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SURFICIAL GEOLOGY OF THE CANTON 30 X 60 MINUTE QUADRANGLE

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OHIO DIVISION OF GEOLOGICAL SURVEY
Map SG-2
Prepared in cooperation with the United States Geological Survey, National Cooperative Geologic Mapping Program (STATEMAP)

EXPLANATION

This map provides a three-dimensional framework of the area's surficial geology and depicts four important aspects of surficial geology:

1) the geologic deposits, indicated by letters which represent the major lithologies;
2) the thickness of the individual deposits, indicated by numbers and modifiers;
3) the lateral extent of the deposits, indicated by map-unit area boundaries;
4) the vertical sequence of deposits, shown by the stack of symbols within each map-unit area.

In effect, each stack represents a generalized cross section for each area.

Letters represent geologic deposits (lithologies) and are described in detail below. Geologic deposits may be a single lithology such as sand (S) or clay (C), or a combination of related lithologies that are found in specific depositional environments, such as sand and gravel (SG) or ice-contact deposits (IC). The bottom symbol in each stack indicates the bedrock lithologies that underlie the surficial deposits. The detailed unit descriptions below summarize:

1) geologic characteristics such as range of textures, bedding, and age;
2) engineering properties or concerns attributed to the unit;
3) depositional environment;
4) geomorphology or geomorphic location;
5) geographic location within the map area, if pertinent.

Numbers (without modifiers) that follow the lithology designator represent the average thickness of a lithology in tens of feet (for example, 3 represents 30 feet). If no number is present, the average thickness is assumed to be 1 (10 feet). These unmodified numbers correspond to a thickness range centered on the specified value, but may vary up to 50 percent. For example, T4 indicates the average thickness of till in a map-unit area is 40 feet, but thickness may vary from 20 to 60 feet.

Modifiers provide additional thickness and distribution information:

1) Parentheses indicate that a unit has a patchy distribution and is missing in portions of that map-unit area. For example, (T2) indicates that till with an average thickness of 20 feet is present in only part of that map-unit area. If no number is present, the unit averages 10 feet or less in thickness, where present.

2) A minus sign following a number indicates the maximum thickness for that unit in areas such as a buried valley or ridge. Thickness decreases from the specified value, commonly near the center of the map-unit area, to the thickness of the same lithology and vertical position specified in an adjacent map-unit area. For example, an SG9- map-unit area adjacent to an SG3 area indicates a sand and gravel unit having a maximum thickness of 90 feet that thins to an average of 30 feet at the edge of the map-unit area. If the material is not present in an adjacent area, it decreases to zero at that boundary.

These letters, numbers, and modifiers are arranged in stacks that depict the vertical sequence of geologic units for a given map-unit area. A single stack of symbols occurs in each map-unit area and applies only to the volume of sediments within that particular map-unit area. Figure 1 illustrates mapping conventions.

Erosion by modern streams has cut through the vertical sequences that surround them and may truncate one or more units in a sequence. The resultant valley sides, too small to delineate, are generally covered with thin, variable colluvium (weathered material that has moved downslope).

The reconnaissance scale of this map cannot accommodate the great local variability within surficial deposits. That variability is recognized in the unit descriptions and by the use of thickness ranges. Therefore, this map should serve only as a regional predictive guide to the area's surficial geology and not as a replacement for subsurface borings and geophysical studies required for site-specific characterizations.

DATA SOURCES

Data were collected from numerous sources (see References). The concentration of data is greatest near the surface and decreases with depth. County soil survey maps, which describe the top 5 feet of surficial materials, provided an initial guide to map-unit areas. These areas were modified through interpretation of local geomorphic settings and other data which indicate change of deposits at depth, such as Ohio Department of Natural Resources water-well logs, Ohio Department of Transportation test-boring logs, theses, and published or unpublished geologic reports, maps, and field notes. These data also provided the basis for lithologic unit descriptions, which summarize, as accurately as possible, recognized associations of genetically related materials. The total thickness of surficial deposits was calculated from Division of Geological Survey open-file bedrock-topography maps, which are available for each 7.5-minute quadrangle in the map area. The bedrock units were summarized from Division of Geological Survey open-file bedrock-geology maps, also available for each 7.5-minute quadrangle.

SURFICIAL UNITS

m⚒⛏ Made land. Large cut and fill areas; includes quarries and pits.

a — Alluvium, Holocene-age. Includes a wide variety of textures from silt and clay to boulders, commonly with organics; generally not compact; rarely greater than 20 feet thick. Found within floodplains of modern streams throughout the entire map area. Mapped only where areal extent and thickness are significant.

O ✱ — Organic deposits, Holocene-age. Muck and peat, formed in undrained depressions. Small areas of organic deposits shown as an asterisk are underlain by material shown in surrounding map-unit area. Found throughout the map area.

C — Clay, Wisconsinan-age. Massive to laminated; may contain interbedded silt and fine sand; clay content may exceed 80 percent. Laminated clay commonly contains thin silt or sand partings. Carbonate-cemented concretions present in some areas. Joints 6 to 12 inches apart common. Found in northeast corner of the map area as a lowland surface deposit.

L — Silt, Wisconsinan-age. Massive or laminated, commonly contains thin, sand partings. May contain clay, sand, or gravel layers. Clay content commonly increases with depth. Found throughout the map area in lowland surface deposits and terraces and as thick, deltaic deposits of proglacial lakes.

LC — Silt and clay, Wisconsinan-age. Laminated to interbedded, may contain thin fine sand or gravel layers. Found as thick lacustrine valley-fill deposits of proglacial lakes in the northern part of the map area.

LS — Silt and sand, Wisconsinan-age. Laminated to interbedded, may contain clay or gravel layers. Found as surface lacustrine deposits in the northeast corner of the map area.

LB — Backwater lake deposits, Wisconsinan-age. Mostly lacustrine silt and clay in tributary valleys south of the glacial border. Commonly interfingered with alluvium, alluvial fans, and debris flows from surrounding steep, bedrock valley walls.

S — Sand, Wisconsinan-age. Contains minor amounts of disseminated gravel or thin lenses of silt or gravel; grains well to moderately sorted, moderately to well rounded; finely stratified to massive, may be cross-bedded; locally may contain organics. In deep buried valleys, may be older than Wisconsinan. Found in terraces and buried valleys throughout the map area.

SG — Sand and gravel, generally Wisconsinan-age. Interbedded sand and gravel commonly containing thin, discontinuous layers of silt and clay; grains well to moderately sorted, moderately to well rounded; finely stratified to massive, may be cross-bedded; locally may contain organics. In deep buried valleys, may be older than Wisconsinan. Found in terraces and buried valleys throughout the map area.

SGi — Sand and gravel, Illinoian-age. Properties similar to unit "SG" above, except upper part of unit is deeply weathered and leached where near surface. Found in high-level terraces and in deep buried valleys.

IC — Ice-contact deposits, Wisconsinan-age. Highly variable deposits of poorly sorted gravel and sand; inclusions of silt, clay, and till lenses common. Deposited directly from stagnant ice as kame or esker landforms. Found throughout the map area.

ICi — Ice-contact deposits, Illinoian-age. Properties similar to unit "IC" above, except upper part of unit is deeply weathered and leached where near surface. Found in high-level terraces south of the Wisconsinan margin.

SGD — Sand and gravel, undifferentiated. Outwash sand and gravel over ice contact or outwash units of mostly sand and gravel, or deeply buried units of predominantly sand and gravel. Data insufficient for more detailed differentiation. Found in terraces and buried valleys throughout the map area.

CG — Complexly interbedded deposits of clay, silt, sand, gravel, and till in deeper parts of buried valleys throughout the glaciated part of the map area. Up to 320 feet thick. Data insufficient for more detailed differentiation.

T — Till, Wisconsinan-age. Unsorted mix of clay, silt, sand, gravel, and boulders. May contain silt, sand, and gravel lenses. Joints common. Deposited directly from the ice of several separate advances. Clay content of till generally highest near the surface, decreasing with depth; sand content of till increases with. Till at depth in buried valleys and thicker areas may be older than Wisconsinan. Most common surficial unit in the map area.

Ti — Till, Illinoian-age. Properties similar to unit "T" above, except upper part of unit is deeply weathered and leached where near surface. Surface distribution is based on previous mapping; current unpublished interpretations of soil profiles for this unit indicate that this till may actually be Wisconsinan in age. Found along the southern margin of glaciation in the eastern part of the map area.

BEDROCK UNITS

P — Sandstone, shale, siltstone, clay, limestone, and coal, Pennsylvanian-age Pottsville, Allegheny, and Conemaugh Groups. Very light to light gray sandstone, medium to coarse grained, nonbedded to massive. Sandstone with abundant rounded quartz-pebbles and quartz- pebble conglomerate may be present in basal portion. Interbeds of shale, siltstone, coal, limestone and clay common in upper portion. Rapid horizontal and vertical changes of rock types. Sandstone is resistant unit forming hills and cliffs in map area. Present over most of the map area.

SSh — Sandstone and shale, Mississippian-age Cuyahoga Formation. Gray to brown shale interbedded with sandstone and siltstone; rapid vertical and horizontal changes. Found in nortwestern portion of map area

Boundary between map-unit areas in which the uppermost lithologic units differ; lower lithologic units may or may not differ.

Boundary between map-unit areas in which the uppermost lithologic unit is the same but underlying unit(s) differ in thickness or in lithology.

✱ Small area of organic deposits.

⛏ Sand and gravel or other surficial pit.

⚒ Bedrock quarry or strip mine.

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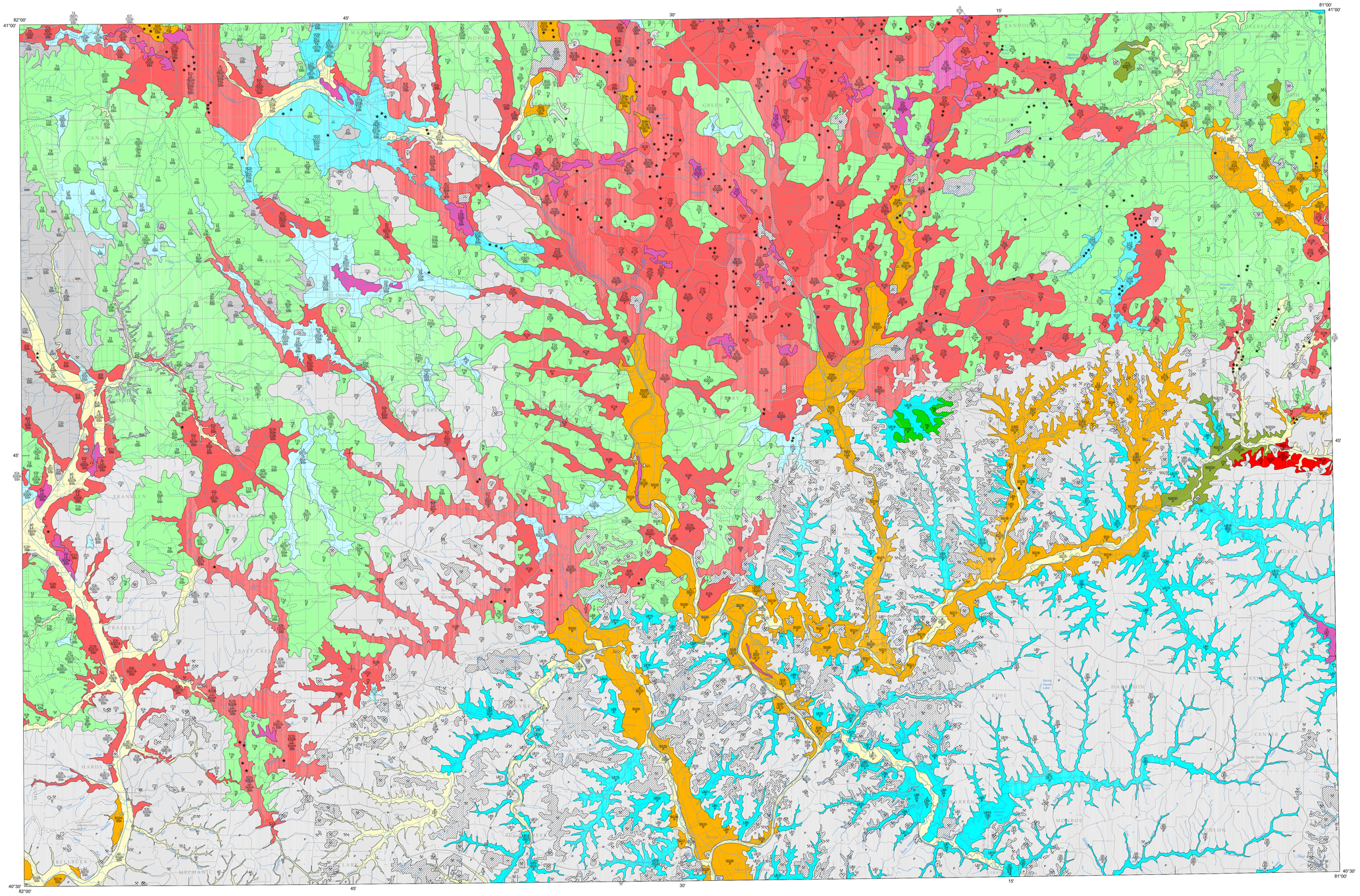

KILOMETERS 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
MILES 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13

SCALE 1:100 000
1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND

1000 0 5000 10 000 15 000 20 000 METERS
5000 0 10 000 20 000 30 000 40 000 50 000 60 000 70 000 FEET

Projection: Ohio State Plane North NAD 1927

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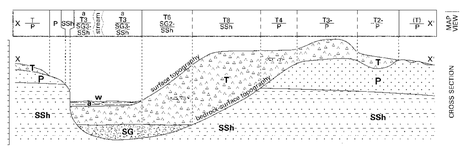


FIGURE 1. – Map view and cross section of a hypothetical stack-unit map. See lithologic-unit descriptions for explanation of symbols. In the map view (top), solid-line boundaries separate map-unit areas having different lithologic units at the surface; underlying lithologic units may or may not differ. Dashed-line bounrdaries separate map-unit areas having the same surface lithologic unit but different thickness or different underlying lithologic units. The cross section along X-X' illustrates thickness and mapping conventions. Thickness values are in tens of feet. Values are gross averages that can vary up to 50 percent, except (1) those followed by a minus sign (-), which represents the maximum thickness of a thinning trough- or wedge-shaped sediment body, or (2) units in parentheses ( ), which indicate a discontinuous distribution of that unit. Precise surface topography can be determined from topographic maps that are available from the Division of Geological Survey at several scales; bedrock-surface topography and bedrock geology are available as Division of Geological Survey open-file maps.

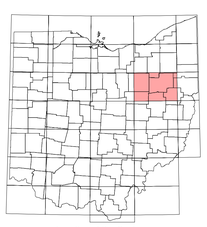
The information contained on this map can be used for many derivative environmental, resource, and geohazards applications. The colors on this map depict the uppermost continuous unit and are intended to assist in visualizing the geology of the area. Discontinuous units (in parentheses) were not included in color assignment.

- Made land, quarries, pits
- Alluvium
- Organic deposits
- Clay
- Silt
- Silt & clay
- Backwater lake deposits
- Silt & sand
- Sand
- Sand and gravel, Wisconsinan
- Sand and gravel, Illinoian
- Ice contact deposits, Wisconsinan
- Ice contact deposits, Illinoian
- Sand and gravel, undifferentiated
- Till, Wisconsinan
- Till, Illinoian
- Pennsylvanian bedrock
- Mississippian sandstone and shale

Index to 7.5-minute (1:24,000 scale) quadrangles in the Canton 30 x 60 minute quadrangle and mapping responsibility:

- Larsen
- Pavey
- Schumacher
- Swinford

Base map preparation by Edward V. Kuehnle from Ohio Department of Transportation data. Data compilation assistance by Noelle C. Logan and Stephanie A. Konfal. Digitizing by Kim E. Vorbau and James F. Laine. Digital-line quality control and editing by Kim E. Vorbau. GIS conversions by James McDonald. 1:100,000 compilation and design by Richard R. Pavey.



Location of the Canton 30x60-minute quadrangle