlation of erosion surface elevation (X) versus the site mean fine silt/coarse silt (F/C) ratio (Y). (A) Correlation using all sites. (B) Correlation for the sites on the main divide axis. ** = 99 percent significance.*

The Napoleon area results are similar. For the "all sites" correlation r = 0.66** and for the main divide axis r = is 0.57, significant at the 90 percent level (Figure 24, A and B). Both indicate finer silt occurs at higher elevations where the loess tends to be thinner.

With regard to the Mechanicsburg area, evidence suggests that proximity to the Wisconsin moraine front and the Mechanicsburg scarp has perturbed loess deposition. In contrast to the New Pennington and Napoleon areas, loess in the Mechanicsburg area is coarse, bedding is more apparent with alternating coarse and fine dominance, and finer material is not present at higher elevations of the erosion surface.

B dr ck Configuration and Till in the Valleys

Figures 5 and 7 are cross sections along minor interfluves normal to the main divide. Both sections, especially that in Figure 5, show that the center of the divide under the low hill is also a bedrock high. Bedrock along the axis of the main divide and off the low hill at New Pennington (Figure 3: NP12 and NP15) is at an elevation of 986 feet (300.6 m) and 985 feet (300.3 m) respectively. Bedrock elevation in the valley to the west of the New Pennington hill is 961 feet (293 m) and to the east is 955 feet (291.1 m) (Figure 5: NP23 and NP24). Bedrock along the axis of the main divide off the low hill is some 25 to 30 feet (7.6-9.1 m) higher than that in the adjacent flanking parts of the lower surface. This suggests that the bedrock surface represents a preglacial terrain only slightly modified by glacial deposition. The general configuration of the present drainage system thus may have been largely inherited from the preglacial system.

The two cross sections (Figures 5 and 7) also show that the steeper slopes that grade to the present drainages truncate the till unit and the underlying bedrock. Thus the till and bedrock will outcrop on these valley slopes. Figure 5 also shows that the till unit resting on bedrock under the New Pennington low hill, albeit leached, is truncated to bedrock both to the east (NP27) and to the west (NP20) of the hill. Thus, it is not possible to trace a single till across the major divide. The relationship of the till at NP23 and NP21 to that at NP18, NP1 and NP14 and at NP25 and NP24 is uncertain. The fact that in all cases the till rests on bedrock does suggest that it may be the same till.

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App ndix A

Appendix A: *Selected field descriptions of cores and accompanying particle-size analyses, from Indiana University.*

MB3: Mechanicsburg, Decatur County, Indiana

MB10: Mechanicsburg, Decatur County, Indiana

MB13: Mechanicsburg, Decatur County, Indiana

NP1: New Pennington, Decatur County, Indiana

NP16: New Pennington, Decatur County, Indiana

RN3: Napoleon, Ripley County, Indiana

Notes:
Ls .... silty loess
Lg .... gritty loess
SG .... sand and gravel
T .... till
Gr .... gravel
Sd .... other sediment
Rw .... weathered bedrock
OC .... organic carbon zone
dl .... deoxidized and leached
ol .... oxidized and leached
ou .... oxidized and unleached
uu .... unoxidized and unleached
P .... paleosol

MB3: Mechanicsburg, Decatur County, Indiana

Sample	Depth in	Depth ft	Depth cm	Horizon	Description
MB3-1	0-5	0-0.4	0-13	Ap	10YR 4/2 sil, mfgr, fri, abrupt, silty loess.
2	-9	-0.75	-23		Same.
3	-14	-1.2	-36	EB	10YR 6/4 sil, wfsab, fri.
4	-21	-1.75	-53	Bt	10YR 7/4, mfsab, sl fir, wcs.
5	-27	-2.25	-69	E'	10YR 7/2 sil, vwfsab, fri, porous, bleached.
6	-35	-2.9	-89	BX	10YR 7/2 w/6/3 mots, sil, sfsab-wmpr, fir, mcs.
7	-43	-3.6	-109		10YR 7/2 w/6/3 mots sicl, sfsab-wmpr, v fir, scs.
8	-52	-4.3	-132	BC	10YR 6/1 w/5/8 mots, mfsab, sl fir, vwcs.
9	-63	-5.25	-160	2C	10YR 6/1 and 5/8, wfsab, laminated, fri, gritty loess.
10	-73	-6.1	-185		Same.
11	-81	-6.75	-206	Bb	7.5YR 5/6 cl, w/10YR 7/1 mots, smsab, fir, mcs (buried soil no. 1)
12	-91	-7.6	-231		Same.
13	-98	-8.2	-249		Same, but weaker structure, clay skins.
14	-110	-9.2	-279	Cg	10YR 7/1 loam, w/5/6 mots and Mn stn, mass, fir .
15	-122	-10.2	-310	Tol	10YR 5/8-6/8 loam, mass, fir, oxidized and leached till (till no. 1)
16	-135	-11.25	-343		Same.
17	-158	-13.2	-401		Same.
18	-199	-16.6	-505	Tou	Same, but calcareous.
19	-250	-20.8	-635	Tuu	10YR 5/1 loam, mass, fir, calcareous, unoxidized and unleached till.
20	-263	-21.9	-668		Same.
21	-275	-22.9	-669		Same.
22	-289	-24.1	-734	Silt	10YR 6/1 sil w/interbedded organic laminae, organic noncalcareous, sil calcareous.
23a	-305	-25.4	-775	OC	10YR 2/1 organic sil, mass, noncalcareous (buried soil no. 2).
23b	-318	-26.5	-808		Same.
24	-323	-26.9	-820		10YR 2/1 and 6/1 interbedded organic and gray silt, noncalcareous.
25	-335	-27.9	-851	Cb	10YR 6/1 sil, mass, calcareous silt.

MB3: (Con.)

Sample	Depth in	Depth ft	Depth cm	Horizon	Description
MB3-26	0-346	0-28.8	0-879		Same.
27	-355	-29.6	-902	OC	10YR 2/1 organic silt, mass, noncalcareous.
28	-364	-30.3	-925		10YR 2/1 and 6/1 interbedded organic and gray silt, noncalcareous.
29	-372	-31.0	-945		Same.
30	-380	-31.7	-965	Cb	10YR 6/1 sil, mass, calcareous silt (22 through 30, double much bog).
31	-410	-34.2	-1041	SG	10YR 6/1 sand and gravel, calcareous.
32	-426	-35.5	-1082		
33	-435	-36.25	-1105	Tuu	10YR 6/1 sl, mass, ocalc, unoxid and unlchd til.
34	-485	-40.4	-1232	SG	10YR 5/1 sand and gravel, calc.
35	-512	-42.7	-1300	Tuu	10YR 5/1 loam, mass, calc, till.
36	-530	-44.2	-1346		Same.
37	-537	-44.75	-1364		10YR 4/1 cl, non calc inclusion.
38	-551	-45.9	-1400	Tuu	10YR 5/1 loam till, calc.
39	-569	-47.4	-1445		Same.
40	-587	-48.9	-1491		Same.
41	-606	-50.5	-1539		Same.
42	-624	-52.0	-1585		Same.
43	-636	-53.0	-1615		Same
44	-651	-54.25	-1654		Interbedded black organics in gray calc silt, transition to
45	-666	-55.5	-1692	OC	Black organic silt, non calc, (buried soil no. 3)
46	-682	-56.8	-1732		Same.
47	-696	-58.0	-1768	Bb	10YR 5/1 cl, mfsab, fir, wcs, non calc.
48	-711	-59.25	-1806		Same.
49	-738	-61.5	-1875		Same.
50	-755	-62.9	-1918	Cb	10YR 5/1 loam, mass, fir, pbly, calc, unoxid and unlchd till (till no. 3).

Field notes say "augered bedrock at 66.5 ft" = 798 in = 2027 cm

MB3: Mechanicsburg, Decatur County, Indiana

Sample	Depth in	Depth ft	Depth cm	Particle Size <2µm %	2-16µm %	16-62µm %	>62µm %
MB3-1	0-5	0-0.4	0-13	15.6	30.5	34.8	19.5
2	-9	-0.75	-23	16.7	35.2	34.8	13.3
3	-14	-1.2	-36	17.9	35.7	34.7	11.7
4	-21	-1.75	-53	24.2	35.0	32.0	8.8
5	-27	-2.25	-69	17.6	36.4	34.8	11.2
6	-35	-2.9	-89	24.0	33.3	32.4	10.4
7	-43	-3.6	-109	29.1	32.1	29.2	9.6
8	-52	-4.3	-132	25.6	30.0	30.2	14.2
9	-63	-5.25	-160	23.0	25.1	27.9	24.0
10	-73	-6.1	-185	25.5	25.3	25.2	24.0
11	-81	-6.75	-206	27.9	22.3	24.6	25.1
12	-91	-7.6	-231	24.9	22.6	25.5	27.1
13	-98	-8.2	-249	27.6	22.7	22.8	26.9
14	-110	-9.2	-279	23.8	21.4	24.1	30.7
15	-122	-10.2	-310	26.1	20.1	21.6	32.2
16	-135	-11.25	-343	24.5	19.6	22.7	33.1
17	-158	-13.2	-401	23.5	19.2	22.6	34.7
18	-199	-16.6	-505	18.8	20.0	24.3	36.9
19	-250	-20.8	-635	17.6	20.4	25.4	36.6
20	-263	-21.9	-668	17.4	20.7	23.6	38.3
21	-275	-22.9	-669	18.1	21.9	24.1	35.9
22	-289	-24.1	-734	12.9	42.8	26.6	17.7
23a	-305	-25.4	-775	16.2	39.4	35.2	9.3
23b	318	-26.5	-808	11.7	43.5	42.2	1.6
24	-323	-26.9	-820	16.6	51.3	31.5	1.0
25	-335	-27.9	-851	11.8	42.2	36.4	9.6
26	-346	-28.8	-879	21.1	48.9	18.5	11.6
27	-355	-29.6	-902	18.2	28.4	50.1	3.3
28	-364	-30.3	-925	11.4	44.5	26.3	17.9
29	-372	31.0	-945	21.9	41.6	30.6	6.0
30	-380	-31.7	-965	25.9	33.2	24.6	16.2
31	-410	-34.2	-1041	9.0	11.9	12.1	67.1
32	-426	-35.5	-1082	11.5	17.6	17.5	53.4

MB3: (Con.)

Sample	Depth			Particle Size			
	in	ft	cm	<2µm	2-16µm	16-62µm	>62µm
				%	%	%	%
MB3-33	0-435	0-36.25	0-1105	14.1	18.5	22.2	45.1
34	-485	-40.4	-1232	6.7	9.2	8.5	75.7
35	-512	-42.7	-1300	11.7	17.8	25.2	45.4
36	-530	-44.2	-1300	16.9	20.8	25.2	37.1
37	-537	-44.75	-1364	27.0	21.5	22.8	28.7
38	-551	-45.9	-1400	15.0	20.5	22.3	42.3
39	-569	-47.4	-1445	15.7	21.0	25.6	37.7
40	-587	-48.9	-1491	16.7	18.7	25.2	39.3
41	-606	-50.5	-1539	15.4	19.1	21.3	44.2
42	-624	-52.0	-1585	16.5	20.5	24.7	38.3
43	-636	-53.0	-1615	17.1	21.6	26.3	35.0
44	-651	-54.25	-1654	15.3	23.7	31.2	29.8
45	-666	-55.5	-1692	16.1	39.5	29.2	15.3
46	-682	-56.8	-1732	34.7	23.7	17.4	24.2
47	-696	-58.0	-1768	39.3	18.4	18.1	24.2
48	-711	-59.25	-1806	39.0	16.7	26.7	17.7
49	-738	-61.5	-1875	33.9	15.8	23.6	26.7
50	-755	-62.9	-1918	27.7	10.8	17.6	44.0

Field notes say "augered bedrock at 66.5 ft" = 798 in = 2027 cm.

MB10: Mechanicsburg, Decatur County, Indiana.

Sample	Depth in	ft	cm	Horizon		Description
MB10-1	0-10	0-0.8	0-25		Ap	10YR 4/2 sil.
2	-19	-1.6	-48		Btx	10YR 6/3 sil, wk fsbk.
3	-27	-2.3	-69			10YR 7/3 sil, mod. fsbk, clay skins.
4	-36	-3.0	-91	Ls		10YR 6/1 sicl, few 10YR 5/6 and 4/3, mod. prism., clay skins on prism faces, Mn stains.
5	-44	-3.7	-112			Same, sil-sicl.
6	-52	-4.3	-132		BC	10YR 6/2 sil, com. med. 10YR 5/6, wk clay skins, wk fsbk.
7	-58	-4.8	-147			10YR 6/3 sicl, com. 10YR 5/4, few 10YR 5/6, fsbk, few Mn stains.
8	-66	-5.5	-168		2C	10YR 5/6 loam, wk fsbk.
9	-74	-6.2	-188			Same.
10	-83	-6.9	-211	Lg		10YR 5/8 loam, com. 10YR 6/3, thin clay skins, wk fsbk.
11	-92	-7.7	-234			10YR 6/6 cl, 10YR 5/8 areas, generally massive.
12	-100	-8.3	-254			Same.
13	-108	-9.0	-274			10YR 7/6 loam, massive.
14	-116	-9.7	-295	P1	Bb	10YR 6/4 loam, com. 10YR 5/6 and 10YR 6/1, mod. fsbk, traces of clay skins, few Mn stains.
15	-123	-10.3	-312			Same.
16	-130	-10.8	-330			7.5 YR 5/6 scl, com. Mn stains, com. pebbles.
17	-139	-11.6	-353	P1	T1 ol	7.5 YR 5/8 scl, com. pebbles, massive.
18	-147	-12.3	-373			Same.
19	-155	-12.9	-394			10YR 6/4 sil, few co 7.5YR 5/8, massive
20	-165	-13.8	-419		T1 dl	10YR 6/1 loam, few fine Fe stains, massive, leached.
21	-175	-14.6	-445	P1		Same, some very weak indication of bedding.
22	-186	-15.5	-472			Same.
23	-255	-21.3	-648		Sg uu	10YR 6/3 calcareous wet loamy sand and some gravel.
24	-259	-21.6	-658		uu	10YR 5/1 sil, calc. finely laminated
25	-260	-21.7	-660	P2	OC	Band of organic-rich silt, some fibers sill intact.
26	-270	-22.5	-686			10YR 5/1 sil, leached, weakly laminated.
27	-290	-24.2	-737			10YR 5/1, loam.
28	-308	-25.7	-782	P2	T? dl	10YR 5/1 loam, few small pebbles.
29	-322	-26.8	-818			10YR 5/1, 10Y 5/1, 10GY 5/1 cl, few 7.5YR 6/8 Fe stains, some wk bedding.
30	-340	-28.3	-864			Same colors, cl, bedding more apparent, few pebbles.
31	-350	-29.2	-859			Same, bedding even more apparent, may be micro shear planes, few pebbles.
32	-360	-30.0	-914			10YR 4/1 loam, massive, few pebbles.

MB10: (C n.)

Sample	Depth in	Depth ft	Depth cm	Horizon		Description
MB10-33	0-361	0-30.1	0-917		SG-OC	10YR 7/1 and 10YR 3/1 calcareous sand and gravel, some organic matter.
34	-371	-30.9	-942	P3?		10YR 7/1 and 10YR 3/1 sil, noncalcareous, nonpebbly.
35	-372	-31.0	-945		OC	10YR 2/1 sil.
36a	-379	-31.6	-963	P3?	Sd-dl	10YR 4/1 loam, massive, bits of “charcoal,” nonpebbly.
36b	-384	-32.0	-975		(T dl)	Same.
36c	-393	-32.8	-945			Same.
37	-420	-35.0	-1067			Same.
38	-445	-37.1	-1130			10YR 4/1 cl, massive, nonpebbly.
39	-455	-37.9	-1156			Same.
40	-475	-39.6	-1207			10YR 4/1 cl, few co 10YR 4/4, wk sbk, wk platy.
41	-495	-41.3	-1257			Same.
42	-506	-42.2	-1285		T? dl	7.5YR 5/8, 5Y 4/1, 5G 6/1 in stratified bands 2-10 mm thick, cl, stratification or bedding deformed in some places.
43	-517	-43.1	-1313			Similar colors, in bands or chunks appearing “reworked,” cl, mod. f. sbkin places.
44	-530	-44.2	-1346			Same.
45	-537	-44.8	-1364			Same, appears more massive.
46	-549	-45.8	-1395			5Y 5/3 cl with few fine 5G 5/1 and 7.5YR 6/8, wk stratified, wk sbk.
47	-561	-46.8	-1425			2.5Y 4/2 loam, few pebbles up to 4 cm.
48	-571	-47.6	-1450			5BG 5/1 loam, few 5B 7/1 and 10YR 5/8.
49	-581	-48.4	-1476			Same colors and texture, few sandier bands.
50	-593	-49.4	-1506		T? uu	5Y 6/1 calc. loam, massive, pebbles.
51	-603	-50.3	-1532			10YR 6/1 calc. loam, massive, very compact, more gravel.
52	-780	-65.0	-1981			10YR 6/1 calc. sil, massive, compact, some gravel. Auger samples to bedrock at 65 ft.

MB10: Mechanicsburg, Decatur County, Indiana.

Sample	Depth in	Depth ft	Depth cm	Particle Size <2µm	2-16µm (%)	16-62µm (%)	>62µm (%)	<2mm (%)	Organic c (%)	$CaCo_3$	
MB10- 1	0-10	0-0.8	0-25		15.6	39.6	34.0	10.9	0.3		
2	-19	-1.6	-48		23.2	39.8	27.5	9.6	0.3		
3	-27	-2.3	-69		27.1	36.6	30.8	8.4	0.2	MB10-1 to 20 =	
4	-36	-3.0	-91		29.2	32.5	31.9	6.4	—	NO DATA	
5	-44	-3.7	-112		25.4	31.2	35.0	8.4	0.1		
6	-52	-4.3	-132		26.2	27.2	35.7	10.9	0.6		
7	-58	-4.8	-147		28.3	30.2	25.9	15.6	1.0		
8	-66	-5.5	-168		17.9	25.9	24.0	32.1	1.8		
9	-74	-6.2	-188		19.7	24.2	24.5	31.6	1.6		
10	-83	-6.9	-211		25.0	18.6	28.9	27.5	2.0		
11	-92	-7.7	-234		27.9	17.2	25.5	29.4	2.1		
12	-100	-8.3	-254		27.1	25.4	23.9	23.5	2.6		
13	-108	-9.0	-274		22.1	23.8	21.4	32.8	1.8		
14	-116	-9.7	-295		25.8	19.3	17.5	37.4	2.2		
15	-123	-10.3	-312		27.8	18.5	15.5	38.3	2.5		
16	-130	-10.8	-330		27.5	6.5	7.8	58.3	11.4		
17	-139	-11.6	-353		25.3	4.9	6.1	63.6	12.4		
18	-147	-12.3	-373		24.1	6.8	6.4	62.8	19.9		
19	-155	-12.9	-394		25.0	29.2	23.6	22.1	0.3		
20	-165	-13.8	-419		25.4	25.9	21.3	27.5	0.9		
21	-175	-14.6	-445		24.4	26.1	21.7	27.8	0.6	.16	.73
22	-186	-15.5	-472		24.5	26.4	19.1	30.0	0.3	.20	.92
23	-255	-21.3	-648		4.8	3.3	8.1	83.8	11.0	.26	29.26
24	-259	-21.6	-658		14.8	42.6	31.5	11.1	1.8	.87	26.07
25	-260	-21.7	-660							6.80	11.53
26	-270	-22.5	-686		21.7	28.3	24.2	25.8	0.6	.95	1.29
27	-290	-24.2	-737		21.6	26.5	22.4	29.4	0.4	.32	.66
28	-308	-25.7	-782		27.5	24.9	20.5	27.2	0.7	.29	.38
29	-322	-26.8	-818		29.2	17.6	23.2	29.9	0.5	.19	.47

MB10: (C n.)

Sample	Depth in	Depth ft	Depth cm	Particle Size <2µm (%)	2-16µm (%)	16-62µm (%)	>62µm (%)	<2mm (%)	Organic c	$CaCo_3$
MB10-30	0-340	0-28.3	0-864	30.2	19.6	18.9	31.4	0.7	.16	.49
31	-350	-29.2	-889	29.0	20.7	15.8	34.5	1.2	.23	2.87
32	-360	-30.0	-914	25.2	21.3	21.3	32.2	1.8	.31	1.50
33	-361	-30.1	-917	11.9	21.0	22.2	44.9	21.1	2.81	22.69
34	-371	-30.9	-942	22.5	29.1	23.0	25.2	0.6	.89	2.42
35	-372	-31.0	-945	16.5	31.3	30.3	21.9	1.0	6.97	6.83
36a	-379	-31.6	-963	24.1	26.3	22.9	27.0	0.3	.49	.94
36b	-384	-32.0	-975	25.1	24.8	21.4	28.7	0.5	.37	.67
36c	-393	-32.8	-998	25.4	25.5	20.8	28.3	0.4		.37
37	-420	-35.0	-1067	26.5	23.6	20.8	29.2	0.5		.55
38	-445	-37.1	-1130	29.6	24.5	19.7	26.1	0.5		.80
39	-455	-37.9	-1156	28.0	24.0	18.7	29.1	0.4		.60
40	-475	-34.6	-1207	29.8	22.4	19.3	28.6	0.6		.87
41	-495	-41.3	-1257	30.2	14.5	28.7	26.6	0.6		.76
42	-506	-42.2	-1285	30.5	21.4	19.0	29.1	0.7		1.35
43	-517	-43.1	-1313	37.6	11.4	14.8	36.2	1.2		4.16
44	-530	-44.2	-1346	31.5	12.0	14.0	42.5	2.0		1.04
45	-537	-44.8	-1364	29.6	21.2	19.6	26.7	3.5		.96
46	-549	-45.8	-1395	33.1	17.9	17.1	31.9	1.3		.72
47	-561	-46.8	-1425	23.1	19.2	17.9	39.8	2.9		.61
48	-571	-47.6	-1450	35.2	14.6	16.4	33.8	0.8		.27
49	-581	-48.4	-1476	23.2	13.3	13.8	49.7	1.9		.81
50	-593	-49.4	-1506	16.3	15.0	18.7	50.0	5.2		24.09
51	-603	-50.3	-1532	14.7	17.1	17.5	50.6	10.2		36.16
52	-780	-65.0	-1981	25.6	19.4	36.5	18.6	9.6		30.29

MB13: Mechanicsburg, Decatur County, Indiana.

Sample	Depth in	Depth ft	Depth cm		Horizon	Description
MB13-1	0-6	0- 0.5	0-15		Ap1	10YR 2/1 sil
2	-10	- 0.8	-25	Ls	Ap2	10YR 4/2 sil, mod. v. f. gr.
3	-16	- 1.3	-41		AE	10YR 5/3 - 10YR 6/6 sil, wk. f. sbk
4	-20	- 1.7	-51		Bt	10YR 5/8 sicl, mod. v f. sbk, weak clay skins on some peds, others slightly bleached.
5	-26	- 2.2	-66	Pedisediment	Bt/Bx	10YR 5/6 sicl, mod. f. sbk and v. f. prism., mod. clay skins, Mn stains on vert. faces, other areas mod. bleached.
6	-36	- 3.0	-91		Bx	10YR 4/4 cl, mod. fsbk and mod. f. prism., mod. clay skings, Fe stains on prism. faces.
7	-45	- 3.8	-114		2Bx, Tou	Stone line at upper boundary. 10YR 5/4 calc. l, wk-mod. fsbk, some illuvial clay in joints.
8	-53	- 4.4	-135		2BC	10YR 5/2 l, wk. vfsbk-wk. f. prism., thin clay skins, calc.
9	-61	- 5.1	-155		2C	10YR 6/4-6/6 l, sandier than above, massive, some wk. bedding, calc.
10	-65	- 5.4	-165		Tou	Same.
11	-77	- 6.4	-196	TO		10YR 6/6 sil-l w. com. 10YR 6/4, generally massive.
12	-90	- 7.5	-209			10YR 6/4 sil-l, massive till, calc. till.
13	-101	- 8.4	-257			10YR 5/4 l, massive, some sandier inclusions
14	-139	-11.6	-353			Same.
15	-160	-13.3	-406		Tuu	10YR 6/2 sil-l massive calc. till, 10YR 6/6 in joints.
16	-178	-14.8	-452			10YR 5/1, massive calc. loam till.
17	-217	-18.1	-551			Same.
18	-220	-18.3	-559			10YR 3/1 thin organic and silt bands, calc. sil.
19	-292	-24.3	-742	TO	Tuu	10YR 5/1, massive calc. loam till.
20	-366	-30.5	-930			Same.
21	-440	-36.7	-1118			Same.
22	-505	-42.1	-1283			Same.
23	-577	-48.1	-1466		Gr	Gravelly loam, calc. unoxidized.
24	-640	-53.3	-1626	TO	Tuu	10YR 5/1 loam, calc. unoxidized till.
24a	-653	-54.4	-1659			Same.
25	-661	-55.1	-1679			Sil, transitional to silty layer below.
26	-667	-55.6	-1694		uu	10YR 5/1 weakly calcareous organic silt.

MB13: (Con.)

Sample	Depth in	Depth ft	Depth cm		Horizon	Description
MB13-27	0-673	0-56.1	0-1709			Calcareous organic sil.
28	-677	-56.4	-1720	P1	dl	Noncalc. sil, not visibly organic, wk. f. grain structure.
29	-684	-57.0	-1737	P1		Same, structure more apparent.
-30	-696	-58.0	-1768			Same.
31	-710	-59.2	-1803			Same.
32	-723	-60.3	-1836			Same.
33	-735	-61.3	-1867	T1	Tdl	5GY 5/1, few 10YR 7/8, noncalc. loam till.
34	-742	-61.8	-1885			10YR 4/5 with 5GY 4/1, noncalc. loam, mod. f. sbk.
35	-753	-62.8	-1913			5GY 5/1 loam, few co. 10YR 6/6, wk. f. sbk, noncalcareous
36	-766	-63.8	-1946			Same.
37	-772	-64.3	-1961	T1	Tuu	5G 5/1 calc. loam till.
38	-863	-71.9	-2192			5Y 4/1 calc. loam till.
39	-914	-76.2	-2322			Same.
40	-927	-77.3	-2355			Same.
41	-932	-77.7	-2367	P2	OC	Organic zone, noncalc. black organic beds, 1/8- to 1/4-inch thick in unoxidized unleached till.

Field notes indicate core refusal at 77.7 feet. Bedrock estimated to be at 97 feet.

MB13: Mechanicsburg, Decatur County, Indiana

Sample	Depth in	Depth ft	Depth cm	Particle Size <2µm (%)	2-16µm (%)	16-62µm (%)	>62µm (%)	<2mm (%)	Organic c	$CaCo_3$
MB13-1	0-6	0-0.5	0-15	16.0	20.5	54.4	9.1	0.3	3.91	.27
2	-10	-0.8	-25	7.3	47.9	31.0	13.8	.7	1.42	.60
3	-16	-1.3	-41	16.0	45.0	28.9	10.1	.1	.63	.48
4	-20	-1.7	-51	28.0	40.5	22.5	9.0	.1	.28	.10
5	-26	-2.2	-66	29.4	30.6	20.6	19.5	1.0	.23	.20
6	-36	-3.0	-91	32.8	24.3	14.9	28.0	.8	.33	.28
7	-45	-3.8	-114	22.6	19.0	20.5	38.0	3.7		20.01
8	-53	-4.4	-135	14.2	18.2	23.8	43.9	.5		32.11
9	-61	-5.1	-155	9.4	16.7	31.8	42.1	.1		34.80
10	-65	-5.4	-165	8.1	11.0	18.7	62.3	11.0		33.87
11	-77	-6.4	-196	15.0	28.3	27.0	29.8	.7		34.69
12	-90	-7.5	-229	15.0	27.4	27.8	29.9	3.5		35.13
13	-101	-8.4	-257	12.1	19.4	22.5	46.0	9.5		33.87
14	-139	-11.6	-353	14.5	21.0	22.3	42.2	8.2		34.57
15	-160	-13.3	-406	17.3	26.9	25.8	30.0	5.7		33.91
16	-178	-14.8	-452	15.4	21.6	27.7	35.4	6.1	.39	34.00
17	-217	-18.1	-551	16.2	23.5	25.3	34.9	8.1	.75	33.43
18	-220	-18.3	-559	14.4	41.3	28.8	15.5	1.6	2.73	31.38
19	-292	-24.3	-742	17.2	25.0	25.1	32.8	11.1	.80	33.41
20	-366	-30.5	-930	15.4	22.0	25.1	37.5	15.0	.70	34.37
21	-440	-36.7	-1118	16.3	21.7	24.5	37.5	10.9	.69	37.54
22	-505	-42.1	-1238	16.8	24.1	25.3	33.8	6.5	.71	35.61
23	-577	-48.1	-1466	14.3	15.1	27.8	42.8	41.6	.70	37.18
24	-640	-53.3	-1626	14.7	21.8	28.1	35.4	11.1	.66	68.09
24a	-653	-54.4	-1659	15.2	23.9	27.4	33.6	4.9	.66	34.55
25	-661	55.1	-1679	14.1	25.0	29.6	31.3	3.4	1.01	38.79
26	-667	-55.6	-1694	8.3	33.7	49.5	8.5	.7	1.34	28.32
27	-673	-56.1	-1709	12.0	32.4	37.2	18.4	.7	1.03	11.18
28	-677	-56.4	-1720	15.9	25.8	28.9	29.5	.7	.57	1.33
29	-684	-57.0	-1737	17.5	28.3	26.9	27.3	.49		

MB13: (Cont.)

Sample	Depth in	Depth ft	Depth cm	Particle Size <2µm (%)	Particle Size 2-16µm (%)	Particle Size 16-62µm (%)	Particle Size >62µm (%)	Particle Size <2mm (%)	Organic c	$CaCo_3$
MB13-30	0-696	0-58.0	0-1768	16.2	27.1	27.1	29.6	.7	.52	1.00
31	-710	-59.2	-1803	17.2	27.4	24.9	30.4	1.0	.41	1.20
32	-723	-60.3	-1836	16.0	24.6	26.4	33.0	1.0	.27	.42
33	-735	-61.3	-1867	24.2	25.4	21.7	28.8	4.1	.32	.71
34	-742	-61.8	-1885	18.3	22.6	19.5	39.6	6.4	.27	3.15
35	-753	-62.8	-1913	25.5	20.1	19.5	35.0	3.2	.17	.39
36	-766	-63.8	-1946	19.9	22.8	19.4	38.0	2.7	.22	.92
37	-772	-64.3	-1961	20.1	21.6	21.5	36.9	4.6	.32	14.01
38	-863	-71.9	-2192	18.8	20.4	20.7	40.1	5.1	.62	18.07
39	-914	-76.2	-2322	17.2	20.2	21.3	41.4	7.0	.79	21.28
40	-927	-77.3	-2355	16.5	21.0	21.9	40.7	8.0	.83	20.33
41	-932	-77.7	-2367	12.9	19.4	25.9	41.8	4.8	1.19	20.24

NP1: New Pennington, Decatur County, Indiana.

Sample	Depth			Horizon	Description
	in	ft	cm		
NP1- 1	0-9	0-0.75	0-23	Ap	10YR 3/4 sil, vwfgr, fri, f roots, abrupt.
2	-15	-1.25	23-38	Bt	10YR 4/2 and 7.5YR 4/6 sil, wfsab, sl fir, spwcs.
3	-20	-1.66	38-51		10YR 6/3 and 7.5YR 5/4 sicl, wfsab, sl fir, sp wcs.
4	-25	-2.08	51-64	BX	7.5YR 4/4 sicl, smpr, fir, brittle, w 4/2 scs on pr..
5	-31	-2.58	64-79		Same shatters.
6	-39	-3.25	79-99	2BX	7.5YR 4/4 gritty sil, smpr, fir, brittlw w/4/2 scs on pr.
7	-46	-3.83	99-117	2BC	7.5YR 4/4 gritty sil, mmsab-mfpl, fir, com mcs, com 6/2 mots.
8	-54	-4.5	117-137	2C	Same, but sp wcs.
9	-62	-5.17	137-157		7.5YR 4/4 gritty sil, vwfsab, fir, sp wcs.
10	-69	-5.75	157-175		7.5YR 4/4 gritty sil, sfpl, com mcs, sp pbls.
11	-75	-6.25	175-191		Same,strongerlaminae.
12	-83	-6.92	191-211	3Btb	5YR 4/6 sicl, mfsab, fir, com mcs, Mn stn, com 2.5YR 3/6 mots, red soil.
13	-92	-7.67	211-234		5YR 4/6 sicl, mmsab, fir, com scs, Mn stn.
14	-100	-8.33	234-254		2.5YR 4/6 cl, mmsab, vfir, com mcs, Mn stn, com 5YR 5/3 mots.
15	-110	-9.17	254-279		Same w/scs, Note: 15-25 degraded clay min.
16	-123	-10.25	279-312		Same, abrupt to.
17	-134	-11.7	312-340	3BCb	2.5YR 4/6 scl, wfsab, sl fir, sp wcs, sp Mn stn,redsoil.
18	-148	-12.33	340-376	4Cb	5YR 5/8 scl, vwfsab, sl fir.
19	-158	-13.17	376-401		5YR 5/6 sl, mass, fri, sand and gravel.
20	-170	-14.17	401-432		Same.
21	-185	-15.42	432-470		Same.
22	-198	-16.5	470-503		Same.
23	-215	-17.92	503-546		7.5YR 5/4 stratified sand.
24	-231	-19.25	546-587		Same.
25	-246	-20.5	587-625	Till	7.5YR 4/6 O andLtill.
26	-257	-21.42	625-653	Rw	5YR 4/6 c, w/chert.

NP1: New Pennington, Decatur County, Indiana.

Sample	Depth in	Depth ft	Depth cm	Sand (%) VC	Sand (%) C	Sand (%) M	Sand (%) F	Sand (%) VF	Sand (%) Total	Silt (%) C	Silt (%) F	Silt (%) Total	Clay (%)	Gravel
NP1- 1	0-9	0-0.75	0-23	1.4	2.7	3.4	2.7	2.4	12.8	33.5	41.1	74.6	12.6	5.6
2	-15	-1.25	-38	0.2	0.6	0.9	0.9	0.4	2.7	26.9	45.4	72.3	25.0	0.2
3	-20	-1.7	-51	0.2	0.4	0.5	0.4	0.4	1.8	31.7	40.0	71.7	26.5	0.0
4	-25	-2.1	-64	0.1	0.3	0.5	0.5	0.4	1.9	32.3	34.3	66.6	31.6	0.0
5	-31	-2.6	-79	0.1	0.4	1.0	1.1	0.6	3.1	32.3	36.6	68.9	28.1	0.0
6	-39	-3.25	-99	0.8	1.3	3.0	3.0	1.3	9.4	28.8	37.3	66.1	24.6	0.0
7	-46	-3.8	-117	2.4	5.6	5.3	2.2	1.2	16.6	26.9	37.4	64.3	19.1	0.3
8	-54	-4.5	-137	1.0	2.4	6.8	7.8	3.7	21.6	25.8	33.6	59.4	19.0	0.3
9	-62	-5.2	-157	3.5	7.7	6.4	2.1	0.8	20.4	26.1	32.3	58.4	21.2	0.3
10	-69	-5.75	-175	3.2	7.0	6.1	2.0	0.8	19.2	26.5	31.6	58.1	22.7	0.0
11	-75	-6.25	-191	3.2	6.7	5.9	1.9	0.8	18.5	23.6	30.8	54.4	27.1	0.3
12	-83	-6.9	-211	3.6	7.6	6.0	1.8	0.4	19.2	19.7	22.4	42.1	38.7	0.2
13	-92	-7.7	-234	3.4	6.6	5.5	1.7	0.8	18.0	19.6	22.5	42.1	39.9	0.3
14	-100	-8.3	-254	5.3	10.8	9.0	2.9	0.9	29.0	16.8	16.5	33.3	37.8	1.1
15	-110	-9.2	-279	5.4	11.9	9.7	3.2	1.5	31.6	15.2	14.7	29.9	38.5	1.2
16	-123	-10.25	-312	1.0	2.8	9.2	10.9	4.8	28.6	18.6	19.8	38.4	33.0	0.5
17	-134	-11.2	-340	2.8	5.9	13.8	17.1	7.9	47.5	15.1	8.6	23.7	28.8	2.2
18	-148	-12.33	-376	2.7	6.7	16.0	19.2	10.6	55.1	14.5	10.9	25.4	19.6	2.6
19	-158	-13.2	-401	2.3	7.9	16.9	20.5	11.1	58.6	13.2	10.0	23.2	18.2	2.5
20	-170	-14.2	-432	2.2	7.5	17.9	23.5	10.4	62.2	10.4	7.9	18.3	19.5	2.1
21	-185	-15.4	-470	0.3	1.4	3.6	17.1	25.9	48.2	28.7	12.0	40.7	11.2	0.1
22	-198	-16.5	-503	1.0	6.3	23.0	24.2	10.9	65.4	13.7	8.1	21.8	12.8	1.0
23	-215	-17.9	-546	1.0	2.9	14.4	32.9	11.8	63.1	14.3	9.8	24.1	12.8	0.3
24	-231	-19.25	-587	1.4	2.8	13.1	24.7	17.9	60.0	22.0	10.5	32.5	7.5	0.8
25	-246	-20.5	-625	2.6	4.4	9.6	10.9	7.9	35.4	22.5	21.3	43.8	20.8	12.5
26	-257	-21.4	-653	4.2	4.4	4.1	3.7	2.5	19.0	8.3	19.2	27.5	53.5	28.1

NP16: New Pennington, Decatur County, Indiana.

Sample	Depth in	Depth ft	Depth cm	Horizon	Description
NP16-1	0-5	0-0.4	0-13	Ap	10YR 4/3 sil, mfgr, fri, com roots.
2	-10	-0.8	-25		10YR 4/3 sil, mfsab, fri, com roots, abrupt.
3	-17	-1.4	-43	Bt	10YR 5/4 sicl, smsab, fir, sp 5YR 5/4 mots, scs.
4	-25	-2.1	-64	BX	10YR 6/4 sicl, smsab, fir, sp 5/4 mots, and 10YR 8/1 ped cts, scs.
5	-31	-2.6	-79		10YR 5/6 sicl, smsab, fir, com 7/1 mots, scs.
6	-36	-3.0	-91	2BX	10YR 5/6 gritty, sil, mmsab, fir, mcs.
7	-45	-3.75	-114	2BC	10YR 5/y gritty sil, mmsab, fir, wcs.
8	-51	-4.25	-130	2C	10YR 6/6 gritty sil, fsab, bedded fir.
9	-57	-4.75	-145		7.5YR 5/6 gritty sil, fsab, bedded, fir.
10	-62	-5.2	-157		Same.
11	-71	-5.9	-180	3Bb	2.5YR 4/6 cl, smsab, vfir, vscs, stone line at top, red soil.
12	-82	-6.8	-208		Same, no stone line, degraded clay min.
13	-90	-7.5	-229		Same.
14	-100	-8.3	-254		Same.
15	-110	-9.2	-279		2.5YR 4/6 gray cl, smsab, fir, vscs.
16	-120	-10.0	-305		Same.
17	-130	-10.8	-330		Same, red soil.
18	-145	-12.1	-368	Cb	2.5YR 5/8 scl, sand and gravel.
19	-159	-13.25	-404		5YR 4/6 scl, sand and gravel.
20	-174	-14.5	-442		Same.
21	-187	-15.6	-475		Same.
22	-200	-16.7	-508		5YR 5/6 sand, stratified.
23	-210	-17.5	-533		Same, on rock.

NP16: New P nnington, Decatur C unty, Indiana.

	Depth			Sand (%)						Silt (%)				
Sample	in	ft	cm	VC	C	M	F	VF	Total	C	F	Total	Clay (%)	Gravel
3NP16-1	0-5	0.4	0-13	0.4	1.7	2.1	1.5	1.0	6.7	32.8	45.3	78.1	15.3	
2	-10	0.8	-25	.2	1.5	2.0	1.6	1.1	6.4	32.3	45.5	77.8	15.8	
3	-17	1.4	-43	.1	.5	.9	.7	.5	2.7	30.3	38.1	68.4	28.0	
4	-25	2.1	-64	.1	.6	.7	.5	.4	2.4	30.0	34.1	64.1	33.5	
5	-31	2.6	-79	.1	.9	1.3	.9	.6	3.7	34.0	33.6	67.6	28.7	
6	-36	3.0	-91	1.4	2.9	4.4	3.1	1.4	13.2	28.5	36.5	65.0	21.8	
7	-45	3.8	-114	1.7	4.1	6.1	4.2	1.8	17.9	25.5	38.3	63.8	18.3	
8	-51	4.3	-130	2.0	4.2	7.4	5.7	2.6	21.9	24.3	34.4	58.7	19.5	
9	-57	4.8	-145	1.4	2.9	6.7	5.2	2.4	19.6	22.6	32.1	54.7	25.7	
10	-62	5.2	-157	2.1	5.1	8.0	6.0	2.7	23.9	21.5	29.1	50.6	25.6	
11	-71	5.9	-180	4.1	5.4	7.9	6.7	3.6	27.7	12.0	16.8	28.8	43.5	
12	-82	6.8	-208	3.4	8.9	13.6	10.3	4.0	40.0	7.6	8.1	15.7	44.0	
13	-90	7.5	-229	6.4	11.9	12.3	7.8	3.7	42.1	8.0	10.7	18.7	39.3	
14	-100	8.3	-254	4.2	8.8	14.5	14.2	7.1	48.7	9.5	9.4	18.9	32.5	
15	-110	9.2	-279	8.1	10.2	14.4	9.5	4.4	46.6	8.6	11.2	19.8	33.6	
16	-120	10.0	-305	4.2	7.4	16.8	8.7	4.4	41.5	10.2	11.5	21.7	36.9	
17	-130	10.8	-330	3.3	7.7	15.6	10.8	6.7	44.1	11.6	9.7	21.3	34.7	25.2
18	-145	12.1	-368	4.1	8.9	20.0	17.4	6.2	56.6	8.1	6.8	14.9	28.5	7.4
19	-159	13.3	-404	5.1	10.1	15.3	13.0	7.7	51.3	13.7	10.4	24.1	24.7	5.8
20	-174	14.5	-442						52.1	10.9	10.1	21.0	26.9	15.5
21	-187	15.6	-475						64.0	7.0	6.0	13.0	23.1	5.8
22	-200	16.7	-508						55.5	23.4	9.0	32.4	12.1	0.3
23	-210	17.5	-533						60.9	13.9	8.1	22.0	17.1	1.9

RN3: Napoleon, Ripley County, Indiana.

Sample	Depth in	Depth ft	Depth cm	Horizon	Description
RN3-1	0-10	0-0.8	0-25	Ap	10YR 3/3 sil, mfgr, fri, abrupt.
2	-16	-1.3	-41	BA	10YR 4/4 sil, wfsab, fri.
3	-24	-2.0	-61	Bt	10YR 5/4 sil, mfsab, frim porous.
4	-31	-2.6	-79	BX	10YR 6/3 sil, stg br mots, mfsab-wmpr, brit, porous.
5	-38	-3.2	-97		10YR 5/4 sil, mfsab-mmpr, brit, com mcs.
6	-44	-3.7	-112	2BX	Same, but gritty.
7	-49	-4.1	-124	2BC	10YR 5/1 sil w/7.5YR 5/6 mots, mfsabs fir, mcs.
8	-57	-4.75	-145	2C	10YR 5/1 sil, mfsab, laminated, fir.
9	-64	-5.3	-163		Same.
10	-73	-6.1	-185		Same.
11	-81	-6.75	-206	Bb	5YR 4/6 cl, smsab, fir, com scs, Mn stn, red soil in sand.
12	-91	-7.6	-231		Same.
13	-101	-8.4	-257		Same w/ degraded clay mins to depth of bedrock.
14	-112	-9.3	-284		2.5YR 4/6 cl, mmsab, fir, com mcs, Mn stn.
15	-122	-10.2	-310		Same.
16	-137	-11.4	-348		Same.
17	-149	-12.4	-378		Same.
18	-163	-13.6	-414		Same.
19	-175	-14.6	-445		2.5YR 4/6 scl, wfsab, fir, sp wcs, Mn stn.
20	-183	-15.25	-465		Same.
21	-192	-16.0	-488		Same.
22	-201	-16.75	-511		Same.
23	-209	-17.4	-531		Same.
24	-225	-18.75	-572	Cb	7.5YR 4/6 cl, gravelly sand.
25	-242	-20.2	-615		Same.
26	-257	-21.4	-653	Tol	7.5YR 4/6 cl, oxidized and leached till.
27	-272	-22.7	-691		10YR 5/4 cl, oxidized and leached till.
28	-287	-23.9	-729		Same.
29	-304	-25.3	-772		Same.
30	-320	026.7	-813		Same.
31	-335	-27.9	-851		Same.
32	-350	-29.2	-889		Same.
33	-361	-30.1	-917		Same.
34	-375	-31.25	-953	SG	7.5YR 3/4 sand and gravel.
35	-391	-32.6	-993	S	7.5YR 3/4 sand.
36	-407	-33.9	-1034	Tol	7.5YR 4/4 till to bedrock.
37	-427	-35.6	-1085		Same.

RN3: Napoleon, Ripley County, Indiana.

Sample	Depth in	Depth cm	Sand (%) VC	Sand (%) C	Sand (%) M	Sand (%) F	Sand (%) VF	Sand (%) Total	Silt (%) C	Silt (%) F	Silt (%) Total	Clay (%)	Gravel
RN3-1	0-10	0-25	0.3	1.5	2.6	2.3	1.3	7.9	30.1	46.2	76.3	15.8	0.4
2	-16	-41	0.2	1.0	1.8	1.3	0.7	5.0	30.0	44.0	74.0	21.0	0.1
3	-24	-61	0.3	1.3	1.8	1.4	0.6	5.4	29.5	43.3	72.8	21.9	0.0
4	-31	-79	0.2	1.2	1.4	1.0	0.4	4.2	28.1	45.9	74.0	21.9	0.0
5	-38	-97	0.3	1.2	3.3	3.0	1.3	9.0	26.3	37.7	64.0	27.0	0.2
6	-44	-112	0.6	2.3	6.7	6.5	2.6	18.7	23.5	33.8	57.3	24.0	1.8
7	-49	-124	0.4	2.2	8.5	8.4	3.4	22.7	22.7	31.8	54.5	22.7	0.6
8	-57	-145	1.1	2.6	9.6	9.7	3.9	26.9	23.9	31.5	55.4	17.7	0.7
9	-64	-163	0.6	2.1	8.4	8.6	3.6	23.2	24.4	30.3	54.7	22.0	0.5
10	-73	-185	0.7	2.3	8.2	8.2	3.4	22.9	23.0	32.4	55.4	21.7	0.3
11	-81	-206	0.3	1.4	7.2	6.8	2.5	18.2	21.3	30.7	52.0	29.9	0.1
12	-91	-231	0.3	2.0	11.4	10.9	3.7	28.1	19.6	27.3	46.9	24.9	0.6
13	-101	-257	0.6	2.7	15.0	13.8	4.6	36.8	16.7	25.0	41.7	21.5	0.5
14	-112	-284	0.5	2.7	14.6	14.0	4.9	36.6	13.2	17.6	30.8	32.6	0.4
15	-122	-310	0.3	2.7	15.0	14.5	5.2	37.7	11.9	16.1	28.0	34.3	0.4
16	-137	-348						41.0	12.7	15.4	28.1	30.9	0.6
17	-149	-378						43.5	11.9	15.5	27.4	29.1	0.9
18	-163	-414						49.6	7.8	9.4	17.2	33.2	1.5
19	-175	-445						50.0	8.1	8.5	16.6	33.4	0.1
20	-183	-465						54.5	7.5	7.5	15.0	30.6	0.4
21	-192	-488						52.2	7.4	7.6	15.0	32.8	0.3
22	-201	-511						54.1	6.9	6.9	13.8	32.2	0.5
23	-209	-531						55.7	8.5	7.5	16.0	28.3	0.5
24	-225	-572						36.8	14.3	19.0	33.3	29.9	1.5
25	-242	-615						35.0	14.3	19.9	34.2	30.8	2.3
26	-257	-653						39.6	12.5	16.1	28.6	31.7	3.7
27	-272	-691						39.6	14.2	19.5	33.7	26.4	3.9
28	-287	-729						34.4	15.4	22.7	38.1	27.6	1.9
29	-304	-772						33.2	16.4	22.0	38.4	28.4	2.1
30	-320	-813						37.0	16.6	19.0	35.6	27.4	3.3
31	-335	-851						38.3	16.5	19.6	36.1	25.6	3.1
32	-350	-889						36.8	16.5	19.2	35.7	27.5	3.3
33	-361	-917						35.4	21.9	19.2	41.1	23.6	4.3
34	-375	-953						48.2	13.3	12.1	25.4	26.4	17.9
35	-391	-993						75.9	4.7	3.1	7.8	16.2	0.7
36	-407	-1034						52.4	18.7	13.3	32.0	15.6	2.4
37	-427	1085						31.8	23.0	22.7	45.7	22.6	3.8

App ndix B

Appendix B: *National Soil Survey Labratory Pedon Characterization Data.*

S84IN-031-001 Located at core site NP21

S84IN-031-002 Located at core site NP16

S84IN-031-003 Located at core site NP9

S84IN-031-004 Located at core site NP10

See Figure 4 for these locations

S84IN-031-001

*** PRIMARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 782, SAMPLES 84P4384-4397
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (CM)	HORIZON	-1-- (- - -TOTAL - - -) CLAY LT .002	-2-- SILT .002 -.05	-3-- SAND .05 -2	-4-- (- -CLAY- -) FINE LT .0002	-5-- CO3 LT .002	-6-- (- -SILT- -) FINE .002 -.02	-7-- COARSE .02 -.05	-8-- (- - - - -SAND- - - - - -) VF .05 -.10	-9-- F .10 -.25	-10- M .25 -.50	-11- C .5 -1	-12- VC 1 -2	-13- (-COARSE FRACTIONS(MM)-) WEIGHT 2 -5	-14- 5 -20	-15- 20 -75	-16- .1- 75	-17- (>2MM) WT PCT OF WHOLE SOIL
			<- - - - - - - - - - - - - PCT OF <2MM (3A1)												<- PCT OF <75MM(3B1)->				
84P4384S	0- 18	A	13.7	70.0	16.3	5.0		44.9	25.1	4.0	5.8	4.5	1.5	0.5	1	TR	--	13	1
84P4385S	18- 30	E	14.7	69.8	15.5	7.0		44.7	25.1	3.7	5.8	4.3	1.4	0.3	TR	--	--	12	TR
84P4386S	30- 43	BT1	16.4	69.1	14.5	7.5		44.6	24.5	3.6	5.4	3.9	1.2	0.4	TR	TR	--	11	TR
84P4387S	43- 61	BT2	20.7	66.6	12.7	10.2		43.9	22.7	3.3	4.7	3.2	1.1	0.4	1	TR	--	10	1
84P4388S	61- 84	BT3	25.0	63.0	12.0	12.8		42.4	20.6	2.8	4.1	3.2	1.4	0.5	1	TR	--	10	1
84P4389S	84-132	BT4	26.4	61.5	12.1	15.0		40.4	21.1	2.6	4.0	3.1	1.8	0.6	3	TR	--	12	3
84P4390S	132-170	2BX	19.4	56.4	24.2	11.1		37.3	19.2	5.7	9.1	6.6	2.1	0.7	1	1	--	20	2
84P4391S	170-218	2BC	19.1	54.3	26.6	11.7		36.0	18.3	6.6	10.3	6.9	1.9	0.9	1	1	--	22	2
84P4392S	218-254	2C1	23.3	50.2	26.5	14.7		33.7	16.5	6.5	10.2	6.8	2.2	0.8	1	1	--	22	2
84P4393S	254-290	3BTB	29.3	33.3	37.4	15.6		21.3	12.0	8.5	14.1	10.0	3.8	1.0	1	1	--	30	2
84P4394S	290-325	3C2	12.8	36.2	51.0	5.3		14.4	21.8	18.3	23.3	6.0	2.0	1.4	1	1	1	35	3
84P4395S	325-345	4C4	16.7	33.6	49.7	4.4		20.5	13.1	10.5	17.5	12.4	6.3	3.0	3	4	1	44	8

DEPTH (CM)	ORGN C 6A1C PCT	TOTAL N 6B3A <2MM	EXTR P 6S3 PPM	TOTAL S 6R3A	(- - DITH-CIT - -) EXTRACTABLE FE 6C2B	AL 6G7A	MN 6D2A	(RATIO/CLAY) CEC 8D1	15 BAR 8D1	(ATTERBERG - LIMITS -) LL 4F1	PI 4F	(- BULK DENSITY -) FIELD MOIST 4A3A	1/3 BAR 4A1D	OVEN DRY 4A1H	COLE WHOLE SOIL 4D1	(- - -WATER CONTENT - -) FIELD MOIST 4B4	1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2a	WRD WHOLE SOIL 4C1
				<- PERCENT OF <2MM -->						PCT <0.4MM		<- - G/CC - - ->			CM/CM	<- - -PCT OF <2MM - ->				CM/CM
0- 18	3.36	0.243			0.6		0.1	1.25	0.86				1.13	1.22	0.026			32.5	11.8	0.23
18- 30	0.32	0.029			0.8		--	0.56	0.44				1.40						6.5	
30- 43	0.21	0.025			0.7		--	0.52	0.43				1.50						7.0	
43- 61	0.17	0.025			1.1		--	0.55	0.42				1.56	1.61	0.011			21.9	8.6	0.21
61- 84	0.20				1.5		--	0.56	0.45				1.50						11.2	
84-132	0.11				1.4		--	0.62	0.46				1.46	1.58	0.026			23.2	12.1	0.16
132-170	0.08				1.2		TR	0.55	0.44				1.76	1.82	0.011			17.1	8.6	0.15
170-218	0.03				0.9		--	0.56	0.42				1.70						8.0	
218-254	0.07				1.4		TR	0.57	0.39				1.65	1.77	0.023			19.2	9.1	0.16
254-290	0.02				4.5		0.1	0.68	0.47				1.68	1.90	0.041			19.7	13.7	0.10
290-325	0.02				2.5		TR	0.74	0.58				1.60						7.4	
325-345	0.06				3.4		0.1	0.64	0.52				1.56	1.61	0.010			19.3	8.7	0.16

AVERAGES, DEPTH 43- 93: PCT CLAY 24 PCT .1-75MM 10

*** P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-001 PRINT DATE 06/12/90
SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 782, SAMPLE 84P4384-4397

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- - - -CEC - - -)			AL	-BASE	SAT-	CO3 AS	RES.		COND.		(- - - -PH - - -)	
	CA	MG	NA	K	SUM	ITY	AL	SUM	NH4-	BASES	SAT	SUM	NH4	CACO3	OHMS		MMHOS		CACL2	H2O
DEPTH	5B5A	5B5A	5B5A	5B5A	BASES			CATS	OAC	+ AL			OAC	<2MM	/CM		/CM		.01M	
(CM)	6N2E	6O2D	6P2B	6Q2B		6H5A	6G9A	5A3A	5A8B	5A3B	5G1	5C3	5C1	6E1G	8E1		8I		8C1F	8C1F
	<- - - - - - - - - - - - -				-MEQ /	100 G - - - - - -				- - ->	<- - - - -	-PCT	- - - -	->					1:2	1:1
0- 18		2.1	TR	0.3		2.5			17.1				100	3					7.1	7.5
18- 30	4.8	0.7	TR	0.2	5.7	4.7	0.9	10.4	8.2	6.6	14	55	70						4.6	5.2
30- 43	1.5	0.4	TR	0.2	2.1	8.3	4.7	10.4	8.5	6.8	69	20	25						3.9	4.5
43- 61	1.2	0.8	TR	0.3	2.3	10.4	6.8	12.7	11.3	9.1	75	18	20						4.0	4.4
61- 84	2.1	1.9	TR	0.3	4.3	13.0	7.4	17.3	14.1	11.7	63	25	30						3.9	4.7
84-132	1.8	3.2	TR	0.3	5.3	13.8	7.8	19.1	16.4	13.1	60	28	32						3.8	4.6
132-170	2.7	3.3	0.1	0.1	6.2	7.0	2.4	13.2	10.7	8.6	28	47	58						4.0	4.8
170-218	2.7	3.6	0.1	0.1	6.5	4.6	0.9	11.1	10.7	7.4	12	59	61						4.2	5.1
218-254	7.6	5.0	0.2	0.1	12.9	2.9		15.8	13.3			82	97						5.2	6.1
254-290	12.3	7.3	0.3	0.2	20.1	3.2		23.3	19.8			86	100						6.6	7.3
290-325		3.2	0.3	0.1		1.3			9.5				100	1					7.2	8.0
325-345		4.0	0.3	0.1		2.0			10.7				100	1					7.5	8.1

ESTIMATED BULK DENSITY FOR LAYER 2, 3, 5, 8, 11,

ANALYSES: S= ALL ON SIEVED <2MM BASIS

S84IN-031-001

*** PRIMARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 782, SAMPLES 84P4384-4397
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (CM)	HORIZON	-1--	-2--	-3--	-4-- TOTAL CLAY LT .002	-5-- TOTAL SILT .002 -.05	-6-- TOTAL SAND .05 -2	-7-- CLAY FINE LT .0002	-8-- CLAY CO3 LT .002	-9-- SILT FINE .002 -.02	-10- SILT COARSE .02 -.05	-11- SAND VF .05 -.10	-12- SAND F .10 -.25	-13- SAND M .25 -.50	-14- SAND C .5 -1	-15- SAND VC 1 -2	-16- COARSE FRACTIONS(MM) WEIGHT 2 -5	-17- WEIGHT 5 -20	-18- WEIGHT 20 -75	-19- WEIGHT .1- 75	-20- (>2MM) WT PCT OF WHOLE SOIL
						<- - - -	- - - -	- - - -	- - -	PCT OF <2MM	(3A1) - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - ->	<- PCT OF	<75MM(3B1)		->	
84P4396S	345-409	4C5				13.9	36.4	49.7	3.2	2.0	21.8	14.6	10.4	16.5	11.4	6.1	5.3	5	4	1	45	10
84P4397S	409-462	4C6				19.1	36.7	44.2	5.8	1.4	23.9	12.9	8.8	16.3	11.7	4.6	2.8	3	16	32	68	51

DEPTH (CM)	ORGN C 6A1C PCT	TOTAL N 6B3A <2MM	EXTR P 6S3 PPM	TOTAL S 6R3A <- PERCENT	DITH-CIT EXTRACTABLE FE 6C2B	DITH-CIT EXTRACTABLE AL 6G7A OF	DITH-CIT EXTRACTABLE MN 6D2A <2MM -->	(RATIO/CLAY) CEC 8D1	(RATIO/CLAY) 15 BAR 8D1	(ATTERBERG - LIMITS -) LL 4F1 PCT	(ATTERBERG - LIMITS -) PI 4F <0.4MM	(BULK DENSITY) FIELD MOIST 4A3A <- -	(BULK DENSITY) 1/3 BAR 4A1D G/CC	(BULK DENSITY) OVEN DRY 4A1H - - ->	COLE WHOLE SOIL 4D1 CM/CM	(WATER CONTENT) FIELD MOIST 4B4 <- -	(WATER CONTENT) 1/10 BAR 4B1C -PCT OF	(WATER CONTENT) 1/3 BAR 4B1C <2MM	(WATER CONTENT) 15 BAR 4B2a - ->	WRD WHOLE SOIL 4C1 CM/CM
345-409	0.03				1.2		0.1	0.55	0.47				2.01	2.07	0.009			10.9	6.5	0.08
409-462	0.15				1.6		TR	0.46	0.42				1.99	2.10	0.010			12.0	8.1	0.04

AVERAGES, DEPTH 43- 93: PCT CLAY 12 PCT .1-75MM 45

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-001 PRINT DATE 06/12/90
SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 782, SAMPLE 84P4384-4397

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- - - -CEC - - -)			AL	-BASE SAT-		CO3 AS	RES.		COND.		(- - - -PH - - -)	
	CA	MG	NA	K	SUM	ITY	AL	SUM	NH4-	BASES	SAT	SUM	NH4	CACO3	OHMS		MMHOS		CACL2	H2O
DEPTH	5B5A	5B5A	5B5A	5B5A	BASES			CATS	OAC	+ AL			OAC	<2MM	/CM		/CM		.01M	
(CM)	6N2E	6O2D	6P2B	6Q2B		6H5A	6G9A	5A3A	5A8B	5A3B	5G1	5C3	5C1	6E1G	8E1		8I		8C1F	8C1F
	<- - - - - - - - - - - - -MEQ / 100 G - - - - - - - - - - - - ->										<- - - - - -PCT - - - - ->								1:2	1:1
345-409		2.8	0.2	0.1					7.7			100	100	26					7.7	8.3
409-462		4.2	0.1	0.2					8.7			100	100	14					7.7	8.2

ANALYSES: S= ALL ON SIEVED <2MM BASIS

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-001 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 782, SAMPLES 84P4384-4397
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

		-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
		ACID	OXALATE	EXTRACTION		PHOSPHOUS		KCL	TOTAL	(- -WATER		CONTENT- -	)	(- - - - WATER DISPERSIBLE - - - -)						MIN	AGGRT
		OPT	FE	SI	AL		CIT-	MN	C	0.06	1-	2-	15	<- - PIPETTE - - >			< - HYDROMETER - >			SOIL	STABL
		DEN				RET	ACID			BAR	BAR	BAR	BAR	CLAY	SILT	SAND	CLAY	SILT	SAND	CONT	<5mm
SAMPLE	HZ	8J	6C9a	6V2	6G12	6S4	6S5	6D3	6A2d	4B1c	4B1a	4B1a	4B2b	<- - -	3A1c	- - ->	<- - -	SML	- - ->	8F1	4G1
NO.	NO		<- P C T	o f	< 2 m m ->	<- P P	M ->		< - - -	- - - -	- - - -	- - P E	R C E N T	o f	< 2 m m	- - - -	- - - -	- - - -	- - - -	- - - ->	< PCT>
84P4384	1								3.60												
84P4385	2								0.36												
84P4386	3								0.30												
84P4387	4								0.23												
84P4388	5								0.31												
84P4389	6								0.22												
84P4390	7								0.10												
84P4391	8								0.10												
84P4392	9								0.11												
84P4393	10								0.09												
84P4394	11								0.09												
84P4395	12								0.12												

*** P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A ***
(DECATUR COUNTY, INDIANA)

S84IN-031-001

PRINT DATE 06/12/90

CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 782, SAMPLES 84P4384-4397
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	HZ NO	-1-- ACID OXALATE OPT DEN 8J	-2-- EXTRACTION FE 6C9a	-3-- SI 6V2	-4-- AL 6G12	-5-- PHOSPHOUS RET 6S4	-6-- CIT-ACID 6S5	-7-- KCL MN 6D3	-8-- TOTAL C 6A2d	-9-- WATER CONTENT 0.06 BAR 4B1c	-10- 1-BAR 4B1a	-11- 2-BAR 4B1a	-12- 15 BAR 4B2b	-13- WATER DISPERSIBLE PIPETTE CLAY	-14- SILT 3A1c	-15- SAND	-16- HYDROMETER CLAY	-17- SILT SML	-18- SAND	-19- MIN SOIL CONT 8F1	-20- AGGRT STABL <5mm 4G1
			<- PCT of <2mm			->	<- PPM	->	<- PERCENT of <2mm											->	< PCT>
84P4396	13								3.27												
84P4397	14								1.75												

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-001 PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 782, SAMPLE 84P4384-4397

CLAY MINERALOGY (<.002mm)

SAMPLE NUMBER	-1-- FRACTION	-2-- X-RAY 7A2i peak size	-3--	-4--	-5--	-6--	-7-- THERMAL DTA 7A3b Percent	-8--	-9-- TGA 7A4b	-10-	-11- ELEMENTAL 7C3 Percent SiO2	-12- AL2O3	-13- Fe2O3	-14- MgO	-15- CaO	-16- K2O	-17- Na2O	-18-	-19- EGME RETN 7D2 mg/g	-20- INTERPRETATION
84P4384	TCLY	KK 2	VM 2	VR 1	MI 1	VR 1	KK 1						4.6			0.9				
84P4385	TCLY	KK 3	VM 3	VR 1	CL 1		KK 3						7.6			1.3				
84P4387	TCLY	KK 3	VM 3	VR 2	MI 2	QZ 1	KK 5						9.4			1.2				
84P4389	TCLY	KK 3	MT 3	VM 3	MI 2	CL 1	KK11						8.6			1.6				
84P4389	TCLY	QZ 1																		
84P4390	TCLY	KK 3	VM 3	MT 2	VR 1		KK 8						8.7			1.0				
84P4391	TCLY	KK 3	VM 3	MT 2	MI 2	VR 1	KK 9						8.3			0.8				
84P4392	TCLY	KK 2	VM 2	MI 1	MT 1	GE 1	KK13						9.4			0.7				
84P4392	TCLY	QZ 1																		
84P4393	TCLY	MT 2	VM 2	KK 2	GE 2	MI 1	KK19						14.0			1.1				
84P4394	TCLY	MI 3	VM 2	KK 2	GE 1		KK 7						14.3			1.9				
84P4395	TCLY	MI 3	VM 2	GE 2	KK 1		KK 5						11.6			1.2				

SAND - SILT MINERALOGY (2.0-0.002mm)

SAMPLE NUMBER	-1-- FRACTION	-2-- X-RAY 7A2i Peak Size	-3--	-4--	-5--	-6-- THERMAL DTA 7A3b Percent	-7--	-8-- TGA 7A4b	-9--	-10- OPTICAL TOT RE	-11- GRAIN COUNT 7B1a Percent	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20- INTERPRETATION
84P4385	VFS									65	QZ64	FP16	FK15	AR 2	CB 1	OP 1				
84P4385	VFS										MI 1	PR 1	POtr	ZRtr	RUtr	HNtr				
84P4387	VFS									64	QZ64	FP16	FK16	AR 2	PR 1	HNtr				
84P4387	VFS										ZRtr	TMtr	OPtr	POtr						
84P4389	VFS									63	QZ63	FP16	AR11	FK 9	PR 1	POtr				
84P4389	VFS										CBtr	OPtr	TMtr	ZRtr	MItr					
84P4391	VFS									62	QZ62	FK16	FP15	AR 6	HN 1	TMtr				
84P4391	VFS										RUtr	POtr	OPtr	GNtr	ZRtr	PRtr				
84P4392	VFS									61	QZ61	FP19	FK14	AR 5	PRtr	TMtr				
84P4392	VFS										HNtr	OPtr	ZRtr							
84P4393	VFS									56	QZ54	FP17	AR13	FK12	BT 1	GN 1				
84P4393	VFS										PR 1	OP 1	AMtr	ZRtr	TMtr					
84P4394	VFS									56	QZ54	FK18	FP17	AR 6	HN 2	OP 1				
84P4394	VFS										PR 1	MI 1	GN 1	POtr	TMtr	ZRtr				
84P4395	VFS									53	QZ51	FP18	AR12	FK10	MI 4	PR 1				
84P4395	VFS										OP 1	HN 1	GN 1	TMtr	CBtr					

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-001 PRINT DATE 06/12/90
SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 782, SAMPLE 84P4384-4397

-1-- -2-- -3-- -4-- -5-- -6-- -7-- -8-- -9-- -10- -11- -12- -13- -14- -15- -16- -17- -18- -19- -20-

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FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm VFS Very Fine Sand, 0.05-0.10mm

MINERAL INTERPRETATION:

KK	kaolinite	VM	verm-mica	VR	vermiculite	MI	mica	CL	chlorite	QZ	quartz
FP	plag-feld	FK	potas-feld	AR	weath-aggreg	CB	carb-aggreg	OP	opaques	PR	pyroxene
PO	plant opal	ZR	zircon	RU	rutile	HN	hornblende	TM	tourmaline	MT	montmorill
GN	garnet	GE	goethite	BT	biotite	AM	amphibole				

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:
COMMENTS:

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                          ***  P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A  ***

S84IN-031-001                                                                                    PRINT DATE 06/12/90
SAMPLED AS    : COBBSFORK             ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY       ; PEDON 84P 782, SAMPLE 84P4384-4397

            -1--  -2--  -3--  -4--  -5--  -6--  -7--  -8--  -9--  -10-  -11-  -12-  -13-  -14-  -15-  -16-  -17-  -18-  -19-  -20-

---------  ----------------------------------------------------------------------------------------------------------------------
           < - - - - - - - - - - - - - - - - - - - - - - - CLAY MINERALOGY (<.002mm) - - - - - - - - - - - - - - - - - - - - - - - - >
           FRACT < - - - - - - X-RAY - - - - - - -><- - - THERMAL - - - -><- - - - - - - - ELEMENTAL - - - - - - - - -><- -> EGME  INTER
SAMPLE      ION <                            >< - DTA - -><- - TGA - -> SiO2 AL2O3 Fe2O3  MgO   CaO   K2O   Na2O <   > RETN  PRETA
                 < - - - - - -  7A2i - - - - - -><- - 7A3b - >< - - 7A4b - ><- - - - - - - - - - - - 7C3 - - - - - - - - -><    >  7D2   TION
NUMBER     <- - >< - - - - peak size - - - - -><- - - Percent - - - -><- - - - - - - - - Percent - - - - - - - - -><- -><mg/g>< - ->

84P4397     TCLY  MI 3  VM 3  KK 2  MT 1  GE 1  KK 8                                 9.2               1.6
84P4397     TCLY  QZ 1

---------  ----------------------------------------------------------------------------------------------------------------------
           < - - - - - - - - - - - - - - - - - - - - - SAND - SILT MINERALOGY (2.0-0.002mm) - - - - - - - - - - - - - - - - - - - - - >
           FRACT < - - - - - - X-RAY - - -><- - - THERMAL - - - -><- - - - - - - - OPTICAL - - - - - - - - - ><                > INTER
SAMPLE      ION <                      >< - DTA - -><- - TGA - ->TOT RE< - - - - - - GRAIN COUNT - - - - - - -><                > PRETA
                 < - - - - -  7A2i - - - - -><- - 7A3b - >< - 7A4b - >< - - - - - - - - -  7B1a - - - - - - - - - -><                >  TION
NUMBER     < - -><- - - - Peak Size - - -><- - - Percent - - - -><- - - - - - - - - - Percent - - - - - - - - -><- - - - - - - - - -><- ->

84P4396     VFS                                                    40   QZ37  FP14  FK14  CB12  CA10  AR 7
84P4396     VFS                                                         PR 1  ZR 1  HN 1  OP 1  MI 1  GN 1
84P4397     VFS                                                    53   QZ51  FP14  FK12  AR 8  CB 7  CA 5
84P4397     VFS                                                         MI 1  GN 1  HN 1  OP 1  PRtr  ZRtr
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FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm   VFS Very Fine Sand, 0.05-0.10mm

MINERAL INTERPRETATION:

QZ	quartz	FP	plag-feld	FK	potas-feld	CB	carb-aggreg	CA	calcite	AR	weath-aggreg
PR	pyroxene	ZR	zircon	HN	hornblende	OP	opaques	MI	mica	GN	garnet
VM	verm-mica	KK	kaolinite	MT	montmorill	GE	goethite				

RELATIVE PEAK SIZE: 5 Very Large   4 Large   3 Medium   2 Small   1 Very Small   6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:
COMMENTS:

S84IN-031-001

*** SUPPLEMENTARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154,
- PEDON 84P 782, SAMPLES 84P4384-4397
- GENERAL METHODS (ENGINEERING FRACTIONS ARE CALCULATED FROM USDA FRACTION SIZES)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (IN.)	HORIZON	ENGINEERING PERCENTAGE PASSING <-INCHES-> 3	2	3/2	1	3/4	3/8	<-NUMBER-> 4	10	40	200	PSDA SIEVE <-MICRONS-> 20	5	2	CUMULATIVE CURVE FRACTIONS(<76MM) USDA LESS THAN <-MM-> 1.	.5	.25	.10	.05	DIAMETERS(MM) AT <--PERCENTILE--> 60	50	10	ATTERBERG <-PCT> LL	PI	GRADATION UNIFMTY CU	CURVTUR CC
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
84P4384S	0- 7	A	100	100	100	100	100	100	100	100	97	86	59	32	14	100	98	94	88	84	0.02	0.013	0.001			19.6	0.9
84P4385S	7- 12	E	100	100	100	100	100	100	100	100	97	87	59	32	15	100	98	94	88	84	0.02	0.012	0.001			21.3	1.0
84P4386S	12- 17	BT1	100	100	100	100	100	100	100	100	97	88	61	34	16	100	98	94	89	85	0.02	0.011	0.001			23.3	1.1
84P4387S	17- 24	BT2	100	100	100	100	100	100	100	99	97	88	64	38	20	99	98	94	90	86	0.02	0.010	0.001			26.4	1.1
84P4388S	24- 33	BT3	100	100	100	100	100	100	100	99	96	89	67	41	25	99	97	94	90	87	0.01	0.008	0.001			27.3	1.0
84P4389S	33- 52	BT4	100	100	100	100	100	100	100	97	94	87	65	41	26	96	95	92	88	85	0.02	0.008	--			30.7	0.9
84P4390S	52- 67	2BX	100	100	100	100	100	100	100	99	95	78	56	34	19	98	96	90	81	75	0.02	0.014	0.001			36.1	1.0
84P4391S	67- 86	2BC	100	100	100	100	100	100	99	98	94	76	54	33	19	97	95	88	78	72	0.03	0.015	0.001			39.7	0.9
84P4392S	86-100	2C1	100	100	100	100	100	100	99	98	93	76	56	36	23	97	95	88	78	72	0.03	0.013	0.001			46.1	0.8
84P4393S	100-114	3BTB	100	100	100	100	100	100	99	98	91	66	50	37	29	97	93	83	70	61	0.05	0.021	--			>100	0.3
84P4394S	114-128	3C2	100	100	100	99	99	99	98	97	92	58	26	18	12	96	94	88	65	48	0.08	0.055	0.001			63.7	5.3
84P4395S	128-136	4C4	100	100	100	99	99	97	95	92	81	52	34	23	15	89	83	72	56	46	0.13	0.065	0.001			>100	1.3

DEPTH (IN.)	(WEIGHT FRACTIONS) ---WHOLE SOIL (MM)- <------PCT OF WHOLE SOIL-----> >2	250-UP	250-75	75-2	75-20	20-5	5-2	<2	-<75 MM FRACTION-- <--PCT OF <75 MM-> 75-2	75-20	20-5	5-2	<2		(WEIGHT PER UNIT VOLUME G/CC) ------WHOLE SOIL------ SOIL SURVEY 1/3 BAR	OVEN-DRY	ENGINEERING MOIST	SATUR-ATED	-------<2 MM FRACTION------- --SOIL SURVEY-- 1/3 BAR	15 BAR	OVEN-DRY	ENGINEERING MOIST	SATUR-ATED	(VOID) --RATIOS-- AT 1/3 BAR WHOLE SOIL	<2 MM
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
0- 7	TR	--	--	--	--	TR	TR	100	--	--	TR	TR	100		1.14	1.23	1.52	1.71	1.13	1.19	1.22	1.50	1.70	1.32	1.35
7- 12	TR	--	--	--	--	--	TR	100	--	--	--	TR	100		1.40										
12- 17	TR	--	--	--	--	TR	TR	100	--	--	TR	TR	100		1.51										
17- 24	1	--	--	1	--	--	1	99	1	--	--	1	99		1.57	1.62	1.92	1.98	1.56	1.59	1.61	1.90	1.97	0.69	0.70
24- 33	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.51										
33- 52	3	--	--	3	--	TR	3	97	3	--	TR	3	97		1.48	1.60	1.82	1.92	1.46	1.52	1.58	1.80	1.91	0.79	0.82
52- 67	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.77	1.83	2.07	2.10	1.76	1.79	1.82	2.06	2.10	0.50	0.51
67- 86	2	--	--	2	--	1	1	98	2	--	1	1	98		1.71										
86-100	2	--	--	2	--	1	1	98	2	--	1	1	98		1.66	1.78	1.98	2.03	1.65	1.72	1.77	1.97	2.03	0.60	0.61
100-114	2	--	--	2	--	1	1	98	2	--	1	1	98		1.69	1.91	2.01	2.05	1.68	1.76	1.90	2.01	2.05	0.57	0.58
114-128	3	--	--	3	1	1	1	97	3	1	1	1	97		1.62										
128-136	8	--	--	8	1	4	3	92	8	1	4	3	92		1.61	1.66	1.90	2.00	1.56	1.59	1.61	1.86	1.97	0.65	0.70

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-001 PRINT DATE 06/12/90
CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 782, SAMPLE 84P4384-4397

DEPTH (IN.)	VOLUME FRACTIONS (MM) AT 1/3 BAR – WHOLE SOIL >2 (PCT OF WHOLE SOIL) 51	250-UP 52	250-75 53	75-2 54	75-20 55	20-5 56	5-2 57	SOIL <2 58	2-.05 59	.05-.002 60	LT .002 61	PORES D 62	PORES F 63	(C/N) RATIO 64	RATIOS TO CLAY (<2 MM FRACTION) FINE CLAY 65	CEC SUM CATS 66	CEC NH4-OAC 67	15 BAR H2O 68	LE 1/3 BAR 69	LINEAR EXTENSIBILITY WHOLE SOIL <-1/3 BAR TO 15 BAR (PCT) 70	WHOLE SOIL OVEN-DRY 71	<2 MM 15 BAR 72	<2 MM OVEN-DRY 73	W R D WHOLE SOIL (IN/IN) 74	W R D <2 MM (IN/IN) 75
0- 7	TR	--	--	--	--	TR	TR	100	7	30	6	19	38	14	0.37	2.30	1.25	0.86	0.190	1.7	2.6	1.7	2.6	0.24	0.23
7- 12	TR	--	--	--	--	--	TR	100	8	37	8	47		11	0.48	0.71	0.56	0.44							
12- 17	TR	--	--	--	--	TR	TR	100	8	39	9	43		8	0.46	0.63	0.52	0.43							
17- 24	1	--	--	1	--	--	1	99	8	40	12	6	35	7	0.49	0.61	0.55	0.42	0.053	0.6	1.1	0.6	1.1	0.21	0.21
24- 33	1	--	--	1	--	TR	1	99	7	36	14	43			0.51	0.69	0.56	0.45							
33- 52	2	--	--	2	--	TR	2	98	7	34	14	10	34		0.57	0.72	0.62	0.46	0.102	1.3	2.6	1.4	2.7	0.16	0.16
52- 67	1	--	--	1	--	TR	1	99	16	38	13	3	30		0.57	0.68	0.55	0.44	0.057	0.6	1.1	0.6	1.1	0.15	0.15
67- 86	1	--	--	1	--	1	1	99	17	34	12	35			0.61	0.58	0.56	0.42							
86-100	1	--	--	1	--	1	1	99	16	31	14	5	32		0.63	0.68	0.57	0.39	0.103	1.4	2.4	1.4	2.4	0.16	0.17
100-114	1	--	--	1	--	1	1	99	24	21	18	4	32		0.53	0.80	0.68	0.47	0.143	1.6	4.2	1.6	4.2	0.10	0.10
114-128	2	--	--	2	1	1	1	98	30	21	8	39			0.41	0.90	0.74	0.58							
128-136	5	--	--	5	1	2	2	95	28	19	9	10	29		0.26	1.10	0.64	0.52	0.066	0.6	1.0	0.6	1.1	0.16	0.17

DEPTH (IN.)	WEIGHT FRACTIONS – CLAY FREE – WHOLE SOIL >2 PCT 76	75-2 (PCT OF >2MM+SAND+SILT) 77	20-2 78	2-.05 79	.05-.002 80	LT .002 81	<2 MM FRACTION SANDS VC (PCT OF SAND+SILT) 82	C 83	M 84	F 85	VF 86	SILTS C 87	SILTS F 88	CLAY 89	TEXTURE DETERMINED IN FIELD (<2 MM) 90	BY PSDA 91	PSDA (MM) SAND 2-.05 (PCT OF 2MM) 92	SILT .05-.002 93	CLAY LT .002 94	(PH) CACL2 .01M 95	ELECTRICAL RESIST. OHMS (<2 MM) 96	CONDUCT. MMHOS 97	SALT MG/KG 98	CUMULT. AMOUNTS IN. OF H2O 1/3 BAR TO 15BAR (WHL SOIL) 99	1/3 BAR TO AIRDRY 100
0- 7				19	81	16	1	2	5	7	5	29	52	16	SIL	SIL	16.3	70.0	13.7	7.1					
7- 12				18	82	17	TR	2	5	7	4	29	52	17	SIL	SIL	15.5	69.8	14.7	4.6					
12- 17				17	83	20	TR	1	5	6	4	29	53	20	SIL	SIL	14.5	69.1	16.4	3.9					
17- 24	1	1	1	16	83	26	1	1	4	6	4	29	55	26	SIL	SIL	12.7	66.6	20.7	4.0					
24- 33	1	1	1	16	83	33	1	2	4	5	4	27	57	33	SIL	SIL	12.0	63.0	25.0	3.9					
33- 52	4	4	4	16	80	34	1	2	4	5	4	29	55	36	SIL	SIL	12.1	61.5	26.4	3.8					
52- 67	1	1	1	30	69	24	1	3	8	11	7	24	46	24	SIL	SIL	24.2	56.4	19.4	4.0					
67- 86	2	2	2	32	65	23	1	2	9	13	8	23	44	24	SIL	SIL	26.6	54.3	19.1	4.2					
86-100	3	3	3	34	64	30	1	3	9	13	8	22	44	30	SIL	SIL	26.5	50.2	23.3	5.2					
100-114	3	3	3	51	46	40	1	5	14	20	12	17	30	41	CL	CL	37.4	33.3	29.3	6.6					
114-128	3	3	2	56	40	14	2	2	7	27	21	25	17	15	FSL	L	51.0	36.2	12.8	7.2					
128-136	9	9	8	54	37	18	4	8	15	21	13	16	25	20	L	L	49.7	33.6	16.7	7.5					

S84IN-031-001

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154,
- PEDON 84P 782, SAMPLES 84P4384-4397
- GENERAL METHODS (ENGINEERING FRACTIONS ARE CALCULATED FROM USDA FRACTION SIZES)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (IN.)	HORIZON	ENGINEERING PERCENTAGE PASSING <-INCHES-> 3	2	3/2	1	3/4	3/8	<-NUMBER-> 4	10	40	200	PSDA SIEVE <-MICRONS-> 20	5	2	CUMULATIVE CURVE FRACTIONS(<76MM) USDA LESS THAN <-MM-> 1.	.5	.25	.10	.05	DIAMETERS(MM) AT <--PERCENTILE--> 60	50	10	ATTERBERG <-PCT> LL	PI	GRADATION UNIFMTY CU	CURVTUR CC
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
84P4396S	136-161	4C5	100	100	100	99	99	97	95	90	77	51	32	20	13	85	80	69	55	45	0.14	0.071	0.001			>100	1.4
84P4397S	161-182	4C6	100	91	84	75	68	60	52	49	44	30	21	14	9	48	45	40	32	27	9.45	2.659	0.002			>100	0.3

DEPTH (IN.)	(WEIGHT FRACTIONS) ---WHOLE SOIL (MM)- <------PCT OF WHOLE SOIL-----> >2	250 -UP	250 -75	75 -2	75 -20	20 -5	5 -2	<2	--<75 MM FRACTION-- <--PCT OF <75 MM-> 75 -2	75 -20	20 -5	5 -2	<2		(WEIGHT PER UNIT VOLUME G/CC) ------WHOLE SOIL------ SOIL SURVEY 1/3 BAR	OVEN -DRY	ENGINEERING MOIST	SATUR -ATED	-------<2 MM FRACTION------- --SOIL SURVEY-- 1/3 BAR	15 BAR	OVEN -DRY	ENGINEERING MOIST	SATUR -ATED	(VOID) --RATIOS-- AT 1/3 BAR WHOLE SOIL	<2 MM
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
136-161	10	--	--	10	1	4	5	90	10	1	4	5	90		2.06	2.12	2.27	2.28	2.01	2.04	2.07	2.23	2.25	0.29	0.32
161-182	51	--	--	51	32	16	3	49	51	32	16	3	49		2.27	2.34	2.41	2.41	1.99	2.03	2.10	2.23	2.24	0.17	0.33

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-001 PRINT DATE 06/12/90
CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 782, SAMPLE 84P4384-4397

DEPTH (IN.)	VOLUME FRACTIONS, WHOLE SOIL (MM) AT 1/3 BAR: >2	250 -UP	250 -75	75 -2	75 -20	20 -5	5 -2	<2	2- .05	.05- .002	LT .002	PORES D	PORES F	(C/)(/N) RAT -IO	RATIOS TO CLAY, <2 MM FRACTION: FINE CLAY	CEC SUM CATS	CEC NH4- OAC	15 BAR H2O	LE 1/3 BAR	LINEAR EXTENSIBILITY, WHOLE SOIL, 1/3 BAR TO 15 BAR (PCT)	WHOLE SOIL, 1/3 BAR TO OVEN-DRY (PCT)	<2 MM, 1/3 BAR TO 15 BAR (PCT)	<2 MM, 1/3 BAR TO OVEN-DRY (PCT)	W R D WHOLE SOIL (IN/IN)	W R D <2 MM (IN/IN)
	PCT OF WHOLE SOIL																								
	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
136-161	8	--	--	8	1	3	4	92	35	25	10	1	21		0.23	3.24	0.55	0.47	0.072	0.5	1.0	0.5	1.0	0.08	0.09
161-182	44	--	--	44	27	14	3	56	19	16	8		14		0.30	2.29	0.46	0.42	0.094	0.3	1.0	0.7	1.8	0.04	0.08

DEPTH (IN.)	WEIGHT FRACTIONS - CLAY FREE, WHOLE SOIL: >2	75 -2	20 -2	2- .05	.05- .002	LT .002	<2 MM FRACTION, SANDS: VC	C	M	F	VF	SILTS C	SILTS F	CLAY	TEXTURE DETERMINED IN FIELD	TEXTURE BY PSDA	PSDA (MM) SAND 2- .05	SILT .05- .002	CLAY LT .002	PH CA-CL2 .01M	ELECTRICAL RES-IST. OHMS	CON-DUCT. MMHOS	SALT MG/KG	CUMULT. AMOUNTS IN. OF H2O 1/3 BAR TO 15BAR	AIRDRY
	PCT OF >2MM+SAND+SILT						PCT OF SAND+SILT								(<2 MM)		(PCT OF .2MM)			(<2 MM)				(WHL SOIL)	
	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
136-161	11	11	10	51	37	14	6	7	13	19	12	17	25	16	L	L	49.7	36.4	13.9	7.7					
161-182	56	56	21	24	20	10	3	6	14	20	11	16	30	24	L	L	44.2	36.7	19.1	7.7					

N A R R A T I V E   P E D O N   D E S C R I P T I O N

Pedon: Cobbsfork
Soil Survey Number S84-IN-031-001
Location: Decatur County, Indiana
SE 1/4 of SE 1/4 of SW 1/4 sec 26 T10N R10E Greensburg quadrangle.
Latitude: 39-17-50-N
Physiography: Upland slope in level or undulating uplands
Slope: %
Precipitation: cm - Aquic Moisture Regime.
MLRA: 114 Southern Illinois and Indiana Thin Loess and Till Plain
Water Table Depth: 0
Drainage: Poorly drained
Stoniness: Erosion or Deposition:
Particle Size Control Section: 30 to 81 cm
Parent Material: lo
ss from mixed-calcareous material over alluvium from mixed material over alluvium from mixed material over glacial till from mixed-calcareous mater
Classification: Fine-silty, mixed, mesic Typic Ochraqualf
Diagnostic Horizons: 0 to 13 cm Ochric, 30 to 132 cm Argillic
Described By: A. Nickell and B. Nagel

NSSL Pedon Number: 84P0782
Print Date: 06/12/90
Longitude: 085-22-35-W
Elevation: 300 m MSL
Permeability: Very slow
Land Use: Forest land not grazed
Runoff:
Sample Date: 09/84

A -- 0 to 18 cm; dark grayish brown (10YR 4/2) moist silt loam; moderate structure; friable; many fine roots; abrupt wavy boundary.
84P4384

E -- 18 to 30 cm; light brownish gray (10YR 6/2) moist silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse platy structure; friable; common fine roots; continuous prominent dark grayish brown (10YR 4/2) organic coats in root channels and/or pores; clear wavy boundary.
84P4385

Bt1 -- 30 to 43 cm; light gray (10YR 7/2) moist silt loam; common medium distinct yellowish brown (10YR 5/6) and common medium prominent yellowish brown (10YR 5/8) mottles; weak medium and coarse subangular blocky structure; friable; common fine roots; discontinuous prominent strong brown (7.5YR 4/6) iron stains on faces of peds; clear wavy boundary.
84P4386

Bt2 -- 43 to 61 cm; light gray (10YR 7/2) moist silt loam; many fine and medium distinct yellowish brown (10YR 5/6) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium and coarse prismatic structure; friable; common fine roots; patchy light brownish gray (10YR 6/2) clay films on vertical faces of peds; clear wavy boundary.
Clay skins are flows on vertical faces.
84P4387

Bt3 -- 61 to 84 cm; light gray (10YR 7/2) moist silt loam; common medium distinct yellowish brown (10YR 5/6) and few medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; discontinuous distinct light brownish gray (10YR 6/2) clay films on vertical faces of peds; few medium irregular soft masses of iron-manganese; clear wavy boundary.
Clay flows are silty clay loam.
84P4388

Bt4 -- 84 to 132 cm; light gray (10YR 7/2) moist silt loam; common fine and medium distinct yellowish brown (10YR 5/6) and common fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; firm; common fine and medium roots; discontinuous distinct light brownish gray (10YR 6/2) clay films on vertical faces of peds; gradual wavy boundary.
Clay skins are flows and silty clay loam.
84P4389

2Bx --132 to 170 cm; yellowish brown (10YR 5/6) and yellowish brown (10YR 5/4) moist silt loam; common fine and medium distinct light gray to gray (10YR 6/1) and common fine and medium distinct light gray (10YR 7/1) mottles; moderate very coarse prismatic structure parting to weak medium and coarse subangular blocky; very firm, brittle; few fine and medium roots; discontinuous distinct brown (10YR 5/3) clay films on faces of peds; 1 percent pebbles; gradual smooth boundary.
Gray colors are silty clay loam clay flows.
84P4390

2BC --170 to 218 cm; yellowish brown (10YR 5/6) and yellowish brown (10YR 5/4) moist silt loam; many coarse prominent light

gray to gray (10YR 6/1) mottles; weak very coarse prismatic structure; friable; few medium and coarse roots; discontinuous distinct gray (10YR 5/1) clay films on vertical faces of peds and discontinuous distinct brown (10YR 5/3) clay films on faces of peds; 1 percent pebbles; gradual smooth boundary.
Consistence is firm in gray.
84P4391

2C1 --218 to 254 cm; yellowish brown (10YR 5/6) moist silt loam; many coarse prominent light gray to gray (10YR 6/1) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; friable; very few fine and medium roots; pressure faces on faces of peds; many medium irregular soft masses of iron-manganese; 1 percent pebbles; clear smooth boundary.
Gray is silty clay loam.
84P4392

3Btb --254 to 290 cm; 60% strong brown (7.5YR 5/6) and 40% light gray to gray (N 6/0) moist clay loam; weak medium prismatic structure parting to weak medium and coarse subangular blocky; friable; very few fine and medium roots; distinct grayish brown (10YR 5/2) clay films on faces of peds; many medium irregular soft masses of iron-manganese; clear smooth boundary.
Truncated buried paleosol.
84P4393

3C2 --290 to 325 cm; strong brown (7.5YR 5/8) and strong brown (7.5YR 4/6) moist fine sandy loam and loam; common medium distinct light gray to gray (10YR 6/1) and many medium distinct brownish yellow (10YR 6/6) mottles; massive; firm; very few fine and medium roots; distinct gray (10YR 5/1) clay films on faces of peds; common medium irregular soft masses of iron-manganese; clear smooth boundary.
This is Ruhe's pedisediment. Compact part is firm other is friable.
84P4394

4C4 --325 to 345 cm; yellowish brown (10YR 5/8) moist loam; common medium prominent dark greenish gray (5GY 4/1) mottles; massive; extremely firm; very few fine and medium roots; many distinct very dark gray (10YR 3/1) manganese or iron-manganese coats on faces of peds; 5 percent pebbles; clear smooth boundary.
Fill material (tongues from previous horizon) on horizontal clevage planes.
84P4395

4C5 --345 to 409 cm; brown (7.5YR 5/4) moist loam; common medium prominent pinkish gray (7.5YR 6/2) mottles; massive; extremely firm; yellowish red (5YR 5/8) iron stains on faces of peds and very dark gray (10YR 3/1) manganese or iron-manganese coats on faces of peds and pressure faces on sand and gravel; strongly effervescent; 5 percent pebbles; clear smooth boundary.
10YR 5/6 pockets of loamy sand or sandy loam. There is a line chert accross the lower boundary. Horizontal clevage planes.
84P4396

4C6 --409 to 462 cm; yellowish brown (10YR 5/4), light brownish gray (10YR 6/2) and light gray to gray (N 6/0) moist loam and clay loam; common medium distinct yellowish brown (10YR 5/6) and common medium distinct yellowish brown (10YR 5/8) mottles; massive; extremely firm; brown (10YR 5/3) clay films on faces of peds; slightly effervescent; 5 percent pebbles.
Gray zones are clay loam and non calcareous.
84P4397

S84IN-031-002

*** PRIMARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF
REVISED TO : SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 783, SAMPLES 84P4398-4415
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (CM)	HORIZON	-1-- CLAY LT .002	-2-- SILT .002 -.05	-3-- SAND .05 -2	-4-- FINE CLAY LT .0002	-5-- CO3 LT .002	-6-- FINE SILT .002 -.02	-7-- COARSE SILT .02 -.05	-8-- VF SAND .05 -.10	-9-- F SAND .10 -.25	-10- M SAND .25 -.50	-11- C SAND .5 -1	-12- VC SAND 1 -2	-13- COARSE FRACTIONS WEIGHT 2 -5	-14- 5 -20	-15- 20 -75	-16- .1- 75	-17- (>2MM) WT PCT OF WHOLE SOIL
			<- - - - - - - -	PCT OF <2MM	(3A1)	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - ->	<- PCT OF	<75MM(3B1)		->	SOIL
84P4398S	0- 20	AP	18.1	76.3	5.6	6.4		51.2	25.1	0.9	1.3	1.6	1.4	0.4	--	--	--	5	--
84P4399S	20- 33	E	20.3	75.8	3.9	8.1		55.1	20.7	0.7	0.9	1.2	0.9	0.2	--	--	--	3	--
84P4400S	33- 50	EB	24.4	73.0	2.6	11.7		51.6	21.4	0.6	0.5	0.7	0.7	0.1	--	--	--	2	--
84P4401S	50- 73	BE	28.7	69.0	2.3	18.1		44.2	24.8	0.9	0.5	0.5	0.4	--	--	--	--	1	--
84P4402S	73- 96	BTX	27.8	65.2	7.0	19.1		42.0	23.2	1.0	1.7	1.9	1.4	1.0	TR	1	--	7	1
84P4403S	96-118	BX1	18.6	62.0	19.4	10.6		43.0	19.0	2.0	5.1	6.3	3.8	2.2	2	2	--	21	4
84P4404S	118-140	BX2	18.4	60.9	20.7	10.2		43.4	17.5	2.0	5.1	6.6	4.1	2.9	2	3	3	25	8
84P4405S	140-161	BX3	14.8	56.8	28.4	6.5		40.9	15.9	3.6	7.3	8.6	5.2	3.7	3	6	1	32	10
84P4406S	161-181	BT	29.1	41.6	29.3	13.8		30.1	11.5	3.9	6.3	8.0	6.4	4.7	7	13	--	40	20
84P4407S	181-207	2BTB1	48.4	18.2	33.4	27.8		12.8	5.4	3.2	6.2	11.4	7.5	5.1	7	8	--	41	15
84P4408S	207-235	2BTB2	46.6	16.4	37.0	26.7		11.7	4.7	3.6	7.1	15.2	7.5	3.6	3	2	--	37	5
84P4409S	235-256	2BTB3	37.0	16.7	46.3	21.4		11.5	5.2	4.2	9.0	22.8	6.7	3.6	6	7	1	50	14

DEPTH (CM)	ORGN C 6A1C PCT	TOTAL N 6B3A <2MM	EXTR P 6S3 PPM	TOTAL S 6R3A	DITH-CIT EXTRACTABLE FE 6C2B	AL 6G7A	MN 6D2A	(RATIO/CLAY) CEC 8D1	15 BAR 8D1	(ATTERBERG - LIMITS -) LL 4F1	PI 4F	(- BULK DENSITY -) FIELD MOIST 4A3A	1/3 BAR 4A1D	OVEN DRY 4A1H	COLE WHOLE SOIL 4D1	(- - -WATER CONTENT - -) FIELD MOIST 4B4	1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2a	WRD WHOLE SOIL 4C1
				<- PERCENT		OF <2MM -->				PCT <0.4MM		<- - G/CC -	- ->		CM/CM	<- - -PCT OF <2MM			- ->	CM/CM
0- 20	1.24	0.129			1.4		0.2	0.62	0.45				1.29	1.34	0.013			20.0	8.2	0.15
20- 33	0.44	0.065			1.8		0.2	0.54	0.48				1.52	1.59	0.015			25.2	9.7	0.24
33- 50	0.17	0.038			1.9		TR	0.56	0.45				1.48	1.53	0.011			24.7	11.0	0.20
50- 73	0.11	0.032			1.9		TR	0.62	0.49				1.52	1.62	0.021			24.8	14.0	0.16
73- 96	0.10				2.0		TR	0.66	0.49				1.44	1.57	0.029			26.5	13.7	0.18
96-118	0.07				1.9		0.1	0.68	0.49				1.55	1.65	0.021			21.8	9.1	0.19
118-140	0.07				1.5		TR	0.71	0.47				1.60						8.7	
140-161	0.06				1.6		0.1	0.55	0.39				1.61	1.65	0.008			20.3	5.8	0.22
161-181	0.08				2.0		TR	0.45	0.34				1.50						9.9	
181-207	0.11				3.8		TR	0.43	0.36				1.42	1.61	0.039			28.5	17.3	0.15
207-235	0.13				4.0		TR	0.44	0.41				1.40						18.9	
235-256	0.09				3.4		TR	0.44	0.43				1.45	1.58	0.027			24.1	15.9	0.11

AVERAGES, DEPTH 33- 83: PCT CLAY 27 PCT .1-75MM 3

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-002 PRINT DATE 06/12/90

SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 783, SAMPLE 84P4398-4415

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- - - -CEC - - -)			AL	-BASE SAT-		CO3 AS	RES.		COND.		(- - - -PH - - -)	
	CA	MG	NA	K	SUM	ITY	AL	SUM	NH4-	BASES	SAT	SUM	NH4	CACO3	OHMS		MMHOS		CACL2	H2O
DEPTH	5B5A	5B5A	5B5A	5B5A	BASES			CATS	OAC	+ AL			OAC	<2MM	/CM		/CM		.01M	
(CM)	6N2E	6O2D	6P2B	6Q2B		6H5A	6G9A	5A3A	5A8B	5A3B	5G1	5C3	5C1	6E1G	8E1		8I		8C1F	8C1F
	<- - - - - - - - - - - - -MEQ / 100 G - - - - - - - - - - - - ->										<- - - - -PCT - - - - ->								1:2	1:1
0- 20	3.9	0.6	TR	1.2	5.7	10.8	1.2	16.5	11.3	6.9	17	35	50						4.3	4.8
20- 33	5.0	0.7	TR	0.4	6.1	9.1	1.8	15.2	11.0	7.9	23	40	55						4.4	4.8
33- 50	4.4	0.8	TR	0.3	5.5	12.3	5.0	17.8	13.6	10.5	48	31	40						3.9	4.5
50- 73	4.3	2.0	TR	0.4	6.7	15.8	7.5	22.5	17.7	14.2	53	30	38						3.8	4.3
73- 96	2.0	4.7	0.1	0.3	7.1	16.2	7.4	23.3	18.4	14.5	51	30	39						3.7	4.2
96-118	1.3	3.3	0.1	0.2	4.9	10.0	4.2	14.9	12.6	9.1	46	33	39						3.9	4.2
118-140	2.0	3.8	TR	0.2	6.0	8.8	3.5	14.8	13.1	9.5	37	41	46						3.9	4.3
140-161	1.5	2.6	0.1	0.1	4.3	5.6	1.4	9.9	8.1	5.7	25	43	53						4.2	4.6
161-181	3.8	5.2	0.1	0.1	9.2	7.0	1.1	16.2	13.0	10.3	11	57	71						4.4	4.7
181-207	7.5	8.6	0.2	0.2	16.5	9.1	0.9	25.6	20.8	17.4	5	64	79						4.7	4.9
207-235	7.7	8.1	0.3	0.2	16.3	8.4	0.5	24.7	20.7	16.8	3	66	79						4.8	5.1
235-256	7.0	6.7	0.3	0.2	14.2	6.6	0.2	20.8	16.4	14.4	1	68	87						5.0	5.4

ESTIMATED BULK DENSITY FOR LAYER 7, 9, 11,

ANALYSES: S= ALL ON SIEVED <2MM BASIS

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-002 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF
REVISED TO : SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 783, SAMPLES 84P4398-4415
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (CM)	HORIZON	-1-- (- - -TOTAL - - -) CLAY LT .002	-2-- SILT .002 -.05	-3-- SAND .05 -2	-4-- (- -CLAY- -) FINE LT .0002	-5-- CO3 LT .002	-6-- (- -SILT- -) FINE .002 -.02	-7-- COARSE .02 -.05	-8-- (- - -SAND- - -) VF .05 -.10	-9-- F .10 -.25	-10- M .25 -.50	-11- C .5 -1	-12- VC 1 -2	-13- (-COARSE FRACTIONS(MM)-) WEIGHT 2 -5	-14- 5 -20	-15- 20 -75	-16- .1- 75	-17- (>2MM) WT PCT OF WHOLE SOIL
			<- - -	- - -	- - -	- - -	PCT OF <2MM	(3A1)	- - -	- - -	- - -	- - -	->	<- PCT OF	<75MM	(3B1)	->	SOIL
84P4410S	256-296	3BTB4	29.8	20.7	49.5	15.5		14.0	6.7	6.4	12.6	18.1	7.0	5.4	5	12	3	54	20
84P4411S	296-350	3BTB5	28.5	19.4	52.1	14.5		12.2	7.2	7.3	14.6	17.2	8.4	4.6	5	4	--	50	9
84P4412S	350-408	3BTB6	25.5	13.9	60.6	13.2		9.0	4.9	6.0	17.9	24.2	9.3	3.2	3	2	--	57	5
84P4413S	408-453	3BTB7	23.7	13.4	62.9	12.6		9.1	4.3	3.7	12.1	30.2	12.1	4.8	6	8	1	65	15
84P4414S	453-512	3BC1	30.0	11.9	58.1	19.4		8.2	3.7	3.8	15.1	26.4	9.1	3.7	4	3	--	57	7
84P4415S	512-543	3BC2	22.9	17.3	59.8	16.1		10.0	7.3	5.5	17.1	30.0	5.7	1.5	3	1	--	56	4

DEPTH (CM)	ORGN C 6A1C PCT	TOTAL N 6B3A <2MM	EXTR P 6S3 PPM	TOTAL S 6R3A <- PERCENT	(- - DITH-CIT - -) EXTRACTABLE FE 6C2B	AL 6G7A OF	MN 6D2A <2MM -->	(RATIO/CLAY) CEC 8D1	15 BAR 8D1	(ATTERBERG) - LIMITS - LL 4F1 PCT	PI 4F <0.4MM	(- BULK DENSITY -) FIELD MOIST 4A3A <- -	1/3 BAR 4A1D G/CC	OVEN DRY 4A1H - - ->	COLE WHOLE SOIL 4D1 CM/CM	(- - -WATER CONTENT - -) FIELD MOIST 4B4 <- -	1/10 BAR 4B1C -PCT	1/3 BAR 4B1C OF <2MM	15 BAR 4B2a - ->	WRD WHOLE SOIL 4C1 CM/CM
256-296	0.05				3.6		0.1	0.50	0.52				1.40						15.5	
296-350	0.07				3.0		0.1	0.45	0.47				1.36	1.45	0.021			25.2	13.5	0.15
350-408	0.03				2.2		0.1	0.46	0.48				1.40						12.2	
408-453	0.06				2.3		0.1	0.44	0.48				1.38	1.45	0.015			22.1	11.4	0.14
453-512	0.11				2.5		0.1	0.47	0.50				1.40						15.0	
512-543	0.07				2.3		0.1	0.48	0.53				1.50	1.58	0.017			21.2	12.1	0.13

AVERAGES, DEPTH 33- 83: PCT CLAY 30 PCT .1-75MM 54

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-002 PRINT DATE 06/12/90

SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 783, SAMPLE 84P4398-4415

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- - - -CEC - - -)			AL	-BASE SAT-		CO3 AS	RES.		COND.	(- - - -PH - - -)		
DEPTH	CA	MG	NA	K	SUM	ITY	AL	SUM	NH4-	BASES	SAT	SUM	NH4	CACO3	OHMS		MMHOS		CACL2	H2O
(CM)	5B5A 6N2E	5B5A 6O2D	5B5A 6P2B	5B5A 6Q2B	BASES	6H5A	6G9A	CATS 5A3A	OAC 5A8B	+ AL 5A3B	5G1	5C3	OAC 5C1	<2MM 6E1G	/CM 8E1		/CM 8I		.01M 8C1F	8C1F
	<- - - -	- - - -	- - - -	- - - -	-MEQ /	100 G -	- - - -	- - - -	- - - -	- ->	<- - -	- -PCT	- - - -	->					1:2	1:1
256-296	6.4	5.6	0.4	0.2	12.6	6.0		18.6	14.9			68	85						5.2	5.6
296-350	6.0	4.9	0.2	0.2	11.3	5.5		16.8	12.9			67	88						5.3	5.6
350-408	5.6	4.1	0.2	0.1	10.0	4.9		14.9	11.6			67	86						5.3	5.7
408-453	5.4	3.7	0.2	0.1	9.4	4.8		14.2	10.4			66	90						5.5	5.8
453-512	7.6	4.5	0.2	0.2	12.5	5.0		17.5	14.1			71	89						5.5	5.7
512-543	6.2	3.3	0.2	0.2	9.9	4.6		14.5	10.9			68	91						5.7	5.9

ESTIMATED BULK DENSITY FOR LAYER 13, 15, 17,

ANALYSES: S= ALL ON SIEVED <2MM BASIS

*** P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-002 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

CLASSIFICATION: SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 783, SAMPLES 84P4398-4415
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	HZ NO	-1-- ACID OXALATE OPT DEN 8J	-2-- EXTRACTION FE 6C9a	-3-- SI 6V2	-4-- AL 6G12	-5-- PHOSPHOUS RET 6S4	-6-- CIT-ACID 6S5	-7-- KCL MN 6D3	-8-- TOTAL C 6A2d	-9-- (- -WATER CONTENT- -) 0.06 BAR 4B1c	-10- 1- BAR 4B1a	-11- 2- BAR 4B1a	-12- 15 BAR 4B2b	-13- (- - - - WATER DISPERSIBLE - - - -) <- - PIPETTE - - > CLAY <- - -	-14- SILT 3A1c	-15- SAND - - ->	-16- <- - HYDROMETER - > CLAY <- - -	-17- SILT SML	-18- SAND - - ->	-19- MIN SOIL CONT 8F1	-20- AGGRT STABL <5mm 4G1
			<- P C T of < 2 mm ->				<- P P M ->		<- - - - - - - - - - - P E R C E N T					of < 2 mm						- - - - - - - - - - - - >	< PCT>
84P4398	1								1.29												
84P4399	2								0.61												
84P4400	3								0.25												
84P4401	4								0.19												
84P4402	5								0.15												
84P4403	6								0.18												
84P4404	7								0.14												
84P4405	8								0.08												
84P4406	9								0.14												
84P4407	10								0.18												
84P4408	11								0.17												
84P4409	12								0.19												

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-002 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

CLASSIFICATION: SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 783, SAMPLES 84P4398-4415
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

		-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
		ACID OXALATE		EXTRACTION		PHOSPHOUS		KCL	TOTAL	(- -WATER		CONTENT- -	)	(- - - - WATER DISPERSIBLE - - - -)						MIN	AGGRT
		OPT	FE	SI	AL		CIT-	MN	C	0.06	1-	2-	15	<- - PIPETTE - - >			< - HYDROMETER - >			SOIL	STABL
		DEN				RET	ACID			BAR	BAR	BAR	BAR	CLAY	SILT	SAND	CLAY	SILT	SAND	CONT	<5mm
SAMPLE	HZ	8J	6C9a	6V2	6G12	6S4	6S5	6D3	6A2d	4B1c	4B1a	4B1a	4B2b	<- - -	3A1c	- - ->	<- - -	SML	- - ->	8F1	4G1
NO.	NO		<- P C T of < 2 mm ->			<- P P M		->	< - - - - - - - P E R C E N T of < 2 mm											- - - >	< PCT>
84P4410	13								0.13												
84P4411	14								0.12												
84P4412	15								0.15												
84P4413	16								0.13												
84P4414	17								0.14												
84P4415	18								0.09												

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-002 PRINT DATE 06/12/90
SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 783, SAMPLE 84P4398-4415

CLAY MINERALOGY (<.002mm)

SAMPLE NUMBER	-1-- FRACTION	-2-- X-RAY 7A2i peak size	-3--	-4--	-5--	-6--	-7-- THERMAL DTA 7A3b Percent	-8--	-9-- TGA 7A4b Percent	-10-	-11- SiO2	-12- AL2O3	-13- Fe2O3	-14- MgO	-15- CaO	-16- K2O	-17- Na2O	-18-	-19- EGME RETN 7D2 mg/g	-20- INTERPRETATION
84P4398	TCLY	KK 2	VM 2	MI 1	QZ 1		KK 3						9.0			1.5				
84P4399	TCLY	KK 3	VM 2	MI 2	MT 1	GE 1	KK 3						10.2			1.4				
84P4400	TCLY	KK 3	VM 2	MI 2	MT 1		KK 6						10.9			1.5				
84P4401	TCLY	KK 3	MI 3	VM 3	MT 3		KK 7						10.9			1.8				
84P4402	TCLY	KK 3	MI 3	VM 3	MT 2		KK 6						10.7			1.7				
84P4403	TCLY	KK 3	VM 3	MI 2	MT 2		KK 5						9.6			1.4				
84P4404	TCLY	KK 3	VM 3	MI 2	MT 2		KK 2						8.7			1.3				
84P4405	TCLY	VM 3	KK 3	MI 1	QZ 1		KK 3						6.7			1.0				
84P4406	TCLY	KK 3	VM 3	QZ 1	MI 1	MT 1	KK26						8.7			1.0				
84P4407	TCLY	KK 3	VM 3	MI 1			KK27						10.9			1.0				
84P4408	TCLY	KK 3	VM 3	MI 2			KK28						10.4			0.9				
84P4409	TCLY	KK 3	VM 3	MI 2			KK32						10.4			1.0				

SAND - SILT MINERALOGY (2.0-0.002mm)

SAMPLE NUMBER	-1-- FRACTION	-2-- X-RAY 7A2i Peak Size	-3--	-4--	-5-- THERMAL DTA 7A3b Percent	-6--	-7-- TGA 7A4b Percent	-8--	-9--	-10- TOT RE	-11- OPTICAL GRAIN COUNT 7B1a Percent	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20- INTERPRETATION
84P4400	VFS									35	AR41	QZ35	FP12	FK 9	MI 2	HN 1				
84P4400	VFS										BTtr	ZRtr								
84P4406	VFS									68	QZ66	FK14	FP12	AR 6	MS 1	RA 1				
84P4406	VFS										BT 1	OP 1	ZRtr							
84P4407	VFS									61	QZ57	AR16	FK10	FP 8	BT 5	OP 3				
84P4407	VFS										RA 1	MStr	ZRtr							

FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm VFS Very Fine Sand, 0.05-0.10mm

MINERAL INTERPRETATION:

KK	kaolinite	VM	verm-mica	MI	mica	QZ	quartz	MT	montmorill	GE	goethite
AR	weath-aggreg	FP	plag-feld	FK	potas-feld	HN	hornblende	BT	biotite	ZR	zircon
MS	muscovite	RA	resist-aggre	OP	opaques						

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:

*** P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-002 PRINT DATE 06/12/90
SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 783, SAMPLE 84P4398-4415

CLAY MINERALOGY (<.002mm)

FRACT ION < X-RAY 7A2i peak size >< THERMAL: DTA 7A3b, TGA 7A4b Percent >< ELEMENTAL: SiO2 AL2O3 Fe2O3 MgO CaO K2O Na2O 7C3 Percent >< EGME RETN 7D2 mg/g >< INTERPRETATION >

SAMPLE NUMBER	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	FRACT ION	X-RAY					THERMAL DTA		TGA		SiO2	AL2O3	Fe2O3	MgO	CaO	K2O	Na2O		EGME RETN	INTER PRETA TION
84P4410	TCLY	KK 3	VM 3	MI 2	QZ 1		KK31						10.0			0.7				
84P4411	TCLY	KK 3	VM 3	MI 2			KK30						9.6			0.8				
84P4412	TCLY	KK 3	VM 3	MI 2			KK22						8.9			0.8				
84P4413	TCLY	KK 3	VM 3	MI 2			KK26						8.9			0.8				
84P4414	TCLY	KK 3	VM 3	MI 2			KK25						9.2			0.8				
84P4415	TCLY	KK 3	VM 3	MI 2			KK27						9.3			0.7				

SAND - SILT MINERALOGY (2.0-0.002mm)

FRACT ION < X-RAY 7A2i Peak Size >< THERMAL: DTA 7A3b, TGA 7A4b Percent >< OPTICAL: TOT RE, GRAIN COUNT 7B1a Percent >< INTERPRETATION >

SAMPLE NUMBER	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
84P4410	VFS									31	QZ28	AR23	BT22	FK11	FP11	OP 3				
84P4410	VFS										MS 1	CBtr	ZRtr							

FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm   VFS Very Fine Sand, 0.05-0.10mm

MINERAL INTERPRETATION:

KK kaolinite	VM verm-mica	MI mica	QZ quartz	AR weath-aggreg	BT biotite
FK potas-feld	FP plag-feld	OP opaques	MS muscovite	CB carb-aggreg	ZR zircon

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:
COMMENTS:

*** S U P P L E M E N T A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-002 (DECATUR COUNTY, INDIANA)

PRINT DA

SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF
REVISED TO : SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NSSL - PROJECT 84P 154,
 - PEDON 84P 783, SAMPLES 84P4398-4415
 - GENERAL METHODS (ENGINEERING FRACTIONS ARE CALCULATED FROM USDA FRACTION SIZES)

U. S. DEPARTMENT OF A
SOIL CONSERVATION SER
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (IN.)	HORIZON	ENGINEERING PERCENTAGE PASSING, INCHES 3 (1)	2 (2)	3/2 (3)	1 (4)	3/4 (5)	3/8 (6)	NUMBER 4 (7)	10 (8)	40 (9)	200 (10)	PSDA SIEVE, MICRONS 20 (11)	5 (12)	2 (13)	CUMULATIVE CURVE FRACTIONS(<76MM) USDA LESS THAN, MM 1. (14)	.5 (15)	.25 (16)	.10 (17)	.05 (18)	DIAMETERS(MM) AT PERCENTILE 60 (19)	50 (20)	10 (21)	ATTERBERG PCT LL (22)	PI (23)	GRADATION UNIFMTY CU (24)	CURVTUR CC (25)
84P4398S	0- 8	AP	100	100	100	100	100	100	100	100	98	95	69	38	18	100	98	97	95	94	0.01	0.008	0.001			18.4	1.2
84P4399S	8- 13	E	100	100	100	100	100	100	100	100	99	96	75	42	20	100	99	98	97	96	0.01	0.007	0.001			16.9	1.4
84P4400S	13- 20	EB	100	100	100	100	100	100	100	100	99	98	76	45	24	100	99	98	98	97	0.01	0.006	0.001			19.1	1.3
84P4401S	20- 29	BE	100	100	100	100	100	100	100	100	99	98	73	46	29	100	100	99	99	98	0.01	0.006	--			22.9	1.0
84P4402S	29- 38	BTX	100	100	100	100	100	100	99	99	96	93	69	44	28	98	97	95	93	92	0.01	0.007	--			26.2	0.9
84P4403S	38- 46	BX1	100	100	100	100	100	99	98	96	89	78	59	34	18	94	90	84	79	77	0.02	0.012	0.001			28.8	1.0
84P4404S	46- 55	BX2	100	99	99	98	97	96	94	92	84	74	57	33	17	89	86	79	75	73	0.02	0.013	0.001			30.7	1.0
84P4405S	55- 63	BX3	100	100	100	99	99	96	93	90	80	66	50	28	13	87	82	74	68	64	0.04	0.020	0.001			33.4	0.8
84P4406S	63- 71	BT	100	100	100	100	100	94	87	80	70	58	47	33	23	76	71	65	60	57	0.11	0.026	0.001			>100	0.3
84P4407S	71- 81	2BTB1	100	100	100	100	100	96	92	85	72	58	52	45	41	81	74	65	59	57	0.11	0.013	--			>100	--
84P4408S	81- 92	2BTB2	100	100	100	100	100	99	98	95	81	62	55	49	44	92	84	70	63	60	0.05	0.007	--			>100	0.1
84P4409S	92-101	2BTB3	100	100	100	99	99	96	92	86	72	48	42	36	32	83	77	58	50	46	0.27	0.102	--			>100	--

DEPTH (IN.)	WEIGHT FRACTIONS, WHOLE SOIL (MM), PCT OF WHOLE SOIL >2 (26)	250-UP (27)	250-75 (28)	75-2 (29)	75-20 (30)	20-5 (31)	5-2 (32)	<2 (33)	<75 MM FRACTION, PCT OF <75 MM 75-2 (34)	75-20 (35)	20-5 (36)	5-2 (37)	<2 (38)	(39)	WEIGHT PER UNIT VOLUME G/CC, WHOLE SOIL, SOIL SURVEY 1/3 BAR (40)	OVEN-DRY (41)	ENGINEERING MOIST (42)	SATURATED (43)	<2 MM FRACTION, SOIL SURVEY 1/3 BAR (44)	15 BAR (45)	OVEN-DRY (46)	ENGINEERING MOIST (47)	SATURATED (48)	VOID RATIOS AT 1/3 BAR WHOLE SOIL (49)	<2 MM (50)
0- 8	--	--	--	--	--	--	--	100	--	--	--	--	100		1.29	1.34	1.55	1.80	1.29	1.32	1.34	1.55	1.80	1.05	1.05
8- 13	--	--	--	--	--	--	--	100	--	--	--	--	100		1.52	1.59	1.90	1.95	1.52	1.57	1.59	1.90	1.95	0.74	0.74
13- 20	--	--	--	--	--	--	--	100	--	--	--	--	100		1.48	1.53	1.85	1.92	1.48	1.51	1.53	1.85	1.92	0.79	0.79
20- 29	--	--	--	--	--	--	--	100	--	--	--	--	100		1.52	1.62	1.90	1.95	1.52	1.57	1.62	1.90	1.95	0.74	0.74
29- 38	1	--	--	1	--	1	TR	99	1	--	1	TR	99		1.45	1.58	1.83	1.90	1.44	1.51	1.57	1.82	1.90	0.83	0.84
38- 46	4	--	--	4	--	2	2	96	4	--	2	2	96		1.58	1.68	1.91	1.98	1.55	1.61	1.65	1.89	1.97	0.68	0.71
46- 55	8	--	--	8	3	3	2	92	8	3	3	2	92		1.65										
55- 63	10	--	--	10	1	6	3	90	10	1	6	3	90		1.68	1.71	1.98	2.05	1.61	1.64	1.65	1.94	2.00	0.58	0.65
63- 71	20	--	--	20	--	13	7	80	20	--	13	7	80		1.63										
71- 81	15	--	--	15	--	8	7	85	15	--	8	7	85		1.53	1.71	1.90	1.95	1.42	1,50	1.61	1.82	1.88	0.73	0.87
81- 92	5	--	--	5	--	2	3	95	5	--	2	3	95		1.43										
92-101	14	--	--	14	1	7	6	86	14	1	7	6	86		1.55	1.67	1.88	1.97	1.45	1.50	1.58	1.80	1.90	0.71	0.83

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-002 PRINT DATE 06/12/90
CLASSIFICATION: SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 783, SAMPLE 84P4398-4415

DEPTH (IN.)	(V O L U M E	F R A C T I O N S	)											(C/)	(R A T I O S	TO	C L A Y)			(LINEAR EXTENSIBILITY)				(W R D)	
	----W H O L E	S O I L (MM)						A T 1/3 B A R---						(/N)	-------<2 MM FRACTION-------					WHOLE SOIL		--<2 MM--		WHOLE SOIL	<2 MM
	>2	250 -UP	250 -75	75 -2	75 -20	20 -5	5 -2	<2	2- .05	.05- .002	LT .002	PORES D	PORES F	RAT -IO	FINE CLAY	---C E C-- SUM CATS	NH4- OAC	15 BAR H2O	LE 1/3 BAR	<-1/3 BAR TO 15 BAR	OVEN -DRY	(PCT)---> 15 BAR	OVEN -DRY	<--IN/IN->	
	<----------------PCT OF WHOLE SOIL---------------->																								
	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
0- 8	--	--	--	--	--	--	--	100	3	37	9	25	26	10	0.35	0.91	0.62	0.45	0.072	0.8	1.3	0.8	1.3	0.15	0.15
8- 13	--	--	--	--	--	--	--	100	2	43	12	5	38	7	0.40	0.75	0.54	0.48	0.074	1.1	1.5	1.1	1.5	0.24	0.24
13- 20	--	--	--	--	--	--	--	100	1	41	14	7	37	4	0.48	0.73	0.56	0.45	0.045	0.7	1.1	0.7	1.1	0.20	0.20
20- 29	--	--	--	--	--	--	--	100	1	39	16	5	38	4	0.63	0.78	0.62	0.49	0.073	1.1	2.1	1.1	2.1	0.16	0.16
29- 38	1	--	--	1	--	1	TR	99	4	35	15	7	38		0.69	0.84	0.66	0.49	0.104	1.6	2.9	1.6	2.9	0.18	0.18
38- 46	2	--	--	2	--	1	1	98	11	35	11	7	33		0.57	0.80	0.68	0.49	0.113	1.3	2.1	1.3	2.1	0.19	0.20
46- 55	5	--	--	5	2	2	1	95	12	35	10	38			0.55	0.80	0.71	0.47							
55- 63	6	--	--	6	1	4	2	94	16	32	8	7	30		0.44	0.67	0.55	0.39	0.054	0.4	0.6	0.6	0.8	0.22	0.23
63- 71	12	--	--	12	--	8	4	88	15	21	15	38			0.47	0.56	0.45	0.34							
71- 81	9	--	--	9	--	5	4	91	16	9	24	5	37		0.57	0.53	0.43	0.36	0.089	1.7	3.8	1.8	4.3	0.15	0.16
81- 92	3	--	--	3	--	1	2	97	19	8	24	46			0.57	0.53	0.44	0.41							
92-101	8	--	--	8	1	4	4	92	23	8	19	8	33		0.58	0.56	0.44	0.43	0.078	0.9	2.5	1.1	2.9	0.11	0.12

DEPTH (IN.)	(W E I G H T	F R A C T I O N S - C L A Y	F R E E)												(-TEXTURE--)		(--P S D A(MM)---)			(PH)	(-ELECTRICAL)			(CUMULT. AMOUNTS)	
	--W H O L E S O I L--						---<2 MM F R A C T I O N ----								(DETERMINED		SAND	SILT	CLAY	CA-	RES-	CON-	SALT	IN. OF H2O	
	>2	75 -2	20 -2	2- .05	.05- .002	LT .002	------SANDS------- VC	C	M	F	VF	SILTS C	F	CL AY	IN FIELD	BY PSDA	2- .05	.05- .002	LT .002	CL2 .01M	IST. OHMS	DUCT. MMHOS	MG/ KG	1/3 BAR TO 15BAR	AIRDRY
	PCT OF >2MM+SAND+SILT>						(------PCT OF SAND+SILT------)								(--<2 MM-)		(--PCT OF .2MM-)			(- - - - <2 MM- - - -)				(WHL SOIL)	
	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
0- 8				7	93	22	TR	2	2	2	1	31	63	22	SIL	SIL	5.6	76.3	18.1	4.3					
8- 13				5	95	25	TR	1	2	1	1	26	69	25	SIL	SIL	3.9	75.8	20.3	4.4					
13- 20				3	97	32	TR	1	1	1	1	28	68	32	SIL	SIL	2.6	73.0	24.4	3.9					
20- 29				3	97	40		1	1	1	1	35	62	40	SIL	SICL	2.3	69.0	28.7	3.8					
29- 38	1	1	1	10	89	38	1	2	3	2	1	32	58	39	SIL	SICL	7.0	65.2	27.8	3.7					
38- 46	5	5	5	23	72	22	3	5	8	6	2	23	53	23	SIL	SIL	19.4	62.0	18.6	3.9					
46- 55	10	10	6	23	67	20	4	5	8	6	2	21	53	23	SIL	SIL	20.7	60.9	18.4	3.9					
55- 63	12	12	10	29	59	15	4	6	10	9	4	19	48	17	SIL	SIL	28.4	56.8	14.8	4.2					
63- 71	26	26	26	31	43	30	7	9	11	9	6	16	42	41	L	CL	29.3	41.6	29.1	4.4					
71- 81	25	25	25	48	26	70	10	15	22	12	6	10	25	94	C	C	33.4	18.2	48.4	4.7					
81- 92	9	9	9	63	28	79	7	14	28	13	7	9	22	87	C	C	37.0	16.4	46.6	4.8					
92-101	21	21	19	58	21	47	6	11	36	14	7	8	18	59	SC	SC	46.3	16.7	37.0	5.0					

S84IN-031-002

*** SUPPLEMENTARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : NOT DESIGNATED ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF
REVISED TO : SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NSSL - PROJECT 84P 154,
- PEDON 84P 783, SAMPLES 84P4398-4415
- GENERAL METHODS (ENGINEERING FRACTIONS ARE CALCULATED FROM USDA FRACTION SIZES)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (IN.)	HORIZON	ENGINEERING PERCENTAGE PASSING: 3 (INCHES)	2	3/2	1	3/4	3/8	4 (NUMBER)	10	40	200	PSDA SIEVE: 20 (MICRONS)	5	2	CUMULATIVE CURVE FRACTIONS(<76MM) USDA LESS THAN: 1. (MM)	.5	.25	.10	.05	DIAMETERS(MM) AT PERCENTILE: 60	50	10	ATTERBERG (PCT) LL	PI	GRADATION UNIFMTY CU	CURVTUR CC
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
84P4410S	101-116	3BTB4	100	99	99	98	97	91	85	80	66	43	35	28	24	76	70	56	46	40	0.31	0.150	0.001			>100	0.3
84P4411S	116-138	3BTB5	100	100	100	100	100	98	96	91	75	47	37	30	26	87	79	64	50	44	0.20	0.098	--			>100	0.2
84P4412S	138-160	3BTB6	100	100	100	100	100	99	98	95	77	41	33	28	24	92	83	60	43	37	0.25	0.145	0.001			>100	0.7
84P4413S	160-178	3BTB7	100	100	100	100	100	96	92	86	65	34	28	23	20	82	71	45	35	32	0.37	0.282	0.001			>100	4.3
84P4414S	178-201	3BC1	100	100	100	100	100	99	97	93	75	41	36	31	28	90	81	57	43	39	0.28	0.163	--			>100	0.1
84P4415S	201-213	3BC2	100	100	100	100	100	100	99	96	82	42	32	26	22	95	89	60	44	39	0.25	0.141	0.001			>100	1.3

DEPTH (IN.)	WEIGHT FRACTIONS, WHOLE SOIL (MM), PCT OF WHOLE SOIL: >2	250-UP	250-75	75-2	75-20	20-5	5-2	<2	<75 MM FRACTION, PCT OF <75 MM: 75-2	75-20	20-5	5-2	<2		WEIGHT PER UNIT VOLUME G/CC, WHOLE SOIL: SOIL SURVEY 1/3 BAR	SOIL SURVEY OVEN-DRY	ENGINEERING MOIST	ENGINEERING SATURATED	<2 MM FRACTION: SOIL SURVEY 1/3 BAR	SOIL SURVEY 15 BAR	SOIL SURVEY OVEN-DRY	ENGINEERING MOIST	ENGINEERING SATURATED	VOID RATIOS AT 1/3 BAR: WHOLE SOIL	<2 MM
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
101-116	20	--	--	20	3	12	5	80	20	3	12	5	80		1.55										
116-138	9	--	--	9	--	4	5	91	9	--	4	5	91		1.42	1.51	1.75	1.88	1.36	1.41	1.45	1.70	1.85	0.87	0.95
138-160	5	--	--	5	--	2	3	95	5	--	2	3	95		1.43										
160-178	14	--	--	14	TR	8	6	86	14	TR	8	6	86		1.48	1.55	1.76	1.92	1.38	1.42	1.45	1.69	1.86	0.79	0.92
178-201	7	--	--	7	--	3	4	93	7	--	3	4	93		1.44										
201-213	4	--	--	4	--	1	3	96	4	--	1	3	96		1.52	1.60	1.82	1.95	1.50	1.54	1.58	1.82	1.93	0.74	0.77

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-002 PRINT DATE 06/12/90

CLASSIFICATION: SND ; FINE-SILTY, MIXED, MESIC AQUIC FRAGIUDALF

NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 783, SAMPLE 84P4398-4415

DEPTH (IN.)	VOLUME FRACTIONS AT 1/3 BAR, WHOLE SOIL (MM), PCT OF WHOLE SOIL: >2	250 -UP	250 -75	75 -2	75 -20	20 -5	5 -2	<2	2- .05	.05- .002	LT .002	PORES D	PORES F	(C/)(/N) RAT -10	RATIOS TO CLAY, <2 MM FRACTION: FINE CLAY	CEC SUM CATS	CEC NH4-OAC	15 BAR H2O	LE 1/3 BAR	LINEAR EXTENSIBILITY (PCT), WHOLE SOIL <-1/3 BAR TO 15 BAR	WHOLE SOIL OVEN -DRY	<2 MM 15 BAR	<2 MM OVEN -DRY	WRD WHOLE SOIL (IN/IN)	WRD <2 MM (IN/IN)
	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
101-116	12	--	--	12	2	7	3	88	23	10	14	41			0.52	0.62	0.50	0.52							
116-138	5	--	--	5	--	2	3	95	26	10	14	13	33		0.51	0.59	0.45	0.47	0.077	0.9	2.1	1.2	2.2	0.15	0.16
138-160	3	--	--	3	--	1	2	97	31	7	13	46			0.52	0.58	0.46	0.48							
160-178	8	--	--	8	TR	5	3	92	30	7	11	16	28		0.53	0.60	0.44	0.48	0.072	0.9	1.6	1.0	1.7	0.14	0.15
178-201	4	--	--	4	--	2	2	96	30	6	15	46			0.65	0.58	0.47	0.50							
201-213	2	--	--	2	--	1	2	98	33	10	13	13	30		0.70	0.63	0.48	0.53	0.074	0.9	1.7	0.9	1.7	0.13	0.14

DEPTH (IN.)	WEIGHT FRACTIONS - CLAY FREE, WHOLE SOIL: >2 PCT	75 -2	20 -2	2- .05	.05- .002	LT .002	<2 MM FRACTION, SANDS (PCT OF SAND+SILT): VC	C	M	F	VF	SILTS C	SILTS F	CLAY	TEXTURE DETERMINED IN FIELD	TEXTURE BY PSDA	PSDA (PCT OF <2MM): SAND 2- .05	SILT .05- .002	CLAY LT .002	PH CACL2 .01M	ELECTRICAL (<2 MM): RES-IST. OHMS	CON-DUCT. MMHOS	SALT MG/KG	CUMULT. AMOUNTS IN. OF H2O (WHL SOIL): 1/3 BAR TO 15BAR	AIRDRY
	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101-116	26	26	22	52	22	31	8	10	26	18	9	10	20	42	CL	SCL	49.5	20.7	29.8	5.2					
116-138	12	12	12	64	24	35	6	12	24	20	10	10	17	40	CL	SCL	52.1	19.4	28.5	5.3					
138-160	7	7	7	76	17	32	4	12	32	24	8	7	12	34	CL	SCL	60.6	13.9	25.5	5.3					
160-178	18	18	18	68	14	26	6	16	40	16	5	6	12	31	SCL	SCL	62.9	13.4	23.7	5.5					
178-201	10	10	10	75	15	39	5	13	38	22	5	5	12	43	CL	SCL	58.1	11.9	30.0	5.5					
201-213	5	5	5	74	21	28	2	7	39	22	7	9	13	30	CL	SCL	59.8	17.3	22.9	5.7					

N A R R A T I V E   P E D O N   D E S C R I P T I O N

Pedon: SND
Soil Survey Number S84-IN-031-002
Location: Decatur County, Indiana
NE 1/4 of NE 1/4 of NW 1/4 sec 36 T10N R10E. Newpoint quadrangle.
Latitude: 39-16-42-N
Physiography: Upland slope in level or undulating uplands
Slope: %
Precipitation: cm - Udic Moisture Regime.
MLRA: 114 Southern Illinois and Indiana Thin Loess and Till Plain
Water Table Depth: 0
Drainage: Moderately well drained
Stoniness: Erosion or Deposition:
Parent Material: lo
ss from mixed material over loess from mixed material over alluvium from mixed mater
Classification: Fine-silty, mixed, mesic Aquic Fragiudalf
Diagnostic Horizons: 0 to 20 cm Ochric, 50 to 96 cm Argillic
Described By: A. Nickell and B. Nagel

NSSL Pedon Number: 84P0783
Print Date: 06/12/90
Longitude: 085-21-31-W
Elevation: 308 m MSL
Permeability: Slow
Land Use: Cropland
Runoff:
Sample Date: 09/84

Ap -- 0 to 20 cm; light yellowish brown (10YR 6/4) moist silt loam; light yellowish brown (10YR 6/4) dry; weak fine and medium granular structure; friable; many very fine roots; abrupt smooth boundary.
84P4398

E -- 20 to 33 cm; light yellowish brown (10YR 6/4) moist silt loam; massive parting to weak medium platy; firm; common fine roots; discontinuous distinct light gray (10YR 7/2) skeletans (sand or silt) on faces of peds; clear smooth boundary.
84P4399

EB -- 33 to 50 cm; light yellowish brown (10YR 6/4) moist silt loam; moderate medium subangular blocky structure; firm; common very fine roots; continuous distinct light gray (10YR 7/2) skeletans (sand or silt) on faces of peds; clear smooth boundary.
84P4400

BE -- 50 to 73 cm; strong brown (7.5YR 5/6) moist silt loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium prismatic structure; firm; few very fine roots; continuous distinct grayish brown (10YR 5/2) clay films on faces of peds and continuous distinct brown (10YR 5/3) clay films on faces of peds and continuous distinct light gray (10YR 7/2) skeletans (sand or silt) on faces of peds; few fine rounded soft masses of iron-manganese; clear smooth boundary.
84P4401

Btx -- 73 to 96 cm; yellowish brown (10YR 5/4) moist silt loam; common medium distinct light brownish gray (10YR 6/2) and few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; continuous distinct grayish brown (10YR 5/2) clay films on faces of peds and continuous distinct light brownish gray (10YR 6/2) skeletans (sand or silt) on faces of peds; few fine rounded soft masses of iron-manganese; clear wavy boundary.
84P4302

Bx1 -- 96 to 118 cm; yellowish brown (10YR 5/4) moist silt loam; common medium distinct light brownish gray (10YR 6/2) and common coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; very firm; continuous distinct grayish brown (10YR 5/2) clay films on faces of peds and continuous distinct light brownish gray (10YR 6/2) skeletans (sand or silt) on faces of peds; few fine rounded soft masses of iron-manganese; 1 percent pebbles; clear wavy boundary.
84P4403

Bx2 --118 to 140 cm; yellowish brown (10YR 5/4) moist silt loam; common medium distinct light brownish gray (10YR 6/2) and common coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; very firm; continuous distinct light brownish gray (10YR 6/2) skeletans (sand or silt) on faces of peds and continuous distinct grayish brown (10YR 5/2) clay films on faces of peds and continuous distinct gray (10YR 5/1) clay films on faces of peds; few fine rounded soft masses of iron-manganese; 1 percent pebbles; clear smooth boundary.
84P4404

Bx3 --140 to 161 cm; yellowish brown (10YR 5/4) moist silt loam; weak very coarse prismatic structure; very firm; continuous distinct light brownish gray (10YR 6/2) skeletans (sand or silt) on faces of peds and continuous distinct grayish brown (10YR 5/2) clay films in root channels and/or pores; common fine rounded soft masses of iron-manganese; 3 percent pebbles; clear wavy boundary.
84P4405

Bt --161 to 181 cm; yellowish brown (10YR 5/4) and red (2.5YR 4/6) moist loam and clay loam; moderate medium subangular blocky

structure; friable; continuous faint dark red (2.5YR 3/6) clay films on faces of peds; 10 percent pebbles; clear wavy boundary.
Stoneline at lower boundary.
84P4406

2Btb1 --181 to 207 cm; dark red (2.5YR 3/6) moist clay; prominent mottles; strong fine angular blocky structure; friable; continuous faint clay films on faces of peds; 5 percent pebbles; clear wavy boundary.
84P4407

2Btb2 --207 to 235 cm; dark red (2.5YR 3/6) moist clay; strong medium subangular blocky structure parting to moderate fine subangular blocky; friable; continuous faint clay films on faces of peds; 3 percent pebbles; clear wavy boundary.
Vertical 10YR 6/6 streaks.
84P4409

2Btb3 --235 to 256 cm; red (2.5YR 4/6) moist sandy clay; moderate medium subangular blocky structure; friable; continuous distinct dark red (2.5YR 3/6) clay films on faces of peds; 5 percent pebbles; clear wavy boundary.
Horizontal streak of 5YR 3/3 silty clay and 10YR 6/6.
84P4409

3Btb4 --256 to 296 cm; red (2.5YR 4/6) moist clay loam; weak medium subangular blocky structure; friable; continuous distinct dark red (2.5YR 3/6) clay films on faces of peds; common fine soft masses of iron-manganese; 7 percent pebbles; clear wavy boundary.
There is a chert line at lower boundary. Shale fragments are scattered throughout horizon.
84P4410

3Btb5 --296 to 350 cm; red (2.5YR 4/6) moist clay loam; weak very coarse prismatic structure; friable; nonintersecting slickensides on faces of peds and dark red (2.5YR 3/6) clay films on faces of peds; common medium soft masses of iron-manganese; 3 percent pebbles; gradual wavy boundary.
Slickensides along one face. Some manganese stains on horizontal faces.
84P4411

3Btb6 --350 to 408 cm; yellowish red (5YR 4/6) moist clay loam and sandy clay loam; weak very coarse prismatic structure; friable; continuous distinct dark red (2.5YR 3/6) clay films on faces of peds and continuous distinct very dark gray (5YR 3/1) manganese or iron-manganese coats on faces of peds; few fine soft masses of iron-manganese; 1 percent pebbles; clear wavy boundary.
Slight horizontal cleavage in structure and silty strata are lighter colored.
84P4412

3Btb7 --408 to 453 cm; red (2.5YR 4/6) moist sandy clay loam; weak coarse prismatic structure; friable; continuous distinct dark reddish brown (2.5YR 3/4) clay films on faces of peds and continuous distinct very dark gray (5YR 3/1) manganese or iron-manganese coats on faces of peds; few fine soft masses of iron-manganese; 7 percent pebbles; clear wavy boundary.
Horizontal clay bands 1 to 5 mm thick.
84P4413

3BC1 --453 to 512 cm; red (2.5YR 4/6) moist clay loam; weak coarse prismatic structure; friable; continuous distinct dark reddish brown (2.5YR 3/4) clay films on faces of peds; few medium soft masses of iron-manganese; 1 percent pebbles; diffuse wavy boundary.
Horizontal bedding and clay bands 3 to 7 cm thick and 2.5YR 3/2 and 3/4 in color and silty clay.
84P4414

3BC2 --512 to 543 cm; red (2.5YR 4/6) and yellowish brown (10YR 5/6) moist stratified clay loam and silt loam; common medium distinct very pale brown (10YR 7/4) mottles; weak coarse prismatic structure; friable; continuous distinct dark reddish brown (2.5YR 3/4) clay films in root channels and/or pores; common medium soft masses of iron-manganese; 1 percent pebbles.
84P4415

S84IN-031-003

*** PRIMARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 784, SAMPLES 84P4416-4427
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	-1-- DEPTH (CM)	-2-- HORIZON	-3--	-4-- TOTAL CLAY LT .002	-5-- TOTAL SILT .002 -.05	-6-- TOTAL SAND .05 -2	-7-- CLAY FINE LT .0002	-8-- CLAY CO3 LT .002	-9-- SILT FINE .002 -.02	-10- SILT COARSE .02 -.05	-11- SAND VF .05 -.10	-12- SAND F .10 -.25	-13- SAND M .25 -.50	-14- SAND C .5 -1	-15- SAND VC 1 -2	-16- COARSE FRACTIONS (MM) WEIGHT 2 -5	-17- WEIGHT 5 -20	-18- WEIGHT 20 -75	-19- WEIGHT .1- 75	-20- (>2MM) WT PCT OF WHOLE SOIL
				<- - - - - - - - - - - - PCT OF <2MM (3A1)											- - - ->	<- PCT OF <75MM(3B1)->				
84P4416S	0- 12	A		13.1	78.6	8.3	6.5		57.4	21.2	1.7	2.7	2.5	1.0	0.4	TR	TR	--	7	TR
84P4417S	12- 23	E1		12.0	76.8	11.2	6.1		51.8	25.0	2.5	3.8	3.1	1.1	0.7	1	TR	--	10	1
84P4418S	23- 35	E2		11.8	75.4	12.8	5.7		50.7	24.7	2.7	4.1	3.4	1.5	1.1	1	TR	--	11	1
84P4419S	35- 56	E3		12.1	75.8	12.1	6.0		50.8	25.0	2.5	3.6	3.1	1.7	1.2	1	1	--	11	2
84P4420S	56- 83	EB		15.7	73.7	10.6	8.5		49.4	24.3	2.2	3.2	2.8	1.5	0.9	1	TR	--	9	1
84P4421S	83-114	BT1		27.0	64.2	8.8	15.8		44.4	19.8	1.8	2.6	2.2	1.6	0.6	1	TR	--	8	1
84P4422S	114-138	2BT2		24.6	63.4	12.0	14.5		43.0	20.4	2.6	3.7	3.2	1.7	0.8	1	TR	--	10	1
84P4423S	138-176	2BTX		14.9	66.3	18.8	9.0		45.3	21.0	4.4	6.5	5.1	2.0	0.8	2	1	--	17	3
84P4424S	176-204	2BC1		16.9	67.0	16.1	10.0		46.7	20.3	4.2	6.1	4.2	1.1	0.5	1	1	--	14	2
84P4425S	204-256	2BC2		18.3	64.8	16.9	10.0		46.3	18.5	4.2	6.2	4.4	1.5	0.6	3	2	--	17	5
84P4426S	256-305	3BTB		26.3	55.4	18.3	16.0		39.9	15.5	4.8	6.6	4.3	1.5	1.1	2	3	--	18	5
84P4427S	305-367	4C		51.2	31.6	17.2	34.0		23.4	8.2	2.4	3.8	3.6	3.5	3.9	12	39	7V	64	59

DEPTH (CM)	ORGN C 6A1C PCT	TOTAL N 6B3A <2MM	EXTR P 6S3 PPM	TOTAL S 6R3A <- PERCENT	DITH-CIT EXTRACTABLE FE 6C2B	DITH-CIT EXTRACTABLE AL 6G7A OF	DITH-CIT EXTRACTABLE MN 6D2A <2MM -->	(RATIO/CLAY) CEC 8D1	(RATIO/CLAY) 15 BAR 8D1	(ATTERBERG - LIMITS -) LL 4F1 PCT	(ATTERBERG - LIMITS -) PI 4F <0.4MM	(- BULK DENSITY -) FIELD MOIST 4A3A <- -	(- BULK DENSITY -) 1/3 BAR 4A1D G/CC	(- BULK DENSITY -) OVEN DRY 4A1H - - ->	COLE WHOLE SOIL 4D1 CM/CM	(- - WATER CONTENT - -) FIELD MOIST 4B4 <- - -	WATER CONTENT 1/10 BAR 4B1C PCT OF	WATER CONTENT 1/3 BAR 4B1C <2MM	WATER CONTENT 15 BAR 4B2a - ->	WRD WHOLE SOIL 4C1 CM/CM
0- 12	2.23	0.226			1.1		0.1	1.05	0.69				1.20						9.1	
12- 23	0.73	0.072			1.0		TR	0.61	0.50				1.54	1.57	0.006			22.2	6.0	0.25
23- 35	0.40	0.047			1.3		TR	0.61	0.50				1.50	1.53	0.007			22.3	5.9	0.24
35- 56	0.31	0.040			0.9		TR	0.56	0.49				1.47	1.50	0.007			23.8	5.9	0.26
56- 83	0.15				1.0		TR	0.53	0.47				1.52	1.58	0.013			23.3	7.4	0.24
83-114	0.16				2.0		TR	0.55	0.46				1.45	1.56	0.025			25.7	12.3	0.19
114-138	0.14				2.0		0.1	0.57	0.48				1.53	1.69	0.033			23.9	11.9	0.18
138-176	0.05				1.4		0.1	0.54	0.47				1.81	1.86	0.009			16.5	7.0	0.17
176-204	0.05				0.9		TR	0.46	0.41				1.74	1.78	0.008			17.1	6.9	0.18
204-256	0.06				1.1		--	0.42	0.39				1.72	1.77	0.009			17.9	7.2	0.18
256-305	0.06				2.1		--	0.46	0.42				1.57	1.69	0.024			23.1	11.0	0.18
305-367	0.08				5.3		0.1	0.44	0.41				1.40						20.9	

AVERAGES, DEPTH 83-133: PCT CLAY 26 PCT .1-75MM 9

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-003 PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 784, SAMPLE 84P4416-4427

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- - - -CEC - - -)			AL	-BASE SAT-		CO3 AS	RES.		COND.		(- - - -PH - - -)	
DEPTH (CM)	CA 5B5A 6N2E	MG 5B5A 6O2D	NA 5B5A 6P2B	K 5B5A 6Q2B	SUM BASES	ITY 6H5A	AL 6G9A	SUM CATS 5A3A	NH4- OAC 5A8B	BASES + AL 5A3B	SAT 5G1	SUM 5C3	NH4 OAC 5C1	CACO3 <2MM 6E1G	OHMS /CM 8E1		MMHOS /CM 8I		CACL2 .01M 8C1F 1:2	H2O 8C1F 1:1
	<- - - - - - - - - - - - -MEQ / 100 G - - - - - - - - - - - - ->										<- - - - - -PCT - - - - ->									
0- 12	5.2	1.1	0.2	0.2	6.7	12.5	0.9	19.2	13.8	7.6	12	35	49						4.3	4.6
12- 23	2.3	0.6	TR	0.1	3.0	7.1	1.6	10.1	7.3	4.6	35	30	41						4.0	4.5
23- 35	1.6	0.5	TR	0.2	2.3	6.6	2.4	8.9	7.2	4.7	51	26	32						4.0	4.5
35- 56	1.2	0.5	TR	0.2	1.9	6.7	2.9	8.6	6.8	4.8	60	22	28						3.9	4.5
56- 83	1.4	1.1	0.1	0.3	2.9	7.7	3.5	10.6	8.3	6.4	55	27	35						3.9	4.4
83-114	2.6	3.0	0.1	0.5	6.2	12.3	5.3	18.5	14.8	11.5	46	34	42						4.0	4.5
114-138	2.4	3.9	0.1	0.3	6.7	10.7	4.2	17.4	14.0	10.9	39	39	48						4.0	4.5
138-176	1.6	2.6	0.1	0.1	4.4	6.1	1.7	10.5	8.0	6.1	28	42	55						4.3	4.6
176-204	2.0	2.6	0.2	0.1	4.9	4.8	1.3	9.7	7.7	6.2	21	51	64						4.2	4.7
204-256	2.7	2.7	0.3	0.1	5.8	3.8	0.7	9.6	7.6	6.5	11	60	76						4.5	4.7
256-305	5.5	4.4	0.3	0.1	10.3	4.6	0.5	14.9	12.2	10.8	5	69	84						4.6	5.0
305-367	11.5	7.7	0.3	0.3	19.8	6.7	0.3	26.5	22.3	20.1	1	75	89						4.9	5.3

ESTIMATED BULK DENSITY FOR LAYER 1, 12,

ANALYSES: S= ALL ON SIEVED <2MM BASIS V= 75-20MM FROM VOLUME ESTIMATES

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-003 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
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- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	HZ NO	-1-- ACID OXALATE OPT DEN 8J	-2-- FE 6C9a	-3-- EXTRACTION SI 6V2	-4-- AL 6G12	-5-- PHOSPHOUS RET 6S4	-6-- CIT-ACID 6S5	-7-- KCL MN 6D3	-8-- TOTAL C 6A2d	-9-- (- -WATER 0.06 BAR 4B1c	-10- 1-BAR 4B1a	-11- CONTENT- 2-BAR 4B1a	-12- -) 15 BAR 4B2b	-13- (- - - - WATER DISPERSIBLE <- - PIPETTE CLAY	-14- SILT 3A1c	-15- SAND	-16- >< - HYDROMETER CLAY	-17- SILT SML	-18- SAND	-19-) MIN SOIL CONT 8F1	-20- AGGRT STABL <5mm 4G1
		<- P C T	o f < 2	m m		-><- P	P M	->	< - - - P E R C E N T					o f	< 2 m m					- - ><	PCT>
84P4416	1								2.32												
84P4417	2								0.83												
84P4418	3								0.49												
84P4419	4								0.37												
84P4420	5								0.19												
84P4421	6								0.19												
84P4422	7								0.17												
84P4423	8								0.08												
84P4424	9								0.07												
84P4425	10								0.08												
84P4426	11								0.08												
84P4427	12								0.07												

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-003 PRINT DATE 06/12/90
SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 784, SAMPLE 84P4416-4427

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	CLAY MINERALOGY (<.002mm)																			
SAMPLE	FRACTION	X-RAY 7A2i					THERMAL: DTA 7A3b		TGA 7A4b		ELEMENTAL 7C3: SiO2	AL2O3	Fe2O3	MgO	CaO	K2O	Na2O		EGME RETN 7D2	INTERPRETATION
NUMBER		peak size					Percent				Percent								mg/g	
84P4417	TCLY	KK 2	VM 2	MI 2	QZ 1								7.9			1.3				
84P4419	TCLY	KK 3	VM 3	MI 2	MT 1	QZ 1	KK 2						6.3			1.3				
84P4421	TCLY	KK 3	MT 2	MI 2	VM 2	QZ 1	KK 6						8.3			1.6				
84P4422	TCLY	KK 3	MT 2	MI 2	VM 2	QZ 1	KK 8						8.3			1.5				
84P4423	TCLY	KK 3	VM 3	MT 2	MI 2	QZ 1	KK 4						9.2			1.2				
84P4425	TCLY	KK 3	VM 3	MI 2	GE 2	QZ 1	KK11						9.0			1.0				
84P4426	TCLY	KK 3	VM 2	MI 2	GE 2	MT 1	KK16						9.6			0.7				
84P4426	TCLY	QZ 1																		
84P4427	TCLY	KK 3	VM 2	MI 2	GE 2	MT 1	KK30						9.3			1.3				
84P4427	TCLY	QZ 1																		

FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm

MINERAL INTERPRETATION:

KK kaolinite VM verm-mica MI mica QZ quartz MT montmorill GE goethite

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:
COMMENTS:

*** S U P P L E M E N T A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-003 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154,
- PEDON 84P 784, SAMPLES 84P4416-4427
- GENERAL METHODS (ENGINEERING FRACTIONS ARE CALCULATED FROM USDA FRACTION SIZES)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (IN.)	HORIZON	ENGINEERING PERCENTAGE PASSING <--INCHES--> 3	2	3/2	1	3/4	3/8	<-NUMBER-> 4	10	40	200	PSDA SIEVE <-MICRONS-> 20	5	2	CUMULATIVE CURVE USDA LESS THAN <--MM--> 1.	.5	.25	.10	.05	FRACTIONS(<76MM) DIAMETERS(MM) AT <--PERCENTILE--> 60	50	10	ATTERBERG <-PCT> LL	PI	GRADATION UNIFMTY CU	CURVTUR CC
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
84P4416S	0- 5	A	100	100	100	100	100	100	100	100	98	93	70	36	13	100	99	96	93	92	0.01	0.009	0.001			11.3	1.0
84P4417S	5- 9	E1	100	100	100	100	100	100	100	99	96	89	63	32	12	98	97	94	90	88	0.02	0.011	0.001			12.5	0.8
84P4418S	9- 14	E2	100	100	100	100	100	100	100	99	96	88	62	32	12	98	96	93	89	86	0.02	0.012	0.001			12.8	0.8
84P4419S	14- 22	E3	100	100	100	100	100	100	100	99	95	88	62	32	12	98	96	93	89	87	0.02	0.011	0.001			13.2	0.8
84P4420S	22- 33	EB	100	100	100	100	100	100	100	99	96	90	64	35	16	98	97	94	91	89	0.02	0.010	0.001			18.4	1.1
84P4421S	33- 45	BT1	100	100	100	100	100	100	100	100	97	92	71	45	27	99	98	96	93	91	0.01	0.007	--			23.6	1.1
84P4422S	45- 54	2BT2	100	100	100	100	100	100	100	99	96	89	67	41	24	98	97	93	90	87	0.01	0.008	0.001			26.7	1.0
84P4423S	54- 69	2BTX	100	100	100	100	100	100	99	97	93	81	58	32	14	96	94	89	83	79	0.02	0.013	0.001			21.9	1.0
84P4424S	69- 80	2BC1	100	100	100	100	100	100	99	98	95	85	62	35	17	98	96	92	86	82	0.02	0.011	0.001			22.1	1.1
84P4425S	80-101	2BC2	100	100	100	100	100	99	98	95	92	81	61	35	17	94	93	89	83	79	0.02	0.011	0.001			24.8	1.1
84P4426S	101-120	3BTB	100	100	100	100	100	99	97	95	92	80	63	40	25	94	93	88	82	78	0.02	0.009	0.001			33.4	0.9
84P4427S	120-144	4C	100	98	97	94	93	74	54	42	39	35	31	25	22	40	39	37	36	35	5.83	3.535	0.001			>100	0.1

DEPTH (IN.)	(WEIGHT FRACTIONS) ---WHOLE SOIL (MM)- <------PCT OF WHOLE SOIL-----> >2	250 -UP	250 -75	75 -2	75 -20	20 -5	5 -2	<2	-<75 MM FRACTION-- <--PCT OF <75 MM-> 75 -2	75 -20	20 -5	5 -2	<2		(WEIGHT PER UNIT VOLUME G/CC) ------WHOLE SOIL------ SOIL SURVEY 1/3 BAR	OVEN -DRY	ENGINEERING MOIST	SATUR -ATED	-------<2 MM FRACTION------- --SOIL SURVEY-- 1/3 BAR	15 BAR	OVEN -DRY	ENGINEERING MOIST	SATUR -ATED	(VOID) --RATIOS-- AT 1/3 BAR WHOLE SOIL	<2 MM
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
0- 5	TR	--	--	--	--	--	TR	100	--	--	--	TR	100		1.20										
5- 9	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.55	1.58	1.89	1.97	1.54	1.56	1.57	1.88	1.96	0.71	0.72
9- 14	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.51	1.54	1.84	1.94	1.50	1.52	1.53	1.83	1.93	0.76	0.77
14- 22	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.48	1.51	1.84	1.92	1.47	1.49	1.50	1.82	1.92	0.79	0.80
22- 33	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.53	1.59	1.88	1.95	1.52	1.56	1.58	1.87	1.95	0.73	0.74
33- 45	TR	--	--	--	--	TR	TR	100	--	--	TR	TR	100		1.46	1.57	1.84	1.91	1.45	1.51	1.56	1.82	1.90	0.82	0.83
45- 54	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.54	1.70	1.91	1.96	1.53	1.62	1.69	1.90	1.95	0.72	0.73
54- 69	3	--	--	3	--	1	2	97	3	--	1	2	97		1.83	1.88	2.12	2.14	1.81	1.84	1.86	2.11	2.13	0.45	0.46
69- 80	2	--	--	2	--	1	1	98	2	--	1	1	98		1.75	1.79	2.05	2.09	1.74	1.77	1.78	2.04	2.08	0.51	0.52
80-101	5	--	--	5	--	2	3	95	5	--	2	3	95		1.75	1.80	2.05	2.09	1.72	1.75	1.77	2.03	2.07	0.51	0.54
101-120	5	--	--	5	--	3	2	95	5	--	3	2	95		1.60	1.72	1.95	2.00	1.57	1.64	1.69	1.93	1.98	0.66	0.69
120-144	58	--	1	57	7	39	12	42	58	7	39	12	42		1.93										

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-003 PRINT DATE 06/12/90
CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 784, SAMPLE 84P4416-4427

DEPTH (IN.)	(V O L U M E F R A C T I O N S ---- W H O L E S O I L (MM) A T 1/3 B A R --- <---PCT OF WHOLE SOIL---> >2 51	250 -UP 52	250 -75 53	75 -2 54	75 -20 55	20 -5 56	5 -2 57	<2 58	2- .05 59	.05- .002 60	LT .002 61	PORES D 62	PORES F 63	)(C/)(/N) RAT -10 64	(R A T I O S TO C L A Y) --<2 MM FRACTION-- FINE CLAY 65	---C E C-- SUM CATS 66	---C E C-- NH4-OAC 67	15 BAR H2O 68	LE 1/3 BAR 69	(LINEAR EXTENSIBILITY) WHOLE SOIL <-1/3 BAR TO 15 BAR 70	WHOLE SOIL OVEN -DRY 71	--<2 MM-- (PCT)---> 15 BAR 72	--<2 MM-- OVEN -DRY 73	(W R D) WHOLE SOIL <--IN/IN-> 74	<2 MM 75
0- 5	TR	--	--	--	--	--	TR	100	4	36	6	55		10	0.50	1.47	1.05	0.69							
5- 9	1	--	--	1	--	TR	1	99	7	45	7	7	34	10	0.51	0.84	0.61	0.50	0.050	0.4	0.6	0.4	0.6	0.25	0.25
9- 14	1	--	--	1	--	TR	1	99	7	43	7	10	33	9	0.48	0.75	0.61	0.50	0.059	0.4	0.7	0.4	0.7	0.24	0.25
14- 22	1	--	--	1	--	TR	1	99	7	42	7	8	36	8	0.50	0.71	0.56	0.49	0.058	0.4	0.7	0.5	0.7	0.26	0.26
22- 33	1	--	--	1	--	TR	1	99	6	42	9	7	35		0.54	0.68	0.53	0.47	0.083	0.9	1.3	0.9	1.3	0.24	0.24
33- 45	TR	--	--	--	--	TR	TR	100	5	35	15	7	38		0.59	0.69	0.55	0.46	0.093	1.4	2.5	1.4	2.5	0.20	0.19
45- 54	1	--	--	1	--	TR	1	99	7	36	14	5	37		0.59	0.71	0.57	0.48	0.138	1.9	3.4	1.9	3.4	0.18	0.18
54- 69	2	--	--	2	--	1	1	98	12	44	10	2	29		0.60	0.70	0.54	0.47	0.060	0.5	0.9	0.6	0.9	0.17	0.17
69- 80	1	--	--	1	--	1	1	99	10	44	11	4	30		0.59	0.57	0.46	0.41	0.047	0.4	0.8	0.6	0.8	0.18	0.18
80-101	3	--	--	3	--	1	2	97	11	41	12	4	30		0.55	0.52	0.42	0.39	0.055	0.6	0.9	0.6	1.0	0.18	0.18
101-120	3	--	--	3	--	2	1	97	10	32	15	5	35		0.61	0.57	0.46	0.42	0.095	1.4	2.4	1.5	2.5	0.18	0.19
120-144	42	--	1	41	5	28	9	58	5	10	16	27			0.66	0.52	0.44	0.41							

DEPTH (IN.)	(W E I G H T F R A C T I O N S - C L A Y F R E E) --W H O L E S O I L-- >2 PCT 76	75 -2 OF 77	20 -2 >2MM+SAND+SILT> 78	2- .05 79	.05- .002 80	LT .002 81	---<2 MM F R A C T I O N---- ---SANDS--- VC (---PCT OF SAND+SILT---) 82	C 83	M 84	F 85	VF 86	SILTS C 87	SILTS F 88	CL AY 89	(-TEXTURE--) (DETERMINED IN FIELD (--<2 MM-) 90	BY PSDA 91	(--P S D A(MM)---) SAND 2- .05 (--PCT OF .2MM-) 92	SILT .05- .002 93	CLAY LT .002 94	(PH) CA- CL2 .01M 95	(-ELECTRICAL) RES- IST. OHMS (- - - - <2 MM- - - -) 96	CON- DUCT. MMHOS 97	SALT MG/ KG 98	(CUMULT. AMOUNTS) IN. OF H2O 1/3 BAR TO 15BAR (WHL SOIL) 99	AIRDRY 100
0- 5				10	90	15	TR	1	3	3	2	24	66	15	SIL	SIL	8.3	78.6	13.1	4.3					
5- 9	1	1	1	13	86	13	1	1	4	4	3	28	59	14	SIL	SIL	11.2	76.8	12.0	4.0					
9- 14	1	1	1	14	85	13	1	2	4	5	3	28	57	13	SIL	SIL	12.8	75.4	11.8	4.0					
14- 22	1	1	1	14	85	14	1	2	4	4	3	28	58	14	SIL	SIL	12.1	75.8	12.1	3.9					
22- 33	1	1	1	12	86	18	1	2	3	4	3	29	59	19	SIL	SIL	10.6	73.7	15.7	3.9					
33- 45				12	88	37	1	2	3	4	2	27	61	37	SICL	SICL	8.8	64.2	27.0	4.0					
45- 54	1	1	1	16	83	32	1	2	4	5	3	27	57	33	SIL	SIL	12.0	63.4	24.6	4.0					
54- 69	4	4	4	21	75	17	1	2	6	8	5	25	53	18	SIL	SIL	18.8	66.3	14.9	4.3					
69- 80	2	2	2	19	79	20	1	1	5	7	5	24	56	20	SIL	SIL	16.1	67.0	16.9	4.2					
80-101	6	6	6	19	75	21	1	2	5	8	5	23	57	22	SIL	SIL	16.9	64.8	18.3	4.5					
101-120	7	7	7	23	70	33	1	2	6	9	7	21	54	36	SIL	SIL	18.3	55.4	26.3	4.6					
120-144	74	73	65	9	17	27	8	7	7	8	5	17	48	105	C	C	17.2	31.6	51.2	4.9					

N A R R A T I V E   P E D O N   D E S C R I P T I O N

Pedon: Cobbsfork
Soil Survey Number S84-IN-031-003
Location: Decatur County, Indiana
NE 1/4 of NW 1/4 of NE 1/4 sec 36 T10N R10E. Newpoint quadrangle.
Latitude: 39-16-37-N
Physiography: Upland slope in level or undulating uplands
Slope: %
Precipitation: cm - Aquic Moisture Regime.
MLRA: 114 Southern Illinois and Indiana Thin Loess and Till Plain
Water Table Depth: 0
Drainage: Poorly drained
Stoniness: Erosion or Deposition:
Parent Material: lo
ss from mixed material over loess from mixed material over alluvium from mixed material over alluvium from mixed mater
Classification: Fine-silty, mixed, mesic Typic Ochraqualf
Diagnostic Horizons: 0 to 12 cm Ochric, 83 to 176 cm Argillic
Described By: A. Nickell and B. Nagel

NSSL Pedon Number: 84P0784
Print Date: 06/12/90
Longitude: 085-21-15-W
Elevation: 305 m MSL
Permeability: Very slow
Land Use: Forest land not grazed
Runoff:
Sample Date: 09/84

A -- 0 to 12 cm; brown (10YR 5/3) moist silt loam; many fine distinct light brownish gray (10YR 6/2) mottles; moderate fine and medium granular structure; friable; many fine roots; patchy distinct brownish gray (10YR 6/2) (1.5YR 5/6) iron stains; abrupt smooth boundary.
84P4416

E1 -- 12 to 23 cm; light gray (10YR 7/2) moist silt loam; common fine distinct yellowish brown (10YR 5/4) mottles; moderate coarse platy structure parting to moderate fine platy; friable; common fine roots; patchy distinct strong brown (7.5YR 5/6) iron stains; clear smooth boundary.
84P4417

E2 -- 23 to 35 cm; light gray (10YR 7/2) moist silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse platy structure; friable; common fine roots; patchy distinct grayish brown (10YR 5/2) organic coats in root channels and/or pores and patchy distinct strong brown (7.5YR 5/6) iron stains; clear smooth boundary.
84P4418

E3 -- 35 to 56 cm; light gray (10YR 7/2) moist silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak very coarse platy structure parting to weak coarse subangular blocky; friable; few fine roots; patchy distinct strong brown (7.5YR 5/6) iron stains; few fine soft masses of iron-manganese; clear smooth boundary.
84P4419

EB -- 56 to 83 cm; light gray (10YR 7/2) moist silt loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; friable; common medium soft masses of iron-manganese; gradual smooth boundary.
84P4420

Bt1 -- 83 to 114 cm; light brownish gray (10YR 6/2) moist silty clay loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; common medium soft masses of iron-manganese; gradual wavy boundary.
84P4421

2Bt2 --114 to 138 cm; light brownish gray (10YR 6/2) moist silt loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few medium soft masses of iron-manganese; 1 percent pebbles; gradual irregular boundary.
20 % very firm and 80 % firm. 10YR 6/1 clay flows.
84P4422

2Btx --138 to 176 cm; light yellowish brown (10YR 6/4) moist silt loam; common coarse distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; very firm; continuous distinct light gray to gray (10YR 6/1) clay films on faces of peds; common medium irregular soft masses of iron-manganese; 1 percent pebbles; gradual wavy boundary.
84P4423

2BC1 --176 to 204 cm; light yellowish brown (10YR 6/4) moist silt loam; common coarse distinct light brownish gray (10YR 6/2) and common medium distinct yellowish brown (10YR 5/8) mottles; weak very coarse prismatic structure; friable; continuous distinct

light gray to gray (10YR 6/1) clay films on faces of peds; common fine rounded soft masses of iron-manganese; 1 percent pebbles; clear wavy boundary.
84P4424

2BC2 --204 to 256 cm; light olive brown (2.5Y 5/4) moist silt loam; common medium distinct yellowish brown (10YR 5/8) and common coarse distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm; continuous distinct light gray to gray (10YR 6/1) clay films on faces of peds; few fine rounded soft masses of iron-manganese; 1 percent pebbles; gradual smooth boundary.
84P4425

2Btb --256 to 305 cm; yellowish brown (10YR 5/6) and light gray to gray (10YR 6/1) moist silt loam and silty clay loam; common coarse distinct light brownish gray (10YR 6/2) and common medium distinct strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; firm; continuous distinct light gray to gray (10YR 6/1) clay films on faces of peds; few medium irregular soft masses of iron-manganese; 1 percent pebbles; gradual wavy boundary.
Gray areas are silty clay loam.
84P4426

4C --305 to 367 cm; red (2.5YR 5/6), strong brown (7.5YR 5/6) and light gray (5Y 7/1) moist cherty clay; massive; very firm; common medium irregular soft masses of iron-manganese.
Horizontal beds of chert with soil intermingled.
84P4427

*** PRIMARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

S84IN-031-004

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 785, SAMPLES 84P4428-4440
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (CM)	HORIZON	-1-- TOTAL CLAY LT .002	-2-- TOTAL SILT .002 -.05	-3-- TOTAL SAND .05 -2	-4-- CLAY FINE LT .0002	-5-- CLAY CO3 LT .002	-6-- SILT FINE .002 -.02	-7-- SILT COARSE .02 -.05	-8-- SAND VF .05 -.10	-9-- SAND F .10 -.25	-10- SAND M .25 -.50	-11- SAND C .5 -1	-12- SAND VC 1 -2	-13- COARSE FRACTIONS(MM) WEIGHT 2 -5	-14- 5 -20	-15- 20 -75	-16- .1- 75	-17- (>2MM) WT PCT OF WHOLE SOIL
			<- - - - - - - - - - - - -	PCT OF <2MM	(3A1)	- - - - -						- - ->	<- PCT OF	<75MM(3B1)->			
84P4428S	0- 13	A	14.8	76.8	8.4	6.6		54.1	22.7	2.3	2.9	1.9	0.8	0.5	1	1	--	8	2
84P4429S	13- 26	E1	13.6	77.0	9.4	5.9		53.2	23.8	2.5	3.3	2.2	0.9	0.5	1	TR	--	8	1
84P4430S	26- 51	E2	13.1	76.3	10.6	5.3		52.8	23.5	2.6	3.3	2.3	1.5	0.9	1	TR	--	9	1
84P4431S	51- 64	E3	14.3	75.7	10.0	5.5		52.6	23.1	2.4	2.9	2.1	1.6	1.0	1	TR	--	9	1
84P4432S	64- 82	E4	17.9	72.9	9.2	8.7		50.7	22.2	2.2	2.7	1.9	1.4	1.0	2	TR	--	9	2
84P4433S	82- 93	E5	18.6	72.3	9.1	8.9		51.3	21.0	2.0	2.4	1.8	1.6	1.3	4	TR	--	11	4
84P4434S	93-127	2BX1	21.3	67.1	11.6	12.1		46.2	20.9	2.5	3.2	2.5	2.1	1.3	TR	1	--	10	1
84P4435S	127-154	2BX2	18.2	63.7	18.1	10.2		43.1	20.6	4.7	6.2	3.7	1.8	1.7	1	1	--	15	2
84P4436S	154-184	2BX3	20.0	60.5	19.5	11.9		41.8	18.7	5.7	7.0	4.2	1.5	1.1	1	1	--	16	2
84P4437S	184-216	2BX4	21.4	58.5	20.1	10.7		42.1	16.4	5.8	7.0	4.0	1.8	1.5	1	1	--	16	2
84P4438S	216-249	3BTB1	24.7	51.8	23.5	10.4		35.7	16.1	5.5	6.5	4.3	3.5	3.7	3	1	--	21	4
84P4439S	249-279	3BTB2	25.4	47.5	27.1	12.9		32.7	14.8	7.4	7.8	5.2	3.8	2.9	3	2	--	24	5

DEPTH (CM)	ORGN C 6A1C PCT	TOTAL N 6B3A <2MM	EXTR P 6S3 PPM	TOTAL S 6R3A <- PERCENT	DITH-CIT EXTRACTABLE FE 6C2B	AL 6G7A OF	MN 6D2A <2MM -->	(RATIO/CLAY) CEC 8D1	15 BAR 8D1	(ATTERBERG - LIMITS -) LL 4F1 PCT	PI 4F <0.4MM	(- BULK DENSITY -) FIELD MOIST 4A3A <- -	1/3 BAR 4A1D G/CC	OVEN DRY 4A1H - - ->	COLE WHOLE SOIL 4D1 CM/CM	(- - -WATER CONTENT - -) FIELD MOIST 4B4 <- -	1/10 BAR 4B1C -PCT OF	1/3 BAR 4B1C <2MM	15 BAR 4B2a - ->	WRD WHOLE SOIL 4C1 CM/CM
0- 13	2.97				1.1		0.1	0.91	0.70				1.20						10.4	
13- 26	0.64				1.2		TR	0.53	0.49				1.43	1.47	0.009			22.4	6.6	0.22
26- 51	0.34				1.5		0.1	0.50	0.49				1.32	1.35	0.007			21.1	6.4	0.19
51- 64	0.25				1.3		0.1	0.51	0.45				1.42	1.45	0.007			23.7	6.4	0.24
64- 82	0.19				1.5		TR	0.57	0.47				1.46	1.50	0.009			24.0	8.4	0.23
82- 93	0.23				1.7		0.1	0.53	0.42				1.42	1.47	0.011			22.8	7.9	0.21
93-127	0.10				2.0		0.2	0.63	0.51				1.67	1.74	0.014			20.5	10.9	0.16
127-154	0.08				1.8		0.1	0.60	0.49				1.71	1.77	0.011			19.1	8.9	0.17
154-184	0.10				1.5		0.1	0.56	0.48				1.69	1.78	0.017			18.8	9.6	0.15
184-216	0.08				1.7		0.1	0.47	0.41				1.68	1.73	0.010			18.4	8.8	0.16
216-249	0.10				2.2		0.3	0.50	0.47				1.60						11.5	
249-279	0.07				2.8		0.2	0.48	0.44				1.57	1.66	0.018			22.3	11.1	0.17

AVERAGES, DEPTH 25- 93: PCT CLAY 15 PCT .1-75MM 9

*** P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-004 PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 785, SAMPLE 84P4428-4440

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- - - -CEC - - -)			AL	-BASE SAT-		CO3 AS	RES.		COND.		(- - - -PH - - -)	
	CA	MG	NA	K	SUM	ITY	AL	SUM	NH4-	BASES	SAT	SUM	NH4	CACO3	OHMS		MMHOS		CACL2	H2O
DEPTH	5B5A	5B5A	5B5A	5B5A	BASES			CATS	OAC	+ AL			OAC	<2MM	/CM		/CM		.01M	
(CM)	6N2E	6O2D	6P2B	6Q2B		6H5A	6G9A	5A3A	5A8B	5A3B	5G1	5C3	5C1	6E1G	8E1		8I		8C1F	8C1F
	<- - - - - - - - - - - -MEQ / 100 G - - - - - - - - - - - ->										<- - - - - -PCT - - - ->								1:2	1:1
0- 13	8.0	2.0	TR	0.4	10.4	9.5	0.1	19.9	13.5	10.5	1	52	77						4.8	5.0
13- 26	2.8	1.0	TR	0.2	4.0	5.6	1.2	9.6	7.2	5.2	23	42	56						4.2	4.8
26- 51	1.2	0.7	TR	0.1	2.0	6.1	2.7	8.1	6.6	4.7	57	25	30						3.9	4.4
51- 64	1.0	1.0	TR	0.1	2.1	6.5	2.7	8.6	7.3	4.8	56	24	29						3.9	4.4
64- 82	1.9	1.7	TR	0.2	3.8	7.3	2.8	11.1	10.2	6.6	42	34	37						3.9	4.5
82- 93	1.8	2.2	TR	0.2	4.2	6.8	2.7	11.0	9.9	6.9	39	38	42						4.0	4.6
93-127	2.4	3.5	0.1	0.2	6.2	10.4	3.4	16.6	13.4	9.6	35	37	46						4.0	4.8
127-154	2.0	3.0	0.2	0.2	5.4	7.3	2.4	12.7	10.9	7.8	31	43	50						4.0	4.9
154-184	2.3	3.5	0.2	0.2	6.2	6.4	2.0	12.6	11.1	8.2	24	49	56						4.0	5.1
184-216	2.5	3.1	0.2	0.1	5.9	5.6	1.2	11.5	10.1	7.1	17	51	58						4.2	5.2
216-249	3.6	3.9	0.3	0.1	7.9	7.3	1.0	15.2	12.4	8.9	11	52	64						4.4	5.3
249-279	4.1	3.8	0.3	0.1	8.3	6.4	0.7	14.7	12.2	9.0	8	56	68						4.5	5.3

ESTIMATED BULK DENSITY FOR LAYER 1, 11,

ANALYSES: S= ALL ON SIEVED <2MM BASIS

*** P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-004

(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 785, SAMPLES 84P4428-4440
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	-1-- DEPTH (CM)	-2-- HORIZON	-3--	-4-- TOTAL CLAY LT .002	-5-- TOTAL SILT .002 -.05	-6-- TOTAL SAND .05 -2	-7-- CLAY FINE LT .0002	-8-- CLAY CO3 LT .002	-9-- SILT FINE .002 -.02	-10- SILT COARSE .02 -.05	-11- SAND VF .05 -.10	-12- SAND F .10 -.25	-13- SAND M .25 -.50	-14- SAND C .5 -1	-15- SAND VC 1 -2	-16- COARSE FRACTIONS(MM) WEIGHT 2 -5	-17- WEIGHT 5 -20	-18- WEIGHT 20 -75	-19- WEIGHT .1- 75	-20- (>2MM) WT PCT OF WHOLE SOIL
				<- PCT OF <2MM (3A1)											->	<- PCT OF <75MM(3B1)			->	
84P4440S	279-342	4C		40.9	38.8	20.3	18.9		25.0	13.8	5.2	4.6	3.0	2.9	4.6	3	16	8V	38	34

DEPTH (CM)	ORGN C 6A1C PCT	TOTAL N 6B3A <2MM	EXTR P 6S3 PPM	TOTAL S 6R3A	DITH-CIT EXTRACTABLE FE 6C2B	DITH-CIT EXTRACTABLE AL 6G7A	DITH-CIT EXTRACTABLE MN 6D2A	(RATIO/CLAY) CEC 8D1	(RATIO/CLAY) 15 BAR 8D1	(ATTERBERG LIMITS) LL 4F1	(ATTERBERG LIMITS) PI 4F	BULK DENSITY FIELD MOIST 4A3A	BULK DENSITY 1/3 BAR 4A1D	BULK DENSITY OVEN DRY 4A1H	COLE WHOLE SOIL 4D1	WATER CONTENT FIELD MOIST 4B4	WATER CONTENT 1/10 BAR 4B1C	WATER CONTENT 1/3 BAR 4B1C	WATER CONTENT 15 BAR 4B2a	WRD WHOLE SOIL 4C1
				<- PERCENT OF <2MM -->						PCT <0.4MM		<- - G/CC		- - ->	CM/CM	<- - -PCT OF <2MM			- ->	CM/CM
279-342	0.08				3.5		0.2	0.37	0.39				1.60						16.0	

AVERAGES, DEPTH 25- 93: PCT CLAY 41 PCT .1-75MM 38

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-004 PRINT DATE 06/12/90
SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 785, SAMPLE 84P4428-4440

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	(- NH4OAC EXTRACTABLE BASES -)					ACID-	EXTR	(- - - -CEC - - -)			AL	-BASE SAT-		CO3 AS	RES.		COND.	(- - - -PH - - -)		
	CA	MG	NA	K	SUM	ITY	AL	SUM	NH4-	BASES	SAT	SUM	NH4	CACO3	OHMS		MMHOS		CACL2	H2O
DEPTH	5B5A	5B5A	5B5A	5B5A	BASES			CATS	OAC	+ AL			OAC	<2MM	/CM		/CM		.01M	
(CM)	6N2E	6O2D	6P2B	6Q2B		6H5A	6G9A	5A3A	5A8B	5A3B	5G1	5C3	5C1	6E1G	8E1		8I		8C1F	8C1F
	<- - - - - - - - - - - - -MEQ / 100 G - - - - - - - - - - - ->										<- - - - -PCT - - - ->								1:2	1:1
279-342	7.6	4.4	0.3	0.2	12.5	6.4	0.3	18.9	15.2	12.8	2	66	82						5.0	5.5

ESTIMATED BULK DENSITY FOR LAYER 13,

ANALYSES: S= ALL ON SIEVED <2MM BASIS V= 75-20MM FROM VOLUME ESTIMATES

S84IN-031-004

*** PRIMARY CHARACTERIZATION DATA ***
(DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 785, SAMPLES 84P4428-4440
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	HZ NO	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
		ACID OXALATE EXTRACTION				PHOSPHOUS		KCL	TOTAL	(- -WATER CONTENT- -)				(- - - - WATER DISPERSIBLE - - - -)						MIN	AGGRT
		OPT DEN	FE	SI	AL	RET	CIT-ACID	MN	C	0.06 BAR	1-BAR	2-BAR	15 BAR	<- - PIPETTE - - >			< - HYDROMETER - >			SOIL CONT	STABL <5mm
		8J	6C9a	6V2	6G12	6S4	6S5	6D3	6A2d	4B1c	4B1a	4B1a	4B2b	CLAY	SILT 3A1c	SAND	CLAY	SILT SML	SAND	8F1	4G1
			<- P C T of < 2 m m ->				<- P P M ->		< - - - P E R C E N T of < 2 m m - - - >												< PCT>
84P4428	1								2.59												
84P4429	2								0.78												
84P4430	3								0.39												
84P4431	4								0.27												
84P4432	5								0.25												
84P4433	6								0.26												
84P4434	7								0.10												
84P4435	8								0.13												
84P4436	9								0.15												
84P4437	10								0.16												
84P4438	11								0.14												
84P4439	12								0.17												

*** P R I M A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-004 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154, ILLINOIS TILL PLAIN STUDY
- PEDON 84P 785, SAMPLES 84P4428-4440
- GENERAL METHODS 1B1A, 2A1, 2B

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	HZ NO	-1-- ACID OXALATE OPT DEN 8J	-2-- EXTRACTION FE 6C9a	-3-- SI 6V2	-4-- AL 6G12	-5-- PHOSPHOUS RET 6S4	-6-- CIT- ACID 6S5	-7-- KCL MN 6D3	-8-- TOTAL C 6A2d	-9-- (- -WATER 0.06 BAR 4B1c	-10- 1- BAR 4B1a	-11- CONTENT- 2- BAR 4B1a	-12- 15 BAR 4B2b	-13- (WATER DISPERSIBLE PIPETTE CLAY	-14- SILT 3A1c	-15- SAND	-16- HYDROMETER CLAY	-17- SILT SML	-18- SAND	-19- MIN SOIL CONT 8F1	-20- AGGRT STABL <5mm 4G1
			<- PCT of < 2 mm ->			<- PPM ->			<- PERCENT of < 2 mm ->												< PCT>
84P4440	13								0.14												

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-004 PRINT DATE 06/12/90
SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 785, SAMPLE 84P4428-4440

SAMPLE NUMBER	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	CLAY MINERALOGY (<.002mm)																			
	FRACTION	X-RAY 7A2i peak size					THERMAL: DTA 7A3b Percent		TGA 7A4b Percent		ELEMENTAL 7C3 Percent: SiO2	AL2O3	Fe2O3	MgO	CaO	K2O	Na2O		EGME RETN 7D2 mg/g	INTERPRETATION
84P4429	TCLY	KK 3	VM 2	MI 2	QZ 2								6.7			1.4				
84P4431	TCLY	KK 3	VM 2	MI 2	MT 1	QZ 1	KK 1						6.7			1.4				
84P4433	TCLY	KK 3	MI 2	VM 2	MT 1	QZ 1	KK 2						6.4			1.5				
84P4434	TCLY	KK 3	MI 2	MT 2	VM 2		KK 3						8.3			1.5				
84P4435	TCLY	KK 3	VM 2	MI 2	MT 2		KK 3						7.3			1.4				
84P4437	TCLY	KK 3	VM 3	MI 2	MT 1		KK 6						6.4			1.1				
84P4438	TCLY	KK 3	VM 3	MI 2	QZ 1		KK14						7.1			1.2				
84P4439	TCLY	KK 3	VM 2	MI 2			KK13						8.7			1.1				

FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm

MINERAL INTERPRETATION:

KK kaolinite VM verm-mica MI mica QZ quartz MT montmorill

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:
COMMENTS:

*** PRIMARY CHARACTERIZATION DATA ***

S84IN-031-004 PRINT DATE 06/12/90
SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 785, SAMPLE 84P4428-4440

	-1--	-2--	-3--	-4--	-5--	-6--	-7--	-8--	-9--	-10-	-11-	-12-	-13-	-14-	-15-	-16-	-17-	-18-	-19-	-20-
	CLAY MINERALOGY (<.002mm)																			
SAMPLE	FRACTION	X-RAY					THERMAL				ELEMENTAL								EGME	INTER
							DTA		TGA		SiO2	AL2O3	Fe2O3	MgO	CaO	K2O	Na2O		RETN	PRETATION
		7A2i					7A3b		7A4b		7C3								7D2	
NUMBER		peak size					Percent				Percent								mg/g	
84P4440	TCLY	KK 3	VM 2	MI 2	QZ 1		KK27						9.7			1.5				

FRACTION INTERPRETATION:

TCLY Total Clay, <0.002mm

MINERAL INTERPRETATION:

KK kaolinite VM verm-mica MI mica QZ quartz

RELATIVE PEAK SIZE: 5 Very Large 4 Large 3 Medium 2 Small 1 Very Small 6 No Peaks

INTERPRETATION (BY HORIZON):

PEDON MINERALOGY
BASED ON SAND/SILT:
BASED ON CLAY:
FAMILY MINERALOGY:
COMMENTS:

*** S U P P L E M E N T A R Y   C H A R A C T E R I Z A T I O N   D A T A ***

S84IN-031-004 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154,
- PEDON 84P 785, SAMPLES 84P4428-4440
- GENERAL METHODS (ENGINEERING FRACTIONS ARE CALCULATED FROM USDA FRACTION SIZES)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (IN.)	HORIZON	ENGINEERING PERCENTAGE PASSING 3 (INCHES) 1	2 (INCHES) 2	3/2 (INCHES) 3	1 (INCHES) 4	3/4 (INCHES) 5	3/8 (INCHES) 6	4 (NUMBER) 7	10 (NUMBER) 8	40 (NUMBER) 9	200 (NUMBER) 10	PSDA SIEVE 20 (MICRONS) 11	5 (MICRONS) 12	2 (MICRONS) 13	CUMULATIVE CURVE USDA LESS THAN 1. (MM) 14	.5 (MM) 15	.25 (MM) 16	.10 (MM) 17	.05 (MM) 18	FRACTIONS(<76MM) DIAMETERS(MM) AT 60 PERCENTILE 19	50 PERCENTILE 20	10 PERCENTILE 21	ATTERBERG LL (PCT) 22	PI (PCT) 23	GRADATION UNIFMTY CU 24	CURVTUR CC 25
84P4428S	0- 5	A	100	100	100	100	100	100	99	98	96	91	68	36	15	98	97	95	92	90	0.01	0.009	0.001			14.7	1.1
84P4429S	5- 10	E1	100	100	100	100	100	100	100	99	97	91	66	34	13	99	98	95	92	90	0.02	0.010	0.001			13.8	1.0
84P4430S	10- 20	E2	100	100	100	100	100	100	100	99	96	90	65	34	13	98	97	94	91	89	0.02	0.010	0.001			13.4	1.0
84P4431S	20- 25	E3	100	100	100	100	100	100	100	99	96	90	66	35	14	98	96	94	91	89	0.02	0.010	0.001			14.9	1.1
84P4432S	25- 32	E4	100	100	100	100	100	100	100	98	95	90	67	37	18	97	96	94	91	89	0.01	0.009	0.001			19.3	1.2
84P4433S	32- 37	E5	100	100	100	100	100	100	100	96	93	88	67	37	18	95	93	91	89	87	0.01	0.009	0.001			19.8	1.2
84P4434S	37- 50	2BX1	100	100	100	100	100	100	99	99	95	89	67	39	21	98	96	93	90	88	0.01	0.009	0.001			23.8	1.2
84P4435S	50- 61	2BX2	100	100	100	100	100	100	99	98	94	83	60	35	18	96	95	91	85	80	0.02	0.012	0.001			27.4	1.0
84P4436S	61- 72	2BX3	100	100	100	100	100	100	99	98	94	82	61	36	20	97	95	91	84	79	0.02	0.011	0.001			29.9	1.0
84P4437S	72- 85	2BX4	100	100	100	100	100	100	99	98	94	82	62	37	21	97	95	91	84	78	0.02	0.010	0.001			29.5	1.0
84P4438S	85- 98	3BTB1	100	100	100	100	100	100	99	96	88	76	58	37	24	92	89	85	79	73	0.02	0.012	0.001			42.7	0.8
84P4439S	98-110	3BTB2	100	100	100	100	100	99	98	95	87	73	55	36	24	92	89	84	76	69	0.03	0.014	0.001			52.7	0.7

DEPTH (IN.)	WEIGHT FRACTIONS WHOLE SOIL (MM) PCT OF WHOLE SOIL >2 26	250-UP 27	250-75 28	75-2 29	75-20 30	20-5 31	5-2 32	<2 33	<75 MM FRACTION PCT OF <75 MM 75-2 34	75-20 35	20-5 36	5-2 37	<2 38	39	WEIGHT PER UNIT VOLUME G/CC WHOLE SOIL SOIL SURVEY 1/3 BAR 40	SOIL SURVEY OVEN-DRY 41	ENGINEERING MOIST 42	ENGINEERING SATURATED 43	<2 MM FRACTION SOIL SURVEY 1/3 BAR 44	SOIL SURVEY 15 BAR 45	SOIL SURVEY OVEN-DRY 46	ENGINEERING MOIST 47	ENGINEERING SATURATED 48	VOID RATIOS AT 1/3 BAR WHOLE SOIL 49	VOID RATIOS AT 1/3 BAR <2 MM 50
0- 5	2	--	--	2	--	1	1	98	2	--	1	1	98		1.21										
5- 10	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.44	1.48	1.76	1.90	1.43	1.46	1.47	1.75	1.89	0.84	0.85
10- 20	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.33	1.36	1.61	1.83	1.32	1.34	1.35	1.60	1.82	0.99	1.01
20- 25	1	--	--	1	--	TR	1	99	1	--	TR	1	99		1.43	1.46	1.76	1.89	1.42	1.44	1.45	1.76	1.88	0.85	0.87
25- 32	2	--	--	2	--	TR	2	98	2	--	TR	2	98		1.47	1.51	1.82	1.92	1.46	1.49	1.50	1.81	1.91	0.80	0.82
32- 37	4	--	--	4	--	TR	4	96	4	--	TR	4	96		1.45	1.50	1.77	1.90	1.42	1.45	1.47	1.74	1.88	0.83	0.87
37- 50	1	--	--	1	--	1	TR	99	1	--	1	TR	99		1.68	1.75	2.02	2.05	1.67	1.71	1.74	2.01	2.04	0.58	0.59
50- 61	2	--	--	2	--	1	1	98	2	--	1	1	98		1.72	1.78	2.05	2.07	1.71	1.74	1.77	2.04	2.06	0.54	0.55
61- 72	2	--	--	2	--	1	1	98	2	--	1	1	98		1.70	1.79	2.01	2.06	1.69	1.74	1.78	2.01	2.05	0.56	0.57
72- 85	2	--	--	2	--	1	1	98	2	--	1	1	98		1.69	1.74	1.99	2.05	1.68	1.71	1.73	1.99	2.05	0.57	0.58
85- 98	4	--	--	4	--	1	3	96	4	--	1	3	96		1.63										
98-110	5	--	--	5	--	2	3	95	5	--	2	3	95		1.61	1.70	1.95	2.00	1.57	1.62	1.66	1.92	1.98	0.65	0.69

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-004 PRINT DATE 06/12/90

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NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 785, SAMPLE 84P4428-4440

(V O L U M E F R A C T I O N S)(C/)(R A T I O S TO C L A Y)(LINEAR EXTENSIBILITY)(W R D)

DEPTH (IN.)	Whole soil (MM) >2 (51)	250-UP (52)	250-75 (53)	75-2 (54)	75-20 (55)	20-5 (56)	5-2 (57)	<2 (58)	At 1/3 bar 2-.05 (59)	.05-.002 (60)	LT .002 (61)	Pores D (62)	Pores F (63)	(C/N) RAT -IO (64)	Fine clay (65)	CEC Sum cats (66)	CEC NH4-OAC (67)	15 bar H2O (68)	LE 1/3 bar (69)	Whole soil 1/3 bar to 15 bar (70)	Whole soil 1/3 bar to oven-dry (71)	<2 mm 15 bar (72)	<2 mm oven-dry (73)	WRD whole soil IN/IN (74)	WRD <2 MM IN/IN (75)
0- 5	1	--	--	1	--	1	1	99	4	34	7	54			0.45	1.34	0.91	0.70							
5- 10	1	--	--	1	--	TR	1	99	5	42	7	14	32		0.43	0.71	0.53	0.49	0.066	0.7	0.9	0.7	0.9	0.22	0.23
10- 20	1	--	--	1	--	TR	1	99	5	38	7	22	28		0.40	0.62	0.50	0.49	0.061	0.5	0.7	0.5	0.8	0.19	0.19
20- 25	1	--	--	1	--	TR	1	99	5	40	8	13	33		0.38	0.60	0.51	0.45	0.049	0.5	0.7	0.5	0.7	0.24	0.25
25- 32	1	--	--	1	--	TR	1	99	5	40	10	10	35		0.49	0.62	0.57	0.47	0.050	0.7	0.9	0.7	0.9	0.23	0.23
32- 37	2	--	--	2	--	TR	2	98	5	37	10	13	32		0.48	0.59	0.53	0.42	0.065	0.7	1.1	0.7	1.2	0.21	0.21
37- 50	1	--	--	1	--	1	TR	99	7	43	14	3	34		0.57	0.78	0.63	0.51	0.066	0.8	1.4	0.8	1.4	0.16	0.16
50- 61	1	--	--	1	--	1	1	99	12	41	12	2	33		0.56	0.70	0.60	0.49	0.066	0.6	1.2	0.6	1.2	0.17	0.17
61- 72	1	--	--	1	--	1	1	99	12	38	13	5	31		0.60	0.63	0.56	0.48	0.085	1.0	1.7	1.0	1.7	0.15	0.16
72- 85	1	--	--	1	--	1	1	99	13	37	13	6	30		0.50	0.54	0.47	0.41	0.047	0.6	1.0	0.6	1.0	0.16	0.16
85- 98	2	--	--	2	--	1	2	98	14	30	14	38			0.42	0.62	0.50	0.47							
98-110	3	--	--	3	--	1	2	97	16	27	15	5	34		0.51	0.58	0.48	0.44	0.075	1.0	1.8	1.1	1.9	0.17	0.18

(W E I G H T F R A C T I O N S - C L A Y F R E E)(-TEXTURE--)(--P S D A(MM)---)(PH)(-ELECTRICAL)(CUMULT. AMOUNTS)

DEPTH (IN.)	Whole soil >2 PCT (76)	75-2 (77)	20-2 (78)	2-.05 (79)	.05-.002 (80)	LT .002 (81)	Sands VC (82)	Sands C (83)	Sands M (84)	Sands F (85)	Sands VF (86)	Silts C (87)	Silts F (88)	CLAY (89)	Texture in field (90)	Texture by PSDA (91)	Sand 2-.05 (92)	Silt .05-.002 (93)	Clay LT .002 (94)	pH CaCl2 .01M (95)	Res-ist. ohms (96)	Con-duct. mmhos (97)	Salt mg/kg (98)	In. of H2O 1/3 bar to 15bar (99)	In. of H2O to airdry (100)
0- 5	2	2	2	10	88	17	1	1	2	3	3	27	63	17	SIL	SIL	8.4	76.8	14.8	4.8					
5- 10	1	1	1	11	88	16	1	1	3	4	3	28	62	16	SIL	SIL	9.4	77.0	13.6	4.2					
10- 20	1	1	1	12	87	15	1	2	3	4	3	27	61	15	SIL	SIL	10.6	76.3	13.1	3.9					
20- 25	1	1	1	12	87	16	1	2	2	3	3	27	61	17	SIL	SIL	10.0	75.7	14.3	3.9					
25- 32	2	2	2	11	87	21	1	2	2	3	3	27	62	22	SIL	SIL	9.2	72.9	17.9	3.9					
32- 37	5	5	5	11	85	22	2	2	2	3	2	26	63	23	SIL	SIL	9.1	72.3	18.6	4.0					
37- 50	1	1	1	15	84	27	2	3	3	4	3	27	59	27	SIL	SIL	11.6	67.1	21.3	4.0					
50- 61	2	2	2	22	76	22	2	2	5	8	6	25	53	22	SIL	SIL	18.1	63.7	18.2	4.0					
61- 72	2	2	2	24	74	24	1	2	5	9	7	23	52	25	SIL	SIL	19.5	60.5	20.0	4.0					
72- 85	3	3	3	25	73	27	2	2	5	9	7	21	54	27	SIL	SIL	20.1	58.5	21.4	4.2					
85- 98	5	5	5	30	65	31	5	5	6	9	7	21	47	33	SIL	SIL	23.5	51.8	24.7	4.4					
98-110	7	7	7	34	59	32	4	5	7	10	10	20	44	34	SIL	L	27.1	47.5	25.4	4.5					

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-004 (DECATUR COUNTY, INDIANA)

PRINT DATE 06/12/90

SAMPLED AS : COBBSFORK ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
REVISED TO : CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF

NSSL - PROJECT 84P 154,
- PEDON 84P 785, SAMPLES 84P4428-4440
- GENERAL METHODS (ENGINEERING FRACTIONS ARE CALCULATED FROM USDA FRACTION SIZES)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA 68508-3866

SAMPLE NO.	DEPTH (IN.)	HORIZON	ENGINEERING PERCENTAGE PASSING <-----INCHES-----> 3	2	3/2	1	3/4	3/8	<-NUMBER-> 4	10	40	200	PSDA SIEVE <-MICRONS-> 20	5	2	CUMULATIVE CURVE FRACTIONS(<76MM) USDA LESS THAN <--------MM-------> 1.	.5	.25	.10	.05	DIAMETERS(MM) AT <--PERCENTILE--> 60	50	10	ATTER-BERG <-PCT> LL	PI	GRADATION UNI-FMTY CU	CUR-VTUR CC
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
84P4440S	110-134	4C	100	98	96	94	92	84	76	73	67	60	48	37	30	70	68	65	62	58	0.07	0.024	--			>100	0.1

DEPTH (IN.)	WEIGHT FRACTIONS ---WHOLE SOIL (MM)- <------PCT OF WHOLE SOIL-----> >2	250 -UP	250 -75	75 -2	75 -20	20 -5	5 -2	<2	-<75 MM FRACTION-- <--PCT OF <75 MM-> 75 -2	75 -20	20 -5	5 -2	<2		(WEIGHT PER UNIT VOLUME G/CC) ------WHOLE SOIL------ SOIL SURVEY 1/3 BAR	OVEN -DRY	ENGINEERING MOIST	SATUR -ATED	-------<2 MM FRACTION------- --SOIL SURVEY-- 1/3 BAR	15 BAR	OVEN -DRY	ENGINEERING MOIST	SATUR -ATED	(VOID) --RATIOS-- AT 1/3 BAR WHOLE SOIL	<2 MM
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
110-134	34	--	10	24	7	14	3	66	27	8	16	3	73		1.86										

*** SUPPLEMENTARY CHARACTERIZATION DATA ***

S84IN-031-004 PRINT DATE 06/12/90
CLASSIFICATION: CLERMONT ; FINE-SILTY, MIXED, MESIC TYPIC OCHRAQUALF
NATIONAL SOIL SURVEY LABORATORY ; PEDON 84P 785, SAMPLE 84P4428-4440

DEPTH (IN.)	VOLUME FRACTIONS, WHOLE SOIL (MM) AT 1/3 BAR, PCT OF WHOLE SOIL: >2 (51)	250-UP (52)	250-75 (53)	75-2 (54)	75-20 (55)	20-5 (56)	5-2 (57)	<2 (58)	2-.05 (59)	.05-.002 (60)	LT .002 (61)	PORES D (62)	PORES F (63)	(C/N) RAT -10 (64)	RATIOS TO CLAY, <2 MM FRACTION: FINE CLAY (65)	CEC SUM CATS (66)	CEC NH4-OAC (67)	15 BAR H2O (68)	LINEAR EXTENSIBILITY: LE 1/3 BAR (69)	WHOLE SOIL <-1/3 BAR TO 15 BAR (70)	WHOLE SOIL OVEN-DRY (71)	<2 MM (PCT) 15 BAR (72)	<2 MM (PCT) OVEN-DRY (73)	W R D (IN/IN): WHOLE SOIL (74)	<2 MM (75)
110-134	24	--	7	17	5	10	2	76	9	18	19	30			0.46	0.46	0.37	0.39							

DEPTH (IN.)	WEIGHT FRACTIONS - CLAY FREE, WHOLE SOIL: >2 PCT (76)	75-2 PCT OF >2MM+SAND+SILT (77)	20-2 (78)	2-.05 (79)	.05-.002 (80)	LT .002 (81)	<2 MM FRACTION, PCT OF SAND+SILT: SANDS VC (82)	SANDS C (83)	SANDS M (84)	SANDS F (85)	SANDS VF (86)	SILTS C (87)	SILTS F (88)	CLAY (89)	TEXTURE (DETERMINED) IN FIELD (90)	BY PSDA (<2 MM) (91)	PSDA (MM), PCT OF .2MM: SAND 2-.05 (92)	SILT .05-.002 (93)	CLAY LT .002 (94)	PH CACL2 .01M (95)	ELECTRICAL <2 MM: RES-IST. OHMS (96)	CON-DUCT. MMHOS (97)	SALT MG/KG (98)	CUMULT. AMOUNTS IN. OF H2O (WHL SOIL): 1/3 BAR TO 15BAR (99)	AIRDRY (100)
110-134	47	33	23	18	35	37	8	5	5	8	9	23	42	69	L	C	20.3	38.8	40.9	5.0					

NARRATIVE PEDON DESCRIPTION

Pedon: Cobbsfork
Soil Survey Number S84-IN-031-004
Location: Decatur County, Indiana
SW 1/4 of NW 1/4 of SE 1/4 sec 25 T10N R10E. Newpoint quadrangle.
Latitude: 39-17-00-N
Slope: %
Precipitation: cm - Aquic Moisture Regime.
MLRA: 114 Southern Illinois and Indiana Thin Loess and Till Plain
Water Table Depth: 0
Drainage: Poorly drained
Stoniness: Erosion or Deposition:
Particle Size Control Section: 25 to 93 cm
Parent Material: lo
ss from mixed material over loess from mixed material over alluvium over alluvium from
mixed mater
Classification: Fine-silty, mixed, mesic Typic Ochraqualf
Diagnostic Horizons: 0 to 13 cm Ochric
Described By: D. Franzmeier and A. Nickell

NSSL Pedon Number: 84P0785
Print Date: 06/12/90
Longitude: 085-21-18-W
Elevation: 305 m MSL
Permeability: Slow
Land Use: Forest land not grazed
Runoff:
Sample Date: 09/84

A -- 0 to 13 cm; dark brown (10YR 3/3) moist silt loam; weak medium granular structure; very friable; many fine to coarse roots; abrupt smooth boundary.
84P4428

E1 -- 13 to 26 cm; light gray (10YR 7/1) moist silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse platy structure; friable; common fine roots; clear smooth boundary.
Some animal mixing of the upper horizon (20%).
84P4429

E2 -- 26 to 51 cm; light gray (10YR 7/1) moist silt loam; common medium distinct yellowish brown (10YR 5/6) and common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse platy structure; friable; common fine roots; gradual smooth boundary.
84P4430

E3 -- 51 to 64 cm; light gray (10YR 7/1) moist silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few medium roots; discontinuous distinct white (10YR 8/1) skeletans (sand or silt) on faces of peds; gradual smooth boundary.
84P4431

E4 -- 64 to 82 cm; light gray (10YR 7/1) moist silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; common medium roots; discontinuous distinct white (10YR 8/1) skeletans (sand or silt) on faces of peds; gradual smooth boundary.
84P4432

E5 -- 82 to 93 cm; light gray (10YR 7/1) moist silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common medium roots; discontinuous faint white (10YR 8/1) skeletans (sand or silt) on faces of peds; clear irregular boundary.
Horizon tongues into horzion below but is still silty material.
84P4433

2Bx1 -- 93 to 127 cm; yellowish brown (10YR 5/6) moist silt loam; common medium distinct light brownish gray (10YR 6/2), common medium distinct strong brown (7.5YR 5/6) and few fine distinct black (10YR 2/1) mottles; moderate coarse prismatic structure parting to weak medium angular blocky; firm; few fine roots; many discontinuous distinct black (10YR 2/1) manganese or iron-manganese coats in root channels and/or pores; few rounded iron-manganese concretions; clear irregular boundary.
Few manganese nodules 1.5 cm in diameter.
84P4434

2Bx2 --127 to 154 cm; yellowish brown (10YR 5/4) moist silt loam; common medium distinct light gray (10YR 7/1) and common coarse distinct strong brown (7.5YR 5/6) mottles; strong very coarse prismatic structure; very firm, brittle; few medium roots; discontinuous distinct brown (7.5YR 5/6) (107R 6/1) skeletans (sand or silt) on faces of peds and discontinuous distinct black (10YR 2/1) manganese or iron-manganese coats in root channels and/or pores; gradual wavy boundary.
84P4435

2Bx3 --154 to 184 cm; yellowish brown (10YR 5/4) moist silt loam and silty clay loam; strong very coarse prismatic structure;

very firm; few medium roots; discontinuous distinct grayish brown (10YR 5/2) clay films on faces of peds and discontinuous distinct black (10YR 2/1) clay films in root channels and/or pores; few fine irregular soft masses of iron-manganese; gradual wavy boundary. Roots are in gray areas. 10YR 5/1clay flows. Faces of prsims have finer texture.
84P4437

2Bx4 --184 to 216 cm; yellowish brown (10YR 5/4) moist silt loam and silty clay loam; moderate very coarse prismatic structure parting to weak medium subangular blocky; friable, brittle; few medium roots; many prominent black (10YR 2/1) manganese or iron-manganese coats on faces of peds; clear wavy boundary.
Gray areas have finer texture and about all are in form of gray columns sore are up to 5 cm wide. Roots are in gray zones.
84P4437

3Bbt1 --216 to 249 cm; yellowish brown (10YR 5/6) and light gray (10YR 7/1) moist silt loam and silty clay loam; weak coarse angular blocky structure; friable; few medium roots; many patchy prominent black (10YR 2/1) manganese or iron-manganese coats on faces of peds and in pores; abrupt smooth boundary.
Mixed zone above paleosol. Gray areas are finer in texture and contain the roots. Redder areas are very firm.
84P4438

3Btb2 --249 to 279 cm; yellowish brown (10YR 5/6) and light gray (10YR 7/1) moist silty clay loam; weak coarse angular blocky structure; friable; few medium roots; many patchy prominent black (10YR 2/1) manganese or iron-manganese coats on faces of peds and in pores; 1 percent pebbles; abrupt smooth boundary.
Gray zones contain the roots and are finer in texture. Redder areas are very firm. Vertical columns of iron-manganese extend into horizon from above.
84P4439

4C --279 to 342 cm; strong brown (7.5YR 5/6) moist extremely cherty loam; common coarse prominent yellowish red (5YR 4/6) and common coarse distinct light gray (10YR 7/1) mottles; massive; friable; few medium roots; many patchy prominent black (10YR 2/1) manganese or iron-manganese coats on faces of peds and in pores; 40 percent cobbles limestone, 40 percent flagstones limestone.
Gray areas are silty clay loam.
84P4440

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