STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY

REPORT OF INVESTIGATIONS NO. 52

SUB-TRENTON ROCKS FROM FAYETTE COUNTY, OHIO TO BRANT COUNTY, ONTARIO

by

WARREN L. CALVERT

COLUMBUS
1964

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INTRODUCTION

The nature of the sub-Trenton rocks from Fayette County, Ohio to Brant County, Ontario, is shown in the accompanying cross section (plate 1). This cross section is one of a series of preliminary sub-Trenton cross sections, compiled from radioactivity or electrical logs and sample descriptions, published by the Ohio Division of Geological Survey. The five cross sections in this series are listed below and their relative positions are shown on figure 1.

No. 1. Lee County, Virginia, to Fayette County, Ohio (Calvert, 1962, plate 1).

No. 2. Wood County, West Virginia to Fayette County, Illinois (Calvert, 1963a, plate 1).

No. 3. Cass County, Michigan to Crawford County, Pennsylvania (Calvert, 1963b, plate 1).

No. 4. Wood County, West Virginia to Jackson County, Michigan (Calvert, 1963b, plate 2).

No. 5. Fayette County, Ohio to Brant County, Ontario (present report, plate 1).

Gamma ray, neutron, self-potential and resistivity curves from geophysical logs are shown on the cross section (plate 1) where available. Each formation has a characteristic configuration on these curves and sample studies show changes in rock composition where the curves change in character. Logs were not run on

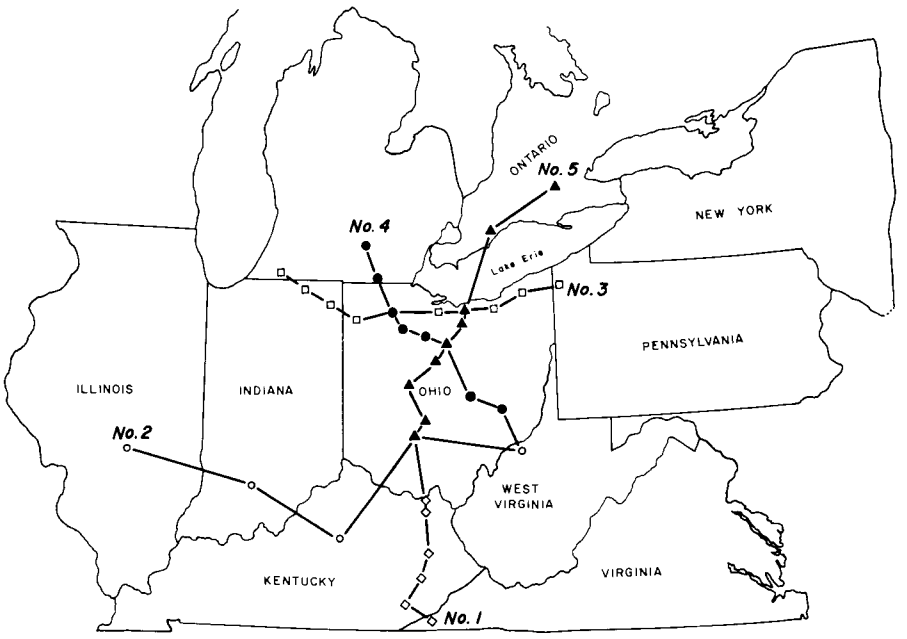


Figure 1. - Location of sub-Trenton cross sections.

well 7 (No. 1 Krause) but the curves for the nearby Dalton and Hanna No. 1 Esthruth have been substituted for the upper part of this hole. In a few cases where it was necessary to shift curves laterally because of space requirements in drafting, an arrow indicates the direction of shift.

DISCUSSION

Cross section No. 5 (plate 1) is an extension of cross section No. 1 (Calvert 1962, plate 1); together they show the continuity of sub-Trenton rocks from the outcrops in Virginia and Tennessee to the Cambrian wedge-edge in Ontario. A recent publication (McGuire and Howell, 1963) substantiates the similarity of sub-Trenton rocks in Kentucky to those of the outcrops in Virginia and Tennessee. The truncation at the top of the Sauk Sequence is continuous northward across Ohio until only a thin zone of basal arkose separates Chazy rocks from the Precambrian in Ontario. This agrees in general with the isopach maps published by Sanford and Quillian (1959) except for their thickness and distribution of "Trempealeau" and "Little Falls". The thick section above the Black River Group and below the Utica (Collingwood) Shale in Ontario (also in Michigan and northwestern Ohio) indicates that sedimentary relationships would be more accurately portrayed by sub-Trenton cross sections if the datum used were the top of the Eggleston Limestone.

The normal section of Cambrian and Ordovician rocks in Ohio is shown in table 1 and their probable age is indicated. No paleontologic studies have been made to substantiate the age assignments. The formation names used in this discussion refer to strictly lithostratigraphic units which are probably time-transgressive.

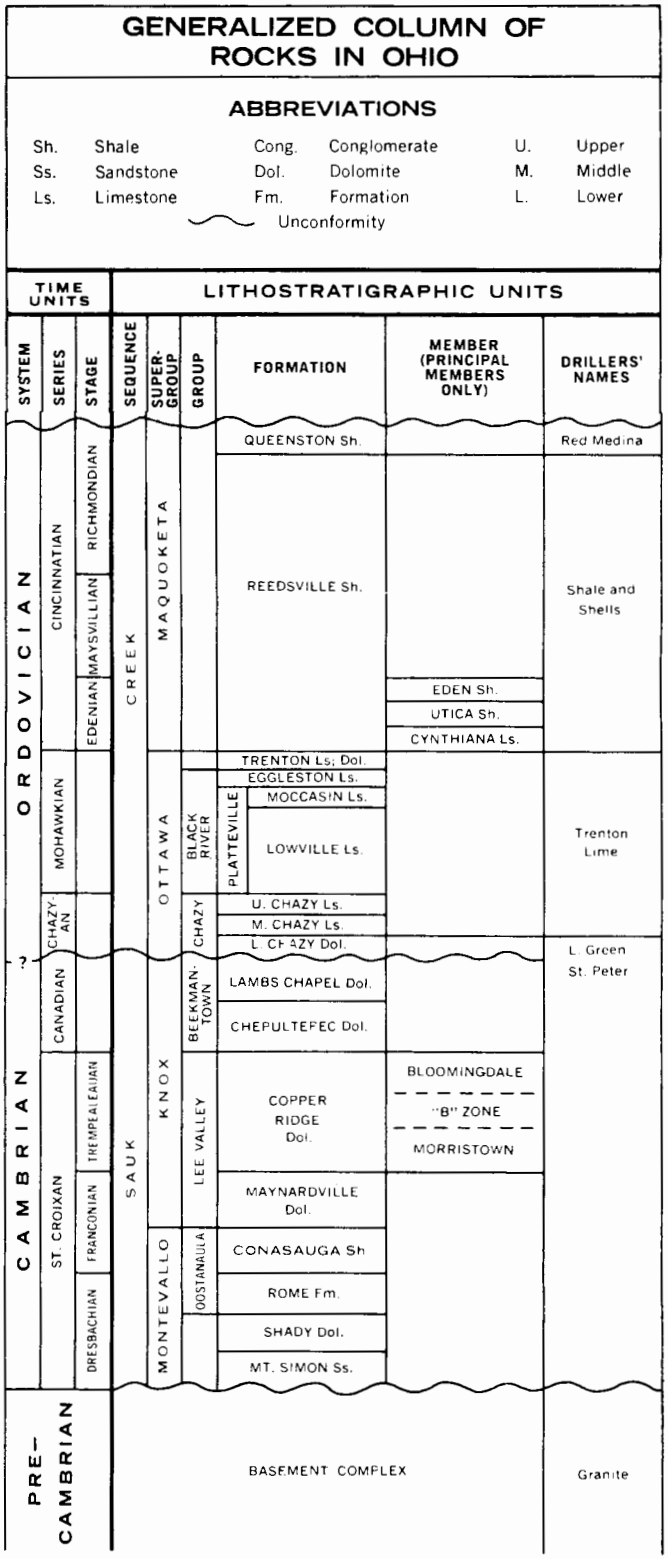
BASAL ARKOSE

A basal arkose composed of metamorphic fragments associated with coarse-grained sandstone generally rests upon the Precambrian. This zone is commonly 10 to 35 feet thick but it is absent over Precambrian topographic highs. It occurs below the true Mt. Simon Sandstone in Ohio but it underlies Shady Dolomite in well 9 (No. 1-8 Orford) and underlies Lower Chazy (Shadow Lake) in well 10 (No. 3-22 Burford). The basal arkose is a discrete rock unit, and although it has generally been considered to be part of the Mt. Simon Sandstone in Ohio, it might be considered a separate unit and be given a formal name.

MT. SIMON SANDSTONE

The Mt. Simon Sandstone is a fine- to coarse-grained, friable, generally nondolomitic sandstone which occurs above the basal arkose in Ohio. It thins northward from 214 feet in well 1 (No. 1 Hopkins) to 90 feet in well 8 (No. 1 Born). It is absent in well 2 (No. 1 Long) because of the presence of a Precambrian monadnock or buried (Waverly) ridge. The Mt. Simon Sandstone is absent in well 9 (No. 1-8 Orford) either because of nondeposition or because it was removed by erosion during a minor regression of the sea prior to Shady deposition.

Table 1. - GENERALIZED COLUMN OF ORDOVICIAN AND CAMBRIAN ROCKS IN OHIO.



SHADY DOLOMITE

The pelletal to oolitic sandy dolomite which overlies the Mt. Simon Sandstone throughout central Ohio is lithologically similar to the Shady Dolomite of the Appalachian succession of rocks and occupies the same stratigraphic position. Interbeds of dolomitic sandstone near the base indicate that it is transitional with the Mt. Simon Sandstone below. A thickness of 212 feet in well 1 (No. 1 Hopkins) diminishes northward to 135 feet in well 8 (No. 1 Born). The Shady Dolomite thins to 120 feet over the Waverly granite ridge in well 2 (No. 1 Long). The abnormal thickness of 205 feet in well 7 (No. 1 Krause) may be due to miscorrelation (no logs run). Because the formation is truncated at the Knox unconformity to the north in Ontario, it is only 82 feet thick in well 9 (No. 1-8 Orford) and is absent in well 10 (No. 3-22 Burford).

ROME FORMATION

The dolomitic sandstone and sandy, silty dolomite of the Rome Formation is characteristically glauconitic, and commonly contains thin interbeds of green and brown micaceous shale. In general, it has a thickness of about 180 feet northward through central Ohio, but is absent north of Lake Erie. It thins to 118 feet in well 2 (No. 1 Long) because of the influence of the Waverly ridge. In well 7 (No. 1 Krause) the Rome Formation may be thicker than shown on the cross section (plate 1).

CONASAUGA FORMATION

The Conasauga Formation varies in thickness from 125 feet in well 4 (No. 1 Sprain) to 49 feet in well 7 (No. 1 Krause). The formation has a variable lithology consisting of shale, siltstone, sandstone, and dolomite, but it characteristically contains more argillaceous, glauconitic, and micaceous material than either the Rome Formation below or the Maynardville Dolomite above. Its upper and lower beds are transitional.

MAYNARDVILLE DOLOMITE

The Maynardville Dolomite is a transitional formation between the argillaceous sandy dolomitic beds of the Conasauga Formation and the relatively pure partly oolitic and pelletal dolomite of the Copper Ridge. A progressive upward decrease in gamma radiation, shown by the logs, is indicative of the upward decrease in argillaceous glauconitic material. The formation is generally 140 to 170 feet thick. It occurs below the unconformity in well 8 (No. 1 Born) and disappears northward because of truncation.

COPPER RIDGE DOLOMITE

The Copper Ridge Dolomite is composed of a lower, darker brown, partly oolitic and pelletal member (Morristown) and an upper, lighter brown, partly sandy

member (Bloomingdale). Its total thickness diminishes from 574 feet in well 1 (No. 1 Hopkins) to 510 feet in well 2 (No. 1 Long); northward its original thickness is reduced by truncation. The lower part of the Upper Copper Ridge is commonly silty and glauconitic ("B" zone). This may represent a minor regression of the sea during which the Lower Copper Ridge suffered erosion, which would explain the variable thickness of the Lower Copper Ridge in northern and western Ohio.

Because of truncation, the entire formation is absent in well 8 (No. 1 Born) and to the north; the Chazy rests upon "B" zone in well 7 (No. 1 Krause); and the Upper Copper Ridge is thin from well 6 (No. 1 Windbigler) through well 3 (No. 1 Zenith).

CHEPULTEPEC DOLOMITE

Because of truncation at the Knox unconformity the Chepultepec Dolomite is only 180 feet thick in well 1 (No. 1 Hopkins) and 48 feet thick in well 2 (No. 1 Long). It has been removed completely by erosion northward in central Ohio. The Chepultepec Dolomite is distinguished from the underlying Copper Ridge Dolomite generally by (1) lighter color, (2) finer crystallinity, (3) less pelletal and oolitic dolomite, and (4) more siliceous and sandy material together with oolitic chert.

CHAZY LIMESTONE

The severe truncation at the Knox unconformity, evident on the cross section is an indication of the long period of erosion which occurred in Ohio subsequent to Beekmantown deposition. This area was suffering erosion while the sandstones, green shales, and carbonates of the lower Simpson Group (Joins, Oil Creek, McLish, and Tulip Creek) of southern Oklahoma were being deposited in an advancing sea. Generally, the basal beds of post-Beekmantown deposits consist of conglomerate composed of fragments and residue from the underlying formation, commonly associated with sandy zones and green shale. Where the underlying formations are carbonates such deposits appear to have been concentrated in local depressions and valleys developed on a karst surface.

In the cross section the three units of the Chazy Limestone may be traced northward into Ontario and indeed may be observed at the outcrop in the Lake Simcoe area (Liberty, 1964). The lower unit, composed of shale, sandy dolomitic shale, and dolomite, is equivalent to the Shadow Lake Formation of Ontario; it is absent locally over topographic highs on the ancient Knox and Precambrian surfaces. It attains a thickness of 60 feet or more. The middle unit, composed of alternating finely crystalline dolomite and lithographic limestone, is the lower member of the Gull River Formation of Ontario. It ranges in thickness from 20 to 60 feet. The upper unit, composed of thin-bedded dense limestone which is shaly and silty, is the lower submember of the middle member of the Gull River Formation of Ontario. It is 35 to 50 feet thick in Ohio and thins to about 18 feet at the outcrop in Ontario. Because of the widespread extent of these three units, they deserve separate formational names, but until such are given, they can be designated as Upper, Middle, and Lower Chazy.

PLATTEVILLE LIMESTONE

The section of relatively pure, dense to lithographic "birdseye" limestone containing scattered stringers of finely crystalline dolomite, which occurs above the

Chazy Limestone and below the dense, bentonite-bearing Eggleston Limestone is the Platteville Limestone. In well 1 (No. 1 Hopkins) the zone from 1616 to 1630 feet apparently represents the shaly lower part of the Moccasin Limestone, but northward this shaly zone pinches out and the Moccasin cannot be distinguished from the underlying Lowville Limestone. At the outcrop in the Lake Simcoe area of Ontario the Platteville, Upper Chazy, and Middle Chazy are apparently all assigned to the Gull River Formation (Liberty 1964). The Platteville Limestone increases in thickness from 280 feet in well 1 (No. 1 Hopkins) northward to over 400 feet in wells 4 through 8, but thins northward to 330 feet in well 9 (No. 1-8 Orford) and 188 feet in well 10 (No. 3-22 Burford). At the outcrop, north of Coboconk, Ontario, it is only about 26 feet thick.

EGGLESTON LIMESTONE

Throughout the area of the cross section the Platteville Limestone is overlain by a thin unit of dense to lithographic and somewhat argillaceous limestone which commonly contains several bentonite beds ranging in thickness from about three inches to three feet. In Tennessee this formation is known as the Eggleston Limestone; in Ontario it is the Coboconk or Lower Bobcaygeon Limestone; in Illinois it is represented by the Spechts Ferry Formation; and in Kentucky it is the Tyrone Limestone. It is commonly 20 to 40 feet thick from central Ohio northward to the outcrop at Coboconk, Ontario, but it thickens southward to 66 feet in well 1 (No. 1 Hopkins) and to about 150 feet at the outcrop near Cumberland Gap, Tennessee.

TRENTON LIMESTONE

The crystalline fossiliferous limestone, commonly cherty near the base, which in Ohio occurs above the Eggleston Limestone and below the argillaceous limestones and dark calcareous shales of the Cynthiana Formation, is known as the Trenton Limestone. It is the same formation as the Lexington Limestone of Kentucky. Where Cynthiana limestones are not developed, the brown Utica (Collingwood) Shale overlies the Trenton Limestone or a possible dolomitized equivalent.

The thickness of the Trenton Limestone varies northward across central Ohio from 50 to 80 feet. Across Lake Erie the stratigraphic position of the Trenton Limestone is occupied by a thick, principally crystalline carbonate section which has been divided into several formations. This section is 445 feet thick in well 9 (No. 1-8 Orford) and 473 feet thick in well 10 (No. 3-22 Burford). It is not clear what part of this thick section is equivalent to the Trenton Limestone of Ohio. The section is about 450 feet thick along the outcrop east of Lake Simcoe, which indicates considerably more deposition generally across Ontario than in Ohio.

SUMMARY

The salient features of cross section No. 5 are:

1. Truncation at the top of the Sauk Sequence northward to a wedge-edge in Ontario.

2. Precambrian topographic ridge or monadnock in well 2 (Pickaway County).

3. Occurrence of the basal arkose beneath formations other than the Mt. Simon Sandstone.

4. Increased thickness in Ontario of carbonate deposits between the Black River Group and the Utica (Collingwood) Shale.

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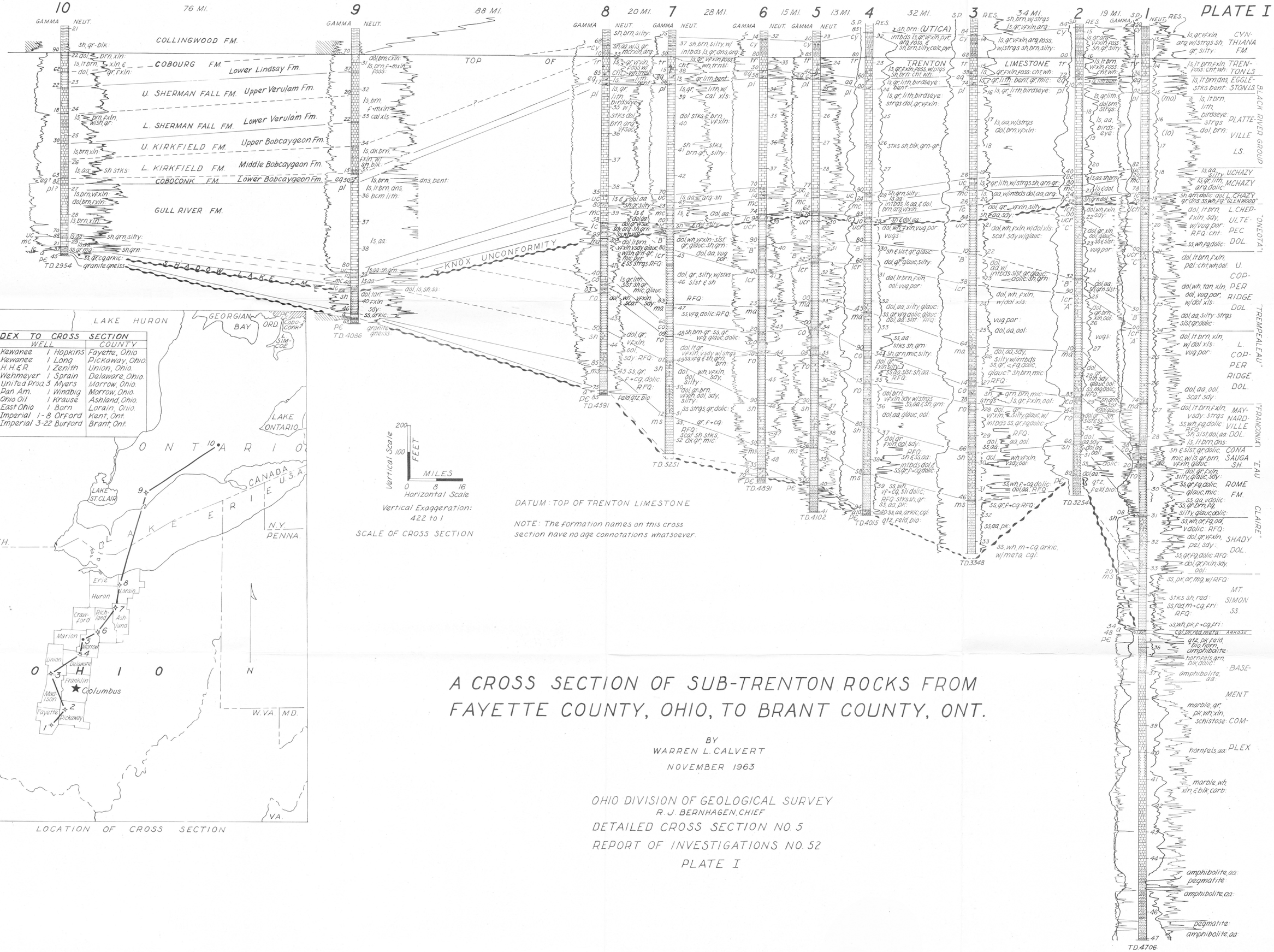
PLATE I



INDEX TO CROSS SECTION			
NO	WELL		COUNTY
1	Kewanee	1 Hopkins	Fayette, Ohio
2	Kewanee	1 Long	Pickaway, Ohio
3	H.H.&R.	1 Zenith	Union, Ohio.
4	Wehmeyer	1 Sprain	Dalaware, Ohio.
5	United Prod.	3 Myers	Morrow, Ohio.
6	Pan Am.	1 Windbig	Morrow, Ohio.
7	Ohio Oil	1 Krause	Ashland, Ohio.
8	East Ohio	1 Born	Lorain, Ohio.
9	Imperial	1-B Orford	Kent, Ont.
10	Imperial	3-22 Burford	Brant, Ont.

LOCATION OF CROSS SECTION

Vertical Scale 200 100 FEET
0 8 16 MILES
Horizontal Scale

Vertical Exaggeration: 422 to 1

SCALE OF CROSS SECTION

DATUM: TOP OF TRENTON LIMESTONE

NOTE: The formation names on this cross section have no age connotations whatsoever.

A CROSS SECTION OF SUB-TRENTON ROCKS FROM FAYETTE COUNTY, OHIO, TO BRANT COUNTY, ONT.

BY
WARREN L. CALVERT

NOVEMBER 1963

OHIO DIVISION OF GEOLOGICAL SURVEY
R. J. BERNHAGEN, CHIEF
DETAILED CROSS SECTION NO. 5
REPORT OF INVESTIGATIONS NO. 52
PLATE I