Appendix 1. Well boring soil descriptions

In this appendix, continuous soil cores collected at each well boring are described following the standards detailed in the Soil Survey Manual (Soil Survey Staff, 1993) and Soil Taxonomy (Soil Survey Staff, 1999).

Soil color was determined using the Munsell Soil-Color Charts (2009) and moist soil. On the basis of observation, each soil horizon is classified using a series of symbols that indicate whether the parent material has been altered by soil formation processes. Uppercase letters designate master horizons that generally are visually and texturally distinct. Most horizons are described with a single capital letter; however, transition horizons, where master horizons may be dominated by the properties of one horizon while also having characteristics of another, are designated with two capital letters with the dominant horizon preceding the non-dominant horizon. If one horizon contains distinct parts with recognizable properties of two master horizons, the horizon is designated with a virgule (/, forward slash) between the capital letters, with the first symbol representing the horizon that has the greatest volume. Distinctive subordinate layers within a master horizon are designated by lowercase letters following the capital master horizon letter to indicate more specific horizon characteristics. Further, consecutive numbers are used to subdivide subordinate layers on the basis of morphological features such as color, texture, or structure. A prime symbol (′) is used to differentiate between two horizons with identical letter and number designations separated by at least one horizon or layer of a different kind.

Key for soil descriptions

Master horizons:

A: A mineral horizon formed at the surface with little to no original rock structure and one or more of the following: a well-mixed combination of humified organic matter and minerals or evidence of cultivation, pasturing, or other agricultural disturbance. This horizon is often referred to as “topsoil.”

E: A mineral horizon that has lost a combination of silicate clay, iron, and aluminum, leaving behind more resistant sand and silt-sized minerals. This horizon is often referred to as “elluvium.”

B: Soil horizon formed below the A and (or) E horizon with little to no original rock structure. The B horizon accumulates silicate clays, iron, aluminum oxides, and organic material through the process of illuviation, in which materials are washed downward from overlying horizons. This horizon is also referred to as “subsoil.”

C: A horizon that shows little effected by soil-building processes but is not bedrock because it can be excavated by hand. The C horizon lacks any of the properties of the A, E, or B horizons but often retains the structural features of the geologic deposits from which it was formed. This horizon is also called the "parent rock."

R: Masses of consolidated rock that cannot be excavated by hand. Also called "bedrock."

Subordinate distinctions

g: strong gleying

p: tillage or other disturbance

r: weathered or soft bedrock

t: accumulation of silicate clay

OR-685 COL-1 NR WHITE CROSS, NC (TRANSITION ZONE)

Ap1—0 to 3 inches; very dark grayish brown (10YR 3/2) loam.
Ap2—3 to 6 inches; brown (10YR 5/3) loam.
E—6 to 8 inches; light yellowish brown (10YR 6/4) loam.
Bt1—8 to 13 inches; yellowish brown (10YR 5/6) silty clay loam.
Bt2—13 to 29 inches; brownish yellow (10YR 6/6) silty clay loam with common medium prominent very pale brown (10YR 7/3) and light gray (10YR 7/2) iron depletions and common fine prominent red (2.5YR 4/6) iron concentrations.
Btg—29 to 40 inches; gray (10YR 7/1) silty clay loam with many medium prominent brownish yellow (10YR 6/6) mottles.
Ct—40 to 46 inches; brownish yellow (10YR 6/6) and white (10YR 8/1) loam with common medium prominent black (10YR 2/1) manganese concretions.
Cr—46 to 70 inches; white (10YR 8/1) weathered metavolcanic rock with many large prominent brownish yellow (10YR 6/6) mottles.

This pedon does not fit any established soil series. The closest fit would be the Kirksey series, which has hard bedrock from 40 to 60 inches below the soil surface. This pedon shows evidence of a seasonal high water table at 13 inches below the soil surface. On the basis of soil colors, a perched water table appears to be present in this zone. The Ct and Cr horizons appear to be the aquitard. The Ap2 and E horizons are compacted and show evidence of a traffic pan. The Ct horizon is weakly cemented.

This core was described by Rich Hayes and Lori Skidmore of the North Carolina Department of Environment and Natural Resources on April 21, 2011.

OR-686 COL-2 NR WHITE CROSS, NC (TRANSITION ZONE)

Ap—0 to 3 inches; dark yellowish brown (10YR 4/4) loam.
BE—3 to 7 inches; strong brown (7.5YR 5/6) clay loam.
Bt1—7 to 20 inches; red (2.5YR 5/6) clay.
Bt2—20 to 32 inches; red (2.5YR 5/6) clay with common fine prominent pink (7.5YR 8/3) mottles.
BCt—32 to 44 inches; red (2.5YR 5/6) clay loam with common medium prominent light brown (7.5YR 6/4) and common fine prominent pink (7.5YR 8/3) mottles.
CBt—44 to 58 inches; light brown (7.5YR 6/4) loam with many medium pink (7.5YR 8/3) and common medium prominent red (2.5YR 5/6) mottles.
Ct—58 to 84 inches; white (10YR 8/1) loam with common medium prominent red (2.5YR 5/6) mottles.

This pedon fits the Georgeville soil series. This pedon is well drained with no evidence of a water table within 84 inches of the soil surface. The Ap2 and E horizons are compacted and show evidence of a traffic pan.

This core was described by Rich Hayes and Lori Skidmore of the North Carolina Department of Environment and Natural Resources on April 21, 2011.

OR-687 COL-3 NR WHITE CROSS, NC (TRANSITION ZONE)

Ap—0 to 1 inches; very dark gray (10YR 3/1) silt loam.
AE—1 to 3 inches; reddish brown (7.5YR 4/4) loam.
BE—3 to 16 inches; yellowish red (7.5YR 4/6) clay loam.
Bt1—16 to 24 inches; yellowish red (5YR 5/6) clay.
Bt2—24 to 39 inches; red (2.5YR 4/6) clay.
Cr—39 to 42 inches; weathered epiclastic bedrock with red (2.5YR 4/6) clay in rock fractures.

This pedon fits the Badin soil series. This pedon is well drained with no evidence of a water table within 42 inches of the soil surface. The Cr horizon is diagonally bedded weathered epiclastic bedrock that is fractured. The thin seams in the rock are filled with red clay that has translocated from the Bt2 horizon.

This core was described by Rich Hayes and Lori Skidmore of the North Carolina Department of Environment and Natural Resources on April 21, 2011.

OR-688 COL-4 NR WHITE CROSS, NC (TRANSITION ZONE)

Ap—0 to 2 inches; dark reddish brown (5YR 3/3) silt loam.
Bt1—2 to 15 inches; red (2.5YR 4/6) clay.
Bt2—15 to 29 inches; yellowish red (5YR 4/6) clay.
BCt1—29 to 34 inches; yellowish red (5YR 4/6) clay loam.
BCt2—34 to 48 inches; light yellowish brown (10YR 6/4) silty clay loam with common light brownish gray (10YR 6/2) iron depletions.
BCtg1—48 to 64 inches; light gray (10YR 7/2) silty clay loam with brownish yellow (10YR 6/6) mottles.
BCtg2—64 to 77 inches; greenish gray (5G 5/1) silty clay loam with strong brown (7.5YR 4/6) mottles.
BCt3—77 to 83 inches; strong brown (7.5YR 4/6) silty clay loam with greenish gray (5G 5/1) iron depletions.
CB1—83 to 93 inches; strong brown (7.5YR 5/6) silt loam with gray (N 6/) iron depletions.
CB2—93 to 104 inches; strong brown (7.5YR 5/6) silt loam with light brown (10YR 6/4) mottles.
C—104 to 114 inches; dark brown (10YR 3/2) silt loam with gray (10YR 5/1) mottles.
R—114 to 115 inches; hard diabase bedrock.

This pedon does not fit any established soil series. The closest fit would be the Mandale series, which has a seasonal high water table (perched) less than 2 feet from the soil surface. Mandale soils also lack the red and yellowish red colors found in this profile. This pedon shows evidence of a seasonal high water table at 34 inches below the soil surface. On the basis of soil colors, this zone appears to be a perched water table.

This pedon may have been formed from two different parent materials. The upper part of the soil (Bt1, Bt2, BCt1, and BCt2 horizons) is estimated to be dominated by 1:1 clay minerals such as kaolinite; therefore, it is likely that the diabase bedrock found at 114 inches is not the parent material of the upper part of the soil. Soils that form in diabase typically are dominated by 2:1 clay minerals such as montmorillonite.

This core was described by Rich Hayes and Lori Skidmore of the North Carolina Department of Environment and Natural Resources on March 31, 2011.

OR-689 CAN-1 NR ORANGE GROVE, NC (TRANSITION ZONE)

Ap—0 to 2 inches; dark reddish brown (2.5YR 3/4) silty clay loam.
Bt1—2 to 17 inches; reddish brown (2.5YR 4/4) clay.
Bt2—17 to 48 inches; red (2.5YR 4/6) clay.
Bt/BC—48 to 51 inches; red (2.5YR 4/6) clay with discrete areas of yellowish brown (10YR 5/4) clay loam.
Cr—51 to 55 inches; dark yellowish brown (10YR 4/4) weathered diorite; this horizon appears to be oriented diagonally from the surrounding horizons.
Bt′—55 to 67 inches; reddish brown (2.5YR 4/4) clay.
BC′—67 to 84 inches; reddish brown (2.5YR 4/4) clay loam with many brownish yellow (10YR 6/6) mottles.
BC′/Cr′—84 to 94 inches; dark reddish brown (2.5YR 3/4) clay loam with gray (N 6/) mottles; many fine fragments of weathered diorite.
R—94 inches; probe refusal.

This soil does not fit any established soil series but is most similar to the Georgeville series. Georgeville soils do not have thin Cr horizons underlain by Bt and BC horizons.

The labeling of the sample core in the first tube appeared to be reversed so that the bottom of the core was labeled as the top. The description was made using what was believed to be the correct orientation. What was described as the Ap horizon had common very fine roots and a darker color, suggesting accumulation of humus.

There appeared to be a diagonal orientation to the following horizons: Bt/BC, Cr, and BC′Cr′. The Cr horizon (51–55 inches) may be an intrusion of diorite. The weathered rock in this horizon was more resistant to weathering than the parent material of the surrounding horizons.

This core was described by Rich Hayes and Lori Skidmore of the North Carolina Department of Environment and Natural Resources on March 31, 2011.

OR-690 CAN-2 NR ORANGE GROVE, NC (TRANSITION ZONE)

Ap—0 to 2 inches; dark reddish brown (2.5YR 3/4) clay loam.
Bt1—2 to 14 inches; dark reddish brown (2.5YR 3/4) clay.
Bt2—14 to 21 inches; reddish brown (2.5YR 4/4) clay.
Cr—21 to 28 inches; gray (N 6/) weathered epiclastic rock.
BCt—28 to 36 inches; red (2.5YR 4/6) clay loam with pink (7.5YR 7/4) mottles.
CBt—36 to 51 inches; yellowish red (5YR 5/8) silty clay loam with pink (7.5YR 7/4) and red (2.5YR 4/8) mottles.
C—51 to 58 inches; very pale brown (10YR 7/3) and brownish yellow (10YR 6/6) silt loam.
R—58 inches; probe refusal.

This soil does not fit any established soil series but is most similar to the Taurus series. Taurus soils do not have thin Cr horizons underlain by BC, CB, and C horizons. The weathered epiclastic rock in the Cr horizon (21–28 inches) was more resistant to weathering than the parent material of the surrounding horizons.

This core was described by Rich Hayes and Lori Skidmore of the North Carolina Department of Environment and Natural Resources on March 31, 2011.