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INTRODUCTION

This report summarizes two aspects of the Wisconsin loess in southern Iowa and presents some information on the sandy-silt immediately underlying the loess and overlying the till in south-central Iowa. The data has originated from project work done over the last five year on the loess and glacial till of Iowa (Project 283-S) in an attempt to solve the problem of stabilization of loess and till for roads. This paper incorporates data procured to date on the loess of southwest, southern and east-central Iowa and present studies in progress in south-central Iowa. (See references 1, 2, 3 and 4.)

SAMPLING

Some of the sample locations were determined by a series of traverses in southwestern Iowa and some by a grid pattern which was carried into south-central and east-central Iowa. Supplemental traverses were used in east-central Iowa.

PREVIOUS WORK

It has long been recognized that the loess thickness decreases eastward from assumed sources such as the Missouri River, and that the percentages of finer material increases. Hutton (5), Simonson et al. (6), Ruhe (7), Davidson and Handy (8) and others have published data on the loess thickness in southern and southwest Iowa. Davidson and Handy (9) have proposed a tentative map showing the areal distribution of 2-micron clay in the Wisconsin loess of southwestern Iowa. (Ruhe (7, 10, 11 and 12) and Ruhe and Scholtes (13) have published material on the sandy-silt, which Ruhe (7, 10, 11, 12 and 13) terms translocated sediment or pedi-sediment.

LOESS THICKNESS

Figure 1 shows the tentative areal distribution of the thickness of the Wisconsin loess in southern Iowa. Although mainly self-explanatory, the following features of the map stand out:

(1) From the south-central part of the state, the loess thickens

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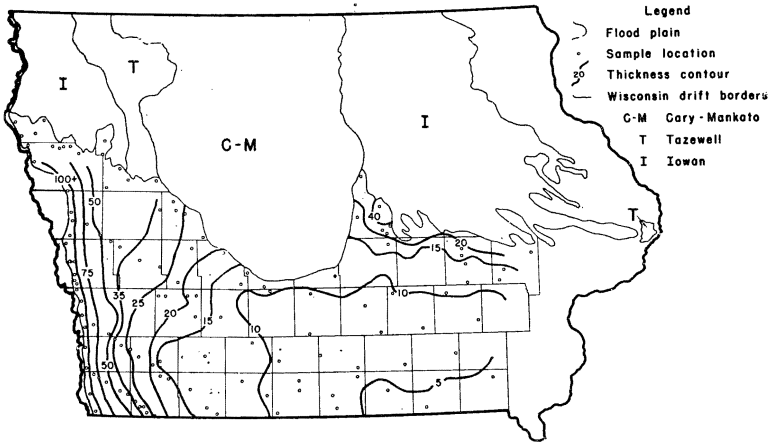

Figure 1. Tentative map showing areal distribution of Wisconsin loess thickness in southern Iowa.

toward the western part of the state and toward the Iowa River to the northeast.

(2) Proceeding east from the eastern edge of the Missouri River flood plain, the loess thins at a progressively decreasing rate.

Clay Content

Figure 2 is a tentative map showing the percent of minus 5-micron clay and clay-size material in the C-horizon of the loess. Features to be pointed out on this contour map are the following:

(1) The clay content increases generally eastward from the Missouri River, but there is a more distinct trend running southeast from the extreme west-central part of the state to the extreme south-central part.

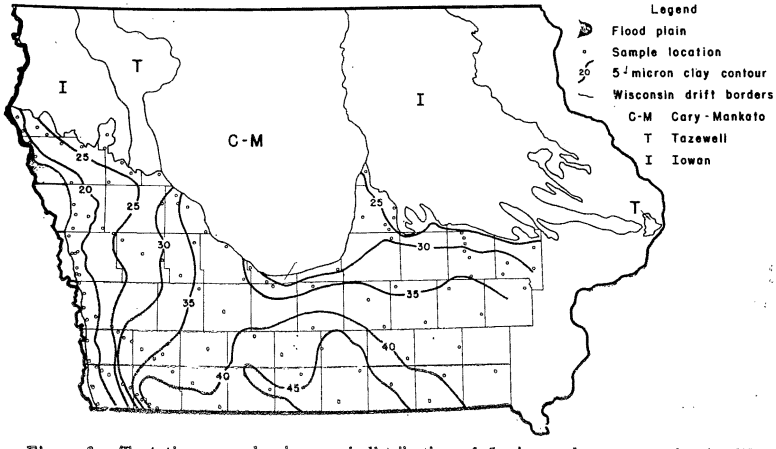

Figure 2. Tentative map showing areal distribution of 5-micron clay content in the Wisconsin loess of southern Iowa.

(2) There is also an increase in 5-micron clay southwest from the Iowa River to the same area in extreme south-central Iowa.

(3) The rate of change of clay content varies as follows in different parts of southern Iowa:

(a) Relatively rapidly in the extreme southwestern part of the state.

(b) Fairly uniform over the rest of southern Iowa except a band running east-west through the south-central part where the clay content itself is uniform, varying between 35 and 40 percent.

Accuracy of Maps

Because of the fact that contour control is directly dependent on number of sample locations both of these maps must be considered as tentative. Another important factor which influences the loess thickness map is the topographic position of the sample sites. Ruhe (7) found that the loess is thickest at crests of divides with progressive thinning down the flanks in both an easterly and westerly direction. This relationship is very much in evidence in the dissected topography of south-central Iowa where roadcuts exposing the total loess thickness of hills shows a downslope thinning of the loess into the valleys, where erosion has been most severe on the loess mantle.

If all the sample sites had been located at the highest topographic positions (primary divides) as the traverses and grids moved eastward across southern Iowa, the contour map of the loess thickness could be interpreted as representing the maximum loess thickness. On the other hand, if sample locations had been closely spaced down the flanks of divides one could expect to find decreasing loess thickness away from primary, secondary and tertiary divides both in an easterly and westerly direction as Ruhe (7) has pointed out and as the authors have seen in south-central Iowa. The contour map presented here does not illustrate this feature and only shows the general thinning of the loess eastward from the Missouri River.

The crux of the point is that some of the data which forms the basis for the loess thickness contours were not taken from auger holes located at topographic highs within a given area, but were taken from road cuts situated on the flanks at elevations below the relatively flat interfluvial divides and thus do not show the maximum loess thickness in all cases.

Particle Size

Figure 3 is a composite cumulative curve showing the range of particle size distribution in the C-horizon of seven major loess sam-

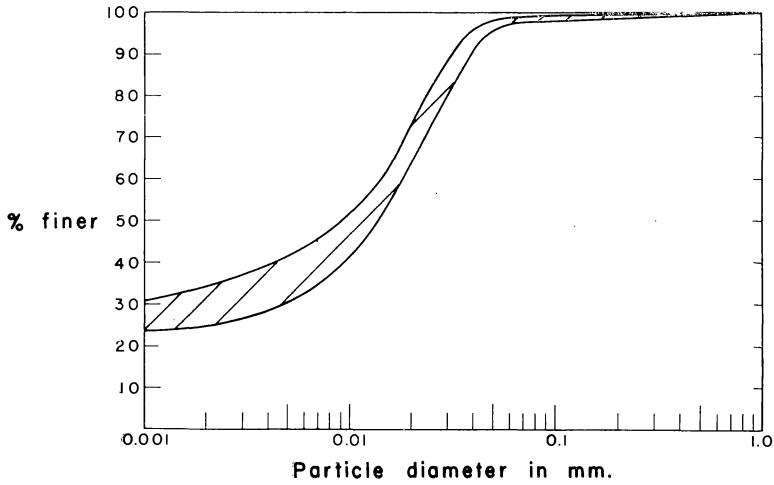

Figure 3. Composite cumulative curve of the C-horizon of seven major loess samples from south-central and southeast Iowa.

ples from south-central and southeast Iowa. (See Table 1.)

The range of sand (>74μ) is 1.5% (0.5 — 2.0%), that of silt (5 — 74μ) is 11% (56 — 67%) and that of clay (<5μ) is 11% (31 — 42%), indicating that the main difference is that clay and silt vary inversely with each other, the sand content, being mostly iron concretions, remaining relatively constant.

Sandy-Silt

In the course of field work on the loess and till of south-central Iowa, it became of interest to study more closely the sandy-silt which underlies the loess and overlies the till. Ruhe's work on this sandy-silt relates origin to a process of landscape evolution.

Figure 4 shows the distribution of sand, silt and clay with depth in three profiles from south-central Iowa. In the first two (Nos. 524 and 525) with only one or two samples taken directly from the sandy-silt it is noted that the contact with the overlying loess is sharp in respect to sand content and that as the sand content increases, the clay content decreases. However, as more samples were taken from

Table 1

Sample Locations in Figure 3

Sample No.	Horizon	Location (County)	Depth
524-5	C-Non-calc.	Mahaska, NW	73″—79″
525-5	C-Non-calc.	Mahaska, SE	70″—76″
527-6	C-Non-calc.	Keokuk, NW	62″—68″
528-5	C-Non-calc.	Keokuk, SE	65″—71″
529-5	C-Non-calc.	Wapello, E-Center	50″—56″
531-3	C-Non-calc.	Van Buren, NE	35″—41″
534-5	C-Non-calc.	Monroe, E-Center	50″—70″

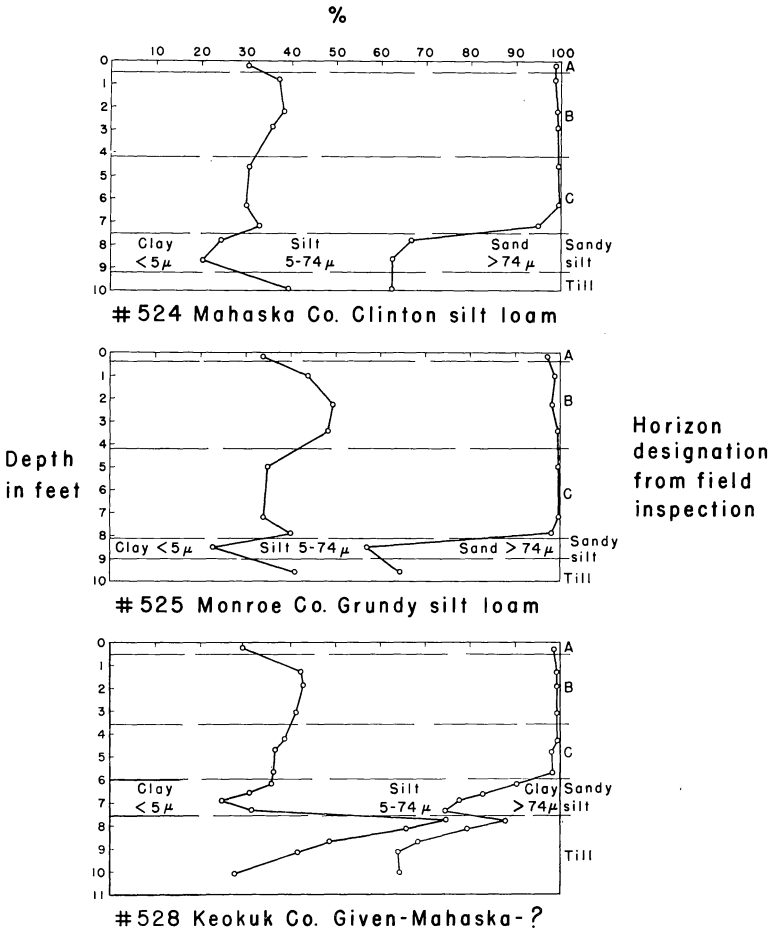

Figure 4. Distribution of sand, silt and clay with depth in three profiles from south-central Iowa.

the sandy-silt, the detail produced from No. 528 (Fig. 4) and from the three profiles shown in Figure 5 of only the sandy-silt itself, shows:

(1) The contact between the loess and sandy-silt is sharp.

(2) There now appears to be an inverse relationship between amounts of sand and clay in the sandy-silt, the silt itself remaining fairly constant, as compared to the inverse relationship between clay and silt in the loess, the sand remaining fairly constant.

(3) The contact between the sandy-silt and the underlying till is sharp.

Further detailed work is now in progress on the sandy-silt and its mineralogy.

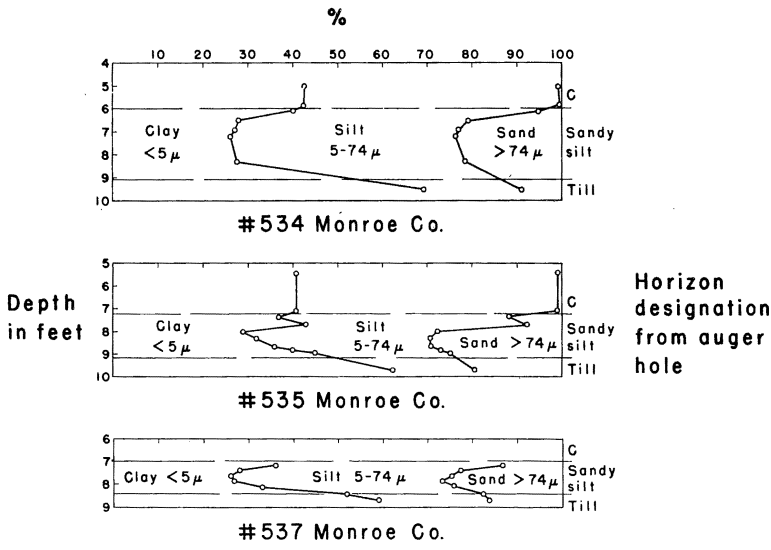

Figure 5. Distribution of sand, silt and clay within the sandy-silt with depth in three profiles from south-central Iowa.

Acknowledgments

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