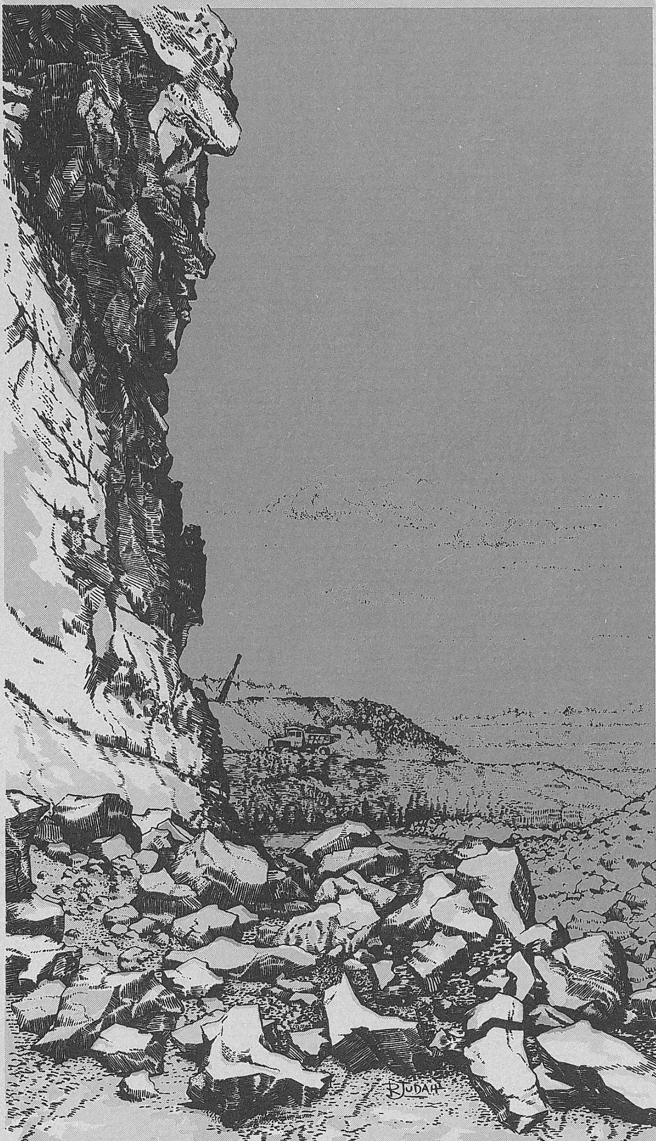
Crushed Stone Resources of the Devonian and Silurian Carbonate Rocks of Indiana

BULLETIN 37



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Crushed Stone Resources of the Devonian and Silurian Carbonate Rocks of Indiana

By ROBERT R. FRENCH

DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY BULLETIN 37

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Crushed Stone Resources of the Devonian and Silurian Carbonate Rocks of Indiana

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Abstract

Devonian and Silurian carbonate rocks exposed on the crest and flanks of the Cincinnati Arch provide most of the raw material for the crushed stone industry of Indiana. The present northwest-southeast structure has controlled the erosion of these strata, but earlier northeast-southwest structural trends apparently influenced deposition and erosion during much of Silurian time. Structural trends with similar northeast-southwest orientation have been noted in older rocks and are well expressed in Jasper and Cass Counties.

Precise stratigraphic-correlation s in northern Indiana are hampered both by thick glacial overburden and by lack of diagnostic lithologic markers in some intervals. This is especially true of the economically important Niagaran reef facies which are now believed to be present in the Salamonie Dolomite and Louisville Limestone in addition to the well-documented Wabash Formation (Huntington Lithofacies) and possibly the Salina Formation.

The crushed stone industry of Indiana produced 21, 635, 639 tons of material valued at $28, 219, 683 in 1964. More than 60 percent of this material was obtained from nine major rock units in the Devonian and Silurian Systems of northern and eastern Indiana. These strata have a wide range of chemical and physical properties which determine the uses of the crushed stone. Production statistics from 1959 through 1964 show that 72. 4 percent of the crushed stone is used in concrete and highway construction.

Introduction

The crushed stone industry and the carbonate strata upon which it is based form one of the most valuable and diversified natural assets of the State of Indiana.

As a result of greater construction demands the productivity of the industry has increased 21.4 percent since 1959, and its productivity is now unprecedented in the history of the state. In 1964, 83 quarries in 45 counties in Indiana produced 21, 635, 639 tons of crushed stone valued at $28, 219, 683. Most of the material produced was consumed within the state f or highway and dam construction, fertilizer and soil conditioner, cement, railroad ballast, filter media, steel flux, glass flux, rock wool, coal mine dust, rubber and paint filler, calcium carbide, pharmaceuticals, stone sand, concrete blocks, and bricks and tile.

Fifty quarries (appendix 1) are currently using strata of the Devonian and Silurian Systems of northern and eastern Indiana to provide more than 60 percent of the total statewide production. This report is concerned only with that part of the industry which exploits the Devonian and Silurian carbonate rocks.

PURPOSE OF STUDY

The purpose of this report is to bring together in one volume as much as possible of the stratigraphic, petrographic, chemical, physical, and economic data compiled in published or unpublished form that is considered pertinent to the crushed stone industry of northern and eastern Indiana. The appendixes have been compiled to provide the reader either with the information available in 1964 concerning the occurrence, thickness, chemical, and physical characteristics of exposed or shallow Devonian and Silurian strata in Indiana or with specific references where that information can be obtained. Much of this information has been obtained from unpublished memorandum reports on file at the Indiana Geological Survey and hitherto not conveniently available to the general public. Other data were obtained from published Survey reports, the older ones of which are found only in some libraries and a few personal collections. Abbreviated descriptions of measured sections of abandoned quarries and outcrops, chemical analyses, and the location of cores on file at the Survey (appendixes 3, 4, 5, and 6) have been included as a guide to exploration for new quarry sites.

PREVIOUS WORK

Many Indiana geologists have contributed directly or indirectly to our present knowledge of the geology of the crushed stone industry of northern and eastern Indiana. Foremost among the contributors are Borden (1874 and 1876), Cumings (1922), Curnings and Shrock (1927 and 1928), Foerste (1895, 1897, 1904b, and 1935), Kindle (1899), Kindle and Breger (1904), Logan (1922), Dawson (1941), Patton (1949 and 1953), Patton and others (1956), and Pinsak and Shaver (1964).

Unpublished data contained in the open-file memorandum reports, theses from several universities in Indiana, and current research have proved invaluable to various parts of this report. Many of the memorandum reports were compiled by J. B. Patton, G. E. Ericksen, D. N. Fiandt, Jr., D. J. McGregor, and T. G. Perry during the period 1947-62.

ACKNOWLEDGMENTS

The writer appreciates the cooperation of the producers and staffs of the crushed stone industry and the cooperation of the members of the Indiana Highway Commission who provided valuable assistance during the compilation of this report.

All chemical analyses were performed by the Geochemistry Section, Indiana Geological Survey, Bloomington, or were released by the producers. All physical tests were performed by the Bureau of Materials and Tests, Indiana State Highway Commission, Indianapolis. Production statistics were obtained from Mary Beth Fox, Indiana Mineral Statistician. Field assistants were Robert D. Tipple in 1963 and Donald G. Eckerty in 1964.

TERMINOLOGY

Stratigraphic terms and names are in accord with those currently recognized by the Indiana Geological Survey except for the expanded use of the existing name Salamonie Dolomite and the relegation of the old terms Laurel Limestone and Osgood Formation to member status in the Salamonie Dolomite, as proposed herein.

For the purposes of this report, the following terms are defined as follows:

Carbonate rocks are those rocks which contain at least 50 percent calcium carbonate or calcium-magnesium carbonate.

Limestone is any sedimentary carbonate rock composed principally of calcium carbonate.

Dolomite is any carbonate rock composed principally of calcium-magnesium carbonate.

High-calcium limestone is limestone containing more than *95* percent calcium carbonate.

High-purity dolomite is dolomite containing more than 41 percent magnesium carbonate.

Figure 1 illustrates the more specific terminology

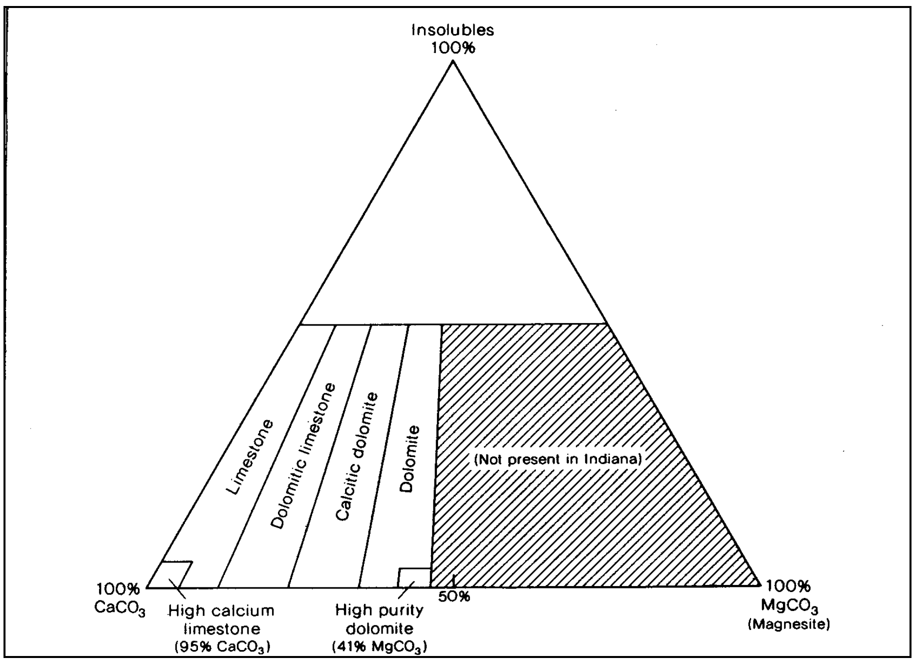

Figure 1. Ternary diagram showing carbonate rock classification.

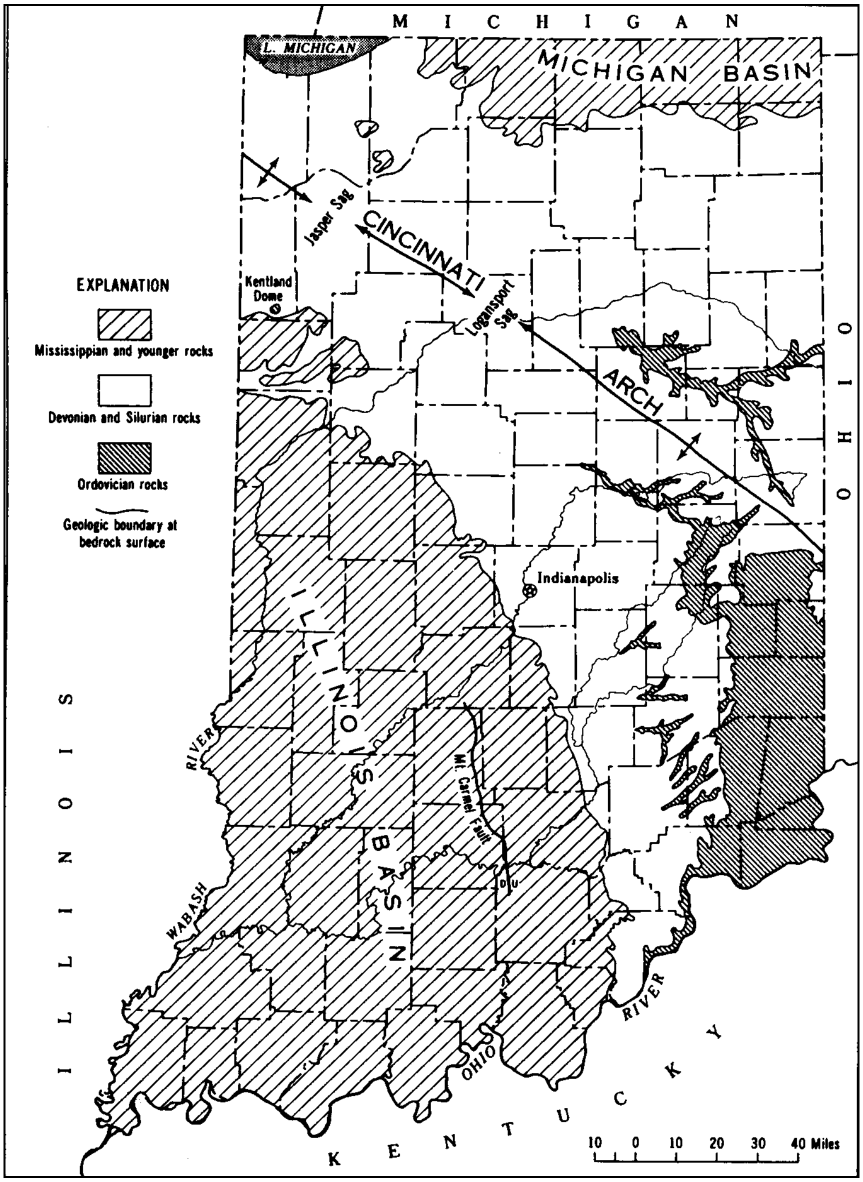

Figure 2. Map of Indiana showing the major structural units and the bedrock limits of the Devonian and Silurian strata.

in a ternary diagram based upon the calcium carbonate, magnesium carbonate, and insoluble constituents.

Structure

Devonian and Silurian strata are exposed in Indiana on the crest and flanks of the present Cincinnati Arch (pl. 1 and fig. 2). This structurally high element has significantly controlled erosion of the strata, but isopachous maps and the lithologic characteristics of the Silurian rocks apparently indicate that some northeast-southwest control was present in Indiana. Rooney (1966) recognized a similar trend in the Trenton Limestone, and Henderson and Zietz (1958, p. 23) postulated a major fault or linear intrusive in the basement rocks of southeastern Indiana. Minor structural elements with northeast-southwest control are definable at several stratigraphic horizons in Cass and Jasper Counties.

Stratigraphy

A study of the crushed stone industry of northern and eastern Indiana requires knowledge of nine distinct rock units of Devonian or Silurian age (fig. 3). Although most of the units are carbonate rock, the variation in mineralogic composition is considerable and has a pronounced influence on the physical characteristics of the material, which in turn determine its uses.

The Devonian carbonate rocks of Indiana are exploited by 18 companies in Clark, Scott, Jefferson, Jennings, Bartholomew, Rush, Shelby, Jasper, Allen,

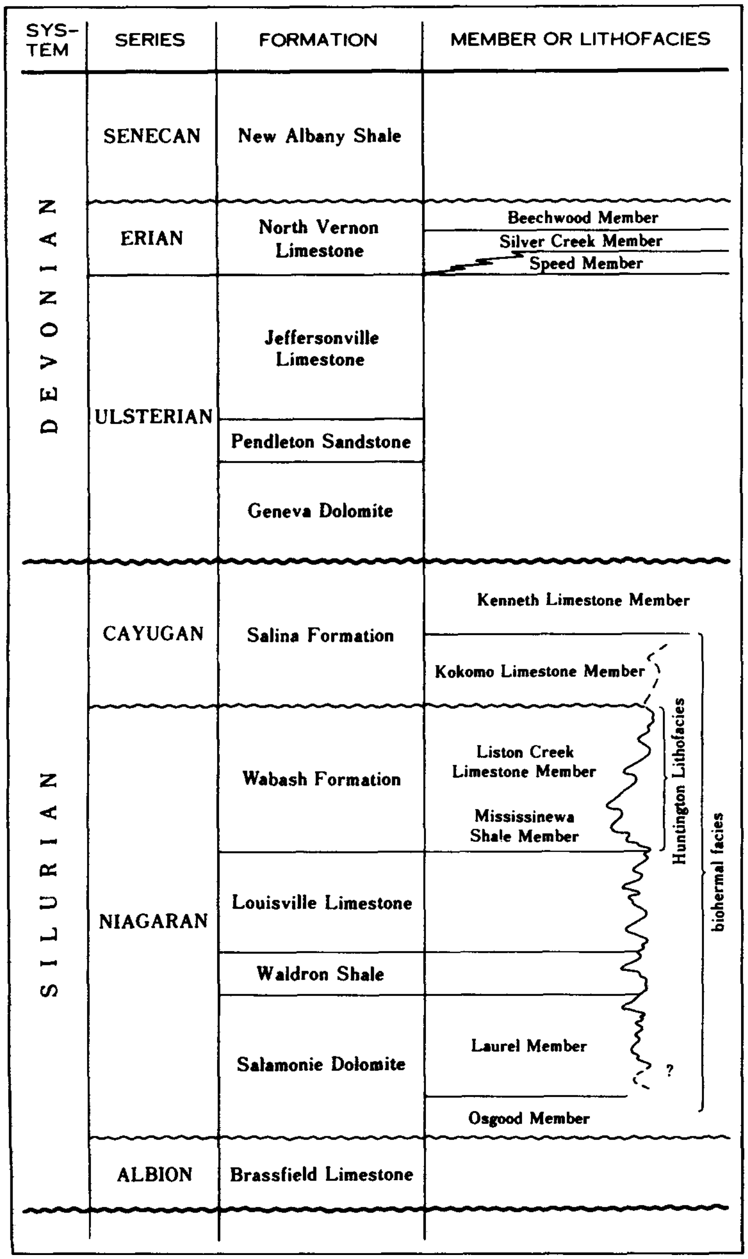

Figure 3. Chart showing rock-unit nomenclature of the Devonian and Silurian Systems exposed in northern and eastern Indiana.

and Cass Counties (pl. 2). The maximum thickness of Devonian strata currently being used is found in Bartholomew and Jefferson Counties where approximately 66 feet of the North Vernon Limestone, Jeffersonville Limestone, and Geneva Dolomite are present. Overburden consisting of the New Albany Shale and younger formations prohibits exploitation of the thicker carbonate section to the west.

Forty-four companies use the Silurian strata in 28 counties of northern and eastern Indiana. The maximum section of commercial Silurian strata currently being exploited is found in Allen County where 176 feet of the Salina and Wabash Formations and the Louisville Limestone are quarried.

A. maximum Silurian section contains more than 400 feet of carbonate strata throughout much of northern Indiana, but nondeposition and erosion have limited some quarries in southeastern Indiana to only 10 to 15 feet of commercial rock.

DEVONIAN SYSTEM

NEW ALBANY SHALE

The black carbonaceous shales of the New Albany Shale (Borden, 1874, p. 158) form part of the overburden at seven quarries in southern Indiana. Removal of the New Albany is expensive because it requires drilling and blasting in many places.

NORTH VERNON LIMESTONE

Borden (18 7 6, p. 160) named all the strata lying below the New Albany Shale and above the Corniferous (Jeffersonville) Limestone the North Vernon Limestone, after the location of the type section in Jennings County. The Indiana Geological Survey currently recognizes the following units within the North Vernon: the Beechwood, Silver Creek, and Speed Members. Numerous additional names and ranks have been proposed for the aforementioned strata, and the reader is referred to Dawson (1941, p. 6-12), Patton (1953, p. 42-49), and Patton and Dawson (1955, p. 39) for clarification of the abandoned nomenclature.

BEECHWOOD MEMBER: The Beechwood Member (Butts, 1915, p. 8) is the youngest Devonian carbonate unit used by the crushed stone industry in southern Indiana. The unit is typically developed as a dark-gray to gray phosphatic limestone which is in most places coarsely crystalline and extremely fossiliferous. The maximum known thickness of the Beechwood in southeastern Indiana is 10 feet.

SILVER CREEK MEMBER: The Silver Creek Member (Siebenthal, 1901, p. 345) is well exposed at the type section and elsewhere in Clark County, where it has been exploited for its natural cement properties since 1832 (fig. 4). The blue to gray limestone is dolomitic, fine grained, and very argillaceous (appendix 2, analysis 108). A maximum thickness of 26 feet has been recorded in south-central Clark County (Whitlatch and Huddle, 1932, p. 375).

SPEED MEMBER: Sutton and Sutton (1937, p. 326) described the Speed Member from 18 inches of “shaly limestone” found in a quarry section near Sellersburg, Clark County. The unit appears to be transitional with the overlying Silver Creek, varying only in the total amount

Figure 4. Adits of room and pillar mining operations in the North Vernon and Jeffersonville Limestones, Clark County.

of argillaceous and biofragmental material (appendix 2, analysis 113).

JEFFERSONVILLE LIMESTONE

The Jeffersonville Limestone (Kindle, 1899, p. 8) was named for the lowest Devonian formation lying above rocks of the Niagaran Series and below the North Vernon Limestone in the vicinity of Jeffersonville, Ind. Three main faunal zones are recognized in the type section. The basal unit of light-gray limestone contains a profuse coral fauna and may possibly be traced northwestward as far as Cass County (Patton, 1949, p. 14). The upper zone is characterized by an abundance of *Paraspirifer acuminatus* and the middle zone by *Brevispirifer gregarius*.

In the type section the Jeffersonville is a gray to brown carbonaceous limestone or dolomitic limestone approximately 40 feet thick. Although the Jeffersonville has a somewhat variable carbonate content, as illustrated in appendix 2, analyses 40-57, the unit is the major source of raw material for a large (capacity 5 million barrels per year) cement plant at Speed, Ind.

GENEVA DOLOMITE

The Geneva Dolomite (Collett, 1882, p. 63) unconformably overlies the Mississinewa Shale Member, Louisville Limestone, Waldron Shale, or Laurel Member in southern and southeastern Indiana. Where typically developed in Shelby County the Geneva is a dark-brown to buff carbonaceous dolomite with large crystalline calcite masses and scattered fossiliferous chert nodules. The Geneva is present in an area that extends westward from Decatur County, Ind., into Illinois, and southward from Hamilton County to central Clark County, Ind. (pl. 3). Excellent exposures are present in Rush, Jennings, Jefferson, and Shelby Counties. A maximum thickness of 35 feet has been recorded in the type area in southern Shelby County (Patton, 1953, p. 33).

SILURIAN SYSTEM

SALINA FORMATION

The Salina Formation, as recognized by Pinsak and Shaver (1964, p. 47), extends southwestward into northern Indiana from the Michigan Basin in two lobate areas and is the youngest Silurian formation exposed in the state (pl. 4).

KENNETH LIMESTONE MEMBER: Cumings and Shrock (1927, p. 77) described the Kenneth Limestone Member from a section of cherty micritic limestone exposed at Kenneth Station, Cass County. The Kenneth is nearly 45 feet thick in Cass and Howard Counties where it overlies the Kokomo. A cement company (capacity 1, 250, 000 barrels per year) uses the Kenneth at Logansport, where it is high-calcium limestone (appendix 2, analyses 82-83).

KOKOMO LIMESTONE MEMBER: The lowermost unit of the Salina exposed in Indiana is the Kokomo Limestone Member (Cumings and Shrock, 1927, p. 76), which appears as a tan or brown-gray dolomite or dolomitic limestone; most of it is thin bedded and contains many carbonaceous laminae. Toward the northeastern part of the state the lower Salina strata become more arenaceous and argillaceous although the characteristic carbonaceous laminae are still present. In the type area the Kokomo overlies the Wabash Formation and is 44 feet thick. Near Logansport, Cass County, the Kokomo is 27 to 84 feet thick.

WABASH FORMATION

The Wabash Formation (Pinsak and Shaver, 1964, p. 34) has been defined as all the strata lying above the Louisville Limestone and below the Salina Formation. The upper valley of the Wabash River in Carroll, Cass, Miami, Wabash, and Huntington Counties was designated as the type area. Pinsak and Shaver (1964, p. 34) further proposed that the existing names Liston Creek Limestone and Mississinewa Shale be relegated to member status in the Wabash Formation. The bioherms and detrital banks of the Huntington Lithofacies are believed to be lateral facies of both the Mississinewa and Liston Creek Members.

The Wabash Formation is approximately 182 feet thick in Allen County, 230 feet thick in Newton County, and as much as 245 feet thick in Cass County.

LISTON CREEK LIMESTONE MEMBER: Cumings and Shrock (1927, p. 75) described the Liston Creek from exposures found in the vicinity of Liston Creek, southwestern Wabash County. The type section consists of 26 feet of gray to tan limestone which is extremely cherty, fine grained, slightly fossiliferous, and thin bedded. A few outcrops contain a brown to yellow fossiliferous dolomite that may be a near-reef facies (Cumings and Shrock, 1927, p. 76). No single exposure in northern Indiana contains a full section of the Liston Creek Limestone Member. In the subsurface of northwestern Cass County it is 85 feet thick, near Kokomo it is 74 f e et thick, and in Tipton County it may be more than 100 feet thick.

MISSISSINEWA SHALE MEMBER.-The Mississinewa Shale Member (Cumings and Shrock, 1927, p. 72) was first de scribed as a unit of formation rank from a series of outcrops along the Mississinewa River in Wabash and Grant Counties, Ind. Where typically developed the Mississinewa is gray to green or buff silty dolomite that is argillaceous and fine grained and that grades to dolomitic siltstone (appendix 4, analyses 293-304). In places it is calcareous and characteristically weathers into irregular blocks with conchoidal fracture. In the type area, noncarbonate clastic materials may exceed 50 percent of the volume (appendix 3, analyses 135-139). Exposures on the south bank of the river at Wabash reveal 75 feet of the Mississinewa. In the subsurface of the type area, the Mississinewa, is approximately 110 feet thick and increases northward to nearly 200 feet in Pulaski and Fulton Counties. Along the west flank of the Cincinnati Arch, in the subsurface of Hamilton County and western Clark County, the Mississinewa is approximately 60 feet thick.

HUNTINGTON LITHOFACIES: Kindle and Breger (1904, p. 408) first described the Huntington Limestone from strata exposed in quarries 1 mile east of the city of Huntington, Ind. Cumings and Shrock (1928, p. 95) redefined the unit as the Huntington Dolomite but correlated it with strata in Randolph County that are now assigned to the Salamonie Dolomite. In the type area, the Huntington Lithofacies of Pinsak and Shaver (1964, p. 39) is a light-gray to cream or mottled dolomite that is fine to coarse grained, porous, and fossiliferous. The strata are generally inclined and are well defined except in the reef-core areas which tend to be more massive. Cumings and Shrock (1928) and Pinsak and Shaver (1964) showed that these biohermal, reef, and reef-detrital rocks are found at any stratigraphic level in. the Wabash Formation, and thus they are lateral equivalents of interreef rocks of the Wabash and its members.

LOUISVILLE LIMESTONE

The Louisville Limestone (Foerste, 1897, p. 218) is the youngest Silurian unit exposed in southeastern Indiana, where it is blue to gray dolomitic limestone which is argillaceous, pyritic, and slightly silty (appendix 2, analyses 97-101). In northeastern Indiana the unit is blue- gray to brown mottled dolomite in which chert nodules and argillaceous laminae are commonly present.

The Louisville is unconformably overlain by the Jeffersonville or the Geneva in the eastern part of Clark County. In the subsurface of western Clark County it is apparently conformably overlain by the Mississinewa. Some primary dip is apparent in exposures at Muncie, Delaware County, and at Pleasant Mills, Adams County. The Louisville-Wabash contact is sharply defined where observed in quarries at Lapel, Madison County, and Fort Wayne, Allen County, but cores from Hamilton County and western Delaware County show a more transitional zone at the contact. No single exposure in Indiana contains more than approximately 60 feet of the Louisville, whereas cores and well samples indicate that maximum sections are approximately 60 feet in Clark County and Delaware County, 82 feet in Marion County, and 101 feet in Allen County.

WALDRON SHALE

The Waldron Shale (Elrod, 1883, p. 106; Waldron

Formation of Pinsak and Shaver, 1964, p. 29, in northern Indiana) is a richly fossiliferous gray to green calcareous shale in the type section in Shelby County, Ind. Exposures near Utica, Clark County, reveal a nearly barren shale. In Adams County the Waldron is carbonaceous dark-gray dolomite with contorted argillaceous laminae and a nodular appearance. Most Waldron samples contain dolomite, calcite, quartz, kaolinite, illite, chlorite, and occasional traces of mixed-layer clay. Dolomite constitutes about 95 percent of the unit in Adams County (appendix 2, analyses 10-11) where it is quarried as aggregate, but the carbonate content decreases toward the south, where the Waldron is removed as waste from some quarries.

Within the outcrop area of southeastern Indiana the Waldron ranges from 5-21 feet to 12 feet in thickness. Cores from Hamilton., Tipton, Delaware, and Cass Counties indicate similar thicknesses, but in Allen County the Waldron is more than 30 feet thick. The argillaceous and nodular character of the Waldron is sufficiently persistent to make it one of the better stratigraphic markers in the Silurian of Indiana (pl. 5).

SALAMONIE DOLOMITE

Pinsak and Shaver (1964, p. 24) defined the Salamonie Dolomite as all the strata lying above the Brassfield Limestone and below the Waldron or Salina Formations in northern Indiana. Type sections were designated at the Rockledge Products quarry, Portland, Jay County, and part of the core of Indiana Geological Survey Drill Hole 44 (appendix 4, analyses 181-206). These strata represent the lateral equivalents of rocks that have been called the Laurel Limestone and the Osgood Formation in southern Indiana. Foerste (1895, p. 191) did not believe that the fauna of the Osgood was diagnostic enough to permit separation from the Laurel. (Also see Tillman, 1961.) Foerste (1897, p. 229) also noted that at many locations the lower Laurel strata contain intercalated shales very similar to those of the Osgood. In many surface exposures the Osgood- Laurel contact appears to be transitional, and in the subsurface the contact cannot be identified lithologically with any degree of certainty north or west of the type sections. In cores from Henry, Jennings, Johnson, and Bartholomew Counties, the argillaceous zones of the Osgood are thin and variable. Rocks of the Laurel typically contain 85 percent dolomite (appendix 3, analysis 48) or as much as 90 percent limestone (appendix 3, analysis 46). Rocks of the Osgood typically contain as much as 74 percent dolomite (appendix 3, analysis 49) or as much as 85 percent limestone (appendix 3, analysis 114). As much as 34 percent noncarbonate material is present in some of the Laurel strata and as much as 19 percent is present in the Osgood carbonate rocks. For these reasons, it is here proposed that the use of the name Salamonie Dolomite be extended to southern Indiana and that the names Laurel and Osgood be relegated to member rank in the Salamonie.

Where it is exposed in Jay and Adams Counties, the Salamonie is white to cream or tan very pure dolomite which is fossiliferous and vuggy, with massive pseudo-oolitic and coquinoid zones near, but not at, the top of the unit. Steep primary dip (21° where measured, fig. 5) is present below the pseudo-oolitic zone and about 30 feet below the Salamonie-Waldron contact in Adams County. These characteristics are believed to be indicative of a reef or near-reef environ-

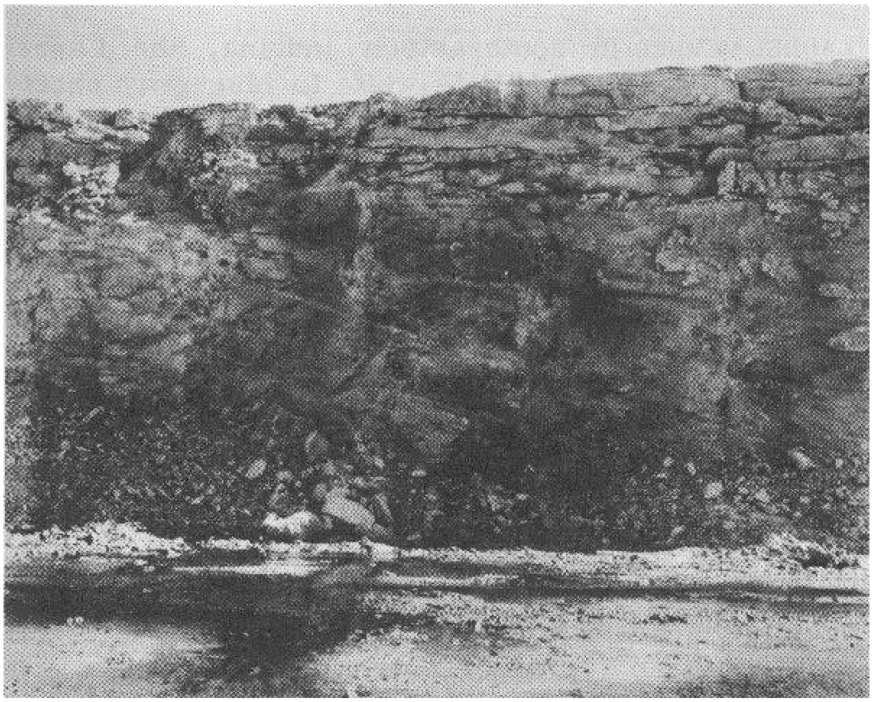

Figure 5. Primary dip in the Salamonie Dolomite, see. 33, T. 23 N., R. 13 E., Adams County.

ment not previously recognized in the Salamonie of northeastern Indiana. Esarey and Bieberman (1948, p. 36) stated that reefs were present from thebase of the Osgood to the top of the Waldron in Marion County, but subsequent coring (appendix 6, cores 113 and 145) has shown that the reef facies actually occupies a higher position and probably correlates with the Wabash and Louisville.

The Salamonie is less than 100 feet thick in most of southeastern Indiana. In northeastern Indiana the unit thickens to more than 200 feet, in Cass County it is about 160 feet thick, and in Newton County it is 180 feet thick.

LAUREL MEMBER: In southeastern Indiana., the Laurel (Foerste, 1895, p. 191) is white to blue-gray cherty dolomitic limestone or dolomite which is mostly thin bedded. The blue-gray or white chert is largely contained within a conspicuous well-bedded zone 8 to 16 feet thick that may be present at varying positions within the unit. In southeastern Indiana the Laurel Member is conformable with the overlying Waldron or is disconformable with the middle Devonian dolomites where the Louisville and Waldron are eroded. Northward the Laurel-Waldron contact appears to be locally disconformable.

OSGOOD MEMBER: The Osgood (Foerste, 1895, p. 191) is a series of intercalated dolomitic limestone and shale beds totaling 10 to 30 feet thick which unconformably overlie the Brassfield Limestone, Saluda Limestone, or Whitewater Formation in southeastern Indiana. In the type section in Ripley County the Osgood Member consists of two thin argillaceous and dolomitic limestones separated and overlain by gray calcareous shales in places. The argillaceous nature of the Osgood is less prominent to the north.

BRASSFIELD LIMESTONE

The Brassfield Limestone (Foerste, 1906, p. 27) in southeastern Indiana is a reddish-brown or gray limestone, generally glauconitic and coarsely crystalline and containing numerous shale lenses and some pebbles of Ordovician limestone. Rubbly bedding less than 1 foot thick is characteristically developed, although more massive beds are not uncommon in some places. The Brassfield is unconformable with the subjacent strata of the Cincinnatian Series and with the overlying Osgood Member.

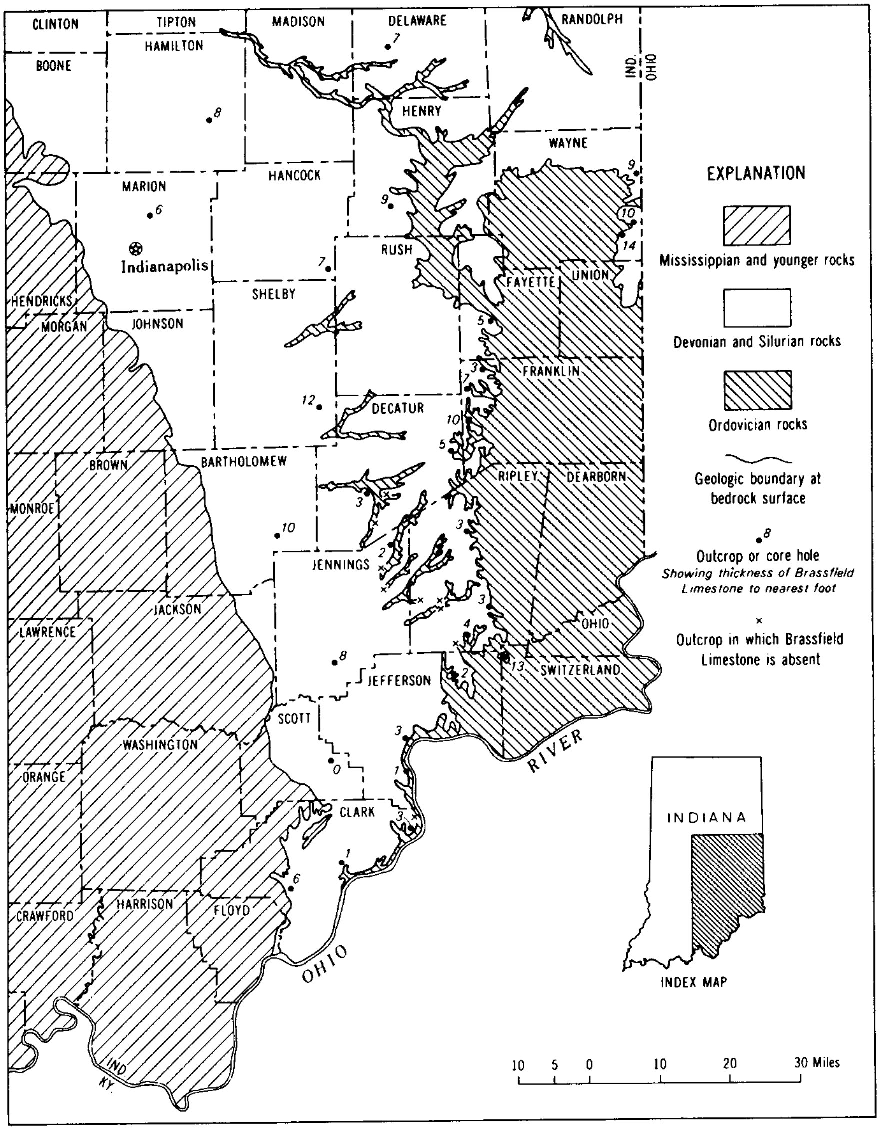

Figure 6. Map of southeastern Indiana showing typical thickness of the Brassfield Limestone. Modified in part from Patton and others (1956), Schneider and Gray (1966), Burger and Wayne (in preparation), and Rexroad (1967).

The Brassfield is either absent or very thin (less than 10 feet) over much of southeastern Indiana (fig. 6). Variations of thickness, lithology, and paleontology at specific localities were discussed by Foerste (1897, 1904a, 1935), who found that the Brassfield was absent from exposures in adjacent parts of Ripley, Jennings, and Decatur Counties.

Uses of Crushed Limestone and Dolomite

Because crushed stone is relatively abundant, bulky, and cheap, the unit cost of lengthy transportation is high and may constitute a large part of the price of delivered stone. A few quarries are isolated enough to be able to transport aggregate by truck farther than about 30 miles and still compete favorably with other quarries. Truck transportation is reported to range from 3 to 5 cents per ton-mile and to average about 3½ cents per ton-mile for distances more than 10 miles. More economical long-distance rates may be obtained if return loads can be arranged. Aggregate hauled to stockpiles in southwestern Indiana, where quarries are few, and return loads of coal represent one method of reducing costs. Crushed stone aggregate required in certain concrete specifications is hauled by independent trucking companies from quarries in northeastern Indiana to points in Elkhart, Lagrange, and Steuben Counties and to ready-mix and aggregate dealers in southwestern Michigan.

Twenty-six quarries in the Devonian- Silurian bedrock area are near railroad facilities. Ballast required on the track itself is probably the major commodity shipped. Some aggregate, however, is shipped from strategically located quarries northward to South

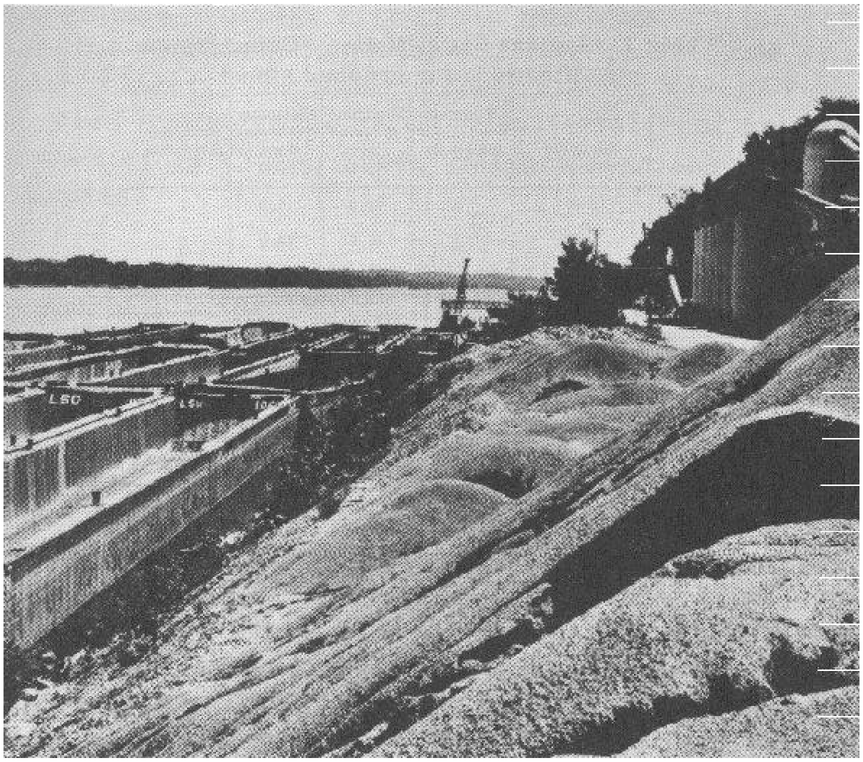

Figure 7. Crushed stone being loaded in barges at Utica, Clark County, for out-of-state markets.

Bend and to other northern Indiana cities where crushed stone is not locally available. Small amounts of high-purity dolomite flux stone is transported by rail to foundries and rock wool plants within the state.

In southern Indiana some aggregate is loaded directly onto barges or is shipped by truck or rail to loading points on the Ohio River (fig. 7). Low-cost water transport allows several Indiana producers to ship many miles into neighboring states and to compete in markets as far away as West Virginia.

Table 1. Indiana State Highway Commission specifications for crushed stone[1]

Grade	Minimum specific gravity	Maximum deleterious materials (pct)	Maxim m abrasion loss (pct)	Maximum soundness loss (pct)	Maximum absorption (pct)
A - -	2.45	5	40.0	15.0	3
B - -	2.45	7	45.0	20.0	3
C - -	2.45	10	50.0	20.0	3

[1]All sampling and testing are performed by the Bureau of Materials and Tests in compliance with the following American Association of State Highway Officers test designations:

Sampling - - - - - - - - - - - T2
Deleterious material- - - - T112, T11
Soundness- - - - - - - - - - -T103, T104
Abrasion - - - - - - - - - - - T96
Specific gravity - - - - - - -T85
Absorption- - - - - - - - - - T85

Most of the crushed stone produced in Indiana is consumed by markets within the state. The largest of these markets is state, federal, and local highway construction. Crushed stone used by the State of Indiana must meet certain physical specifications, which are outlined in table 1, and which may be obtained in more detailed form from the Indiana Highway Commission, Indianapolis. Most of the purer Devonian and Silurian carbonate rocks used by the industry meet these specifications, but deleterious constituents, such as chert, shale, and silt, may seriously affect the physical and chemical properties of the aggregate.

The removal of overburden is probably the greatest single quarrying problem. Although all quarry operators attempt to locate suitable sites with a minimum of overburden, the market conditions in certain areas may make the removal of several tens of feet of waste material economical. Glacial overburden exceeds 400 feet in some parts of northern Indiana (Wayne, 1956, pl. 1) where bedrock outcrops are largely limited to postglacial drainage areas. In southeastern Indiana both the overburden and the usable rock sections are much thinner. The Waldron Shale and the Silver Creek Member are removed as waste material from several operations in Clark, Scott, Bartholomew, and Shelby Counties.

Minor water problems are encountered at several levels within the Devonian and Silurian strata. The Silurian-Devonian contact, the Louisville-Wabash contact, the Waldron-Louisville contact, and the Whitewater-Brassfield contact have all proved to be water-bearing horizons in several locations in southern and eastern Indiana.

Chert in nodular or bedded form is expensive both to drill and crush because of its hard and abrasive character. Porous chert is a detrimental constituent in cement and nearly all forms of aggregate except when the material is used as road metal. Chert is abundant in some places in Laurel limestone of southern Indiana and in the Liston Creek and Kenneth limestones of northern Indiana. Porosity is developed in the chert in areas where it has been subject to groundwater action and especially where it has been exposed at the surface.

Slightly more than 25 percent of the crushed stone produced in Indiana is marketed for uses which demand certain chemical properties. Agricultural limestone and cement consume most of the chemically graded material, and the steel flux, paint, rubber, glass flux, and pharmaceutical markets make up only a minor part of the total industry. Figure 8 illustrates the position within a ternary chemical diagram of the materials marketed by the crushed stone producers of northern and eastern Indiana.

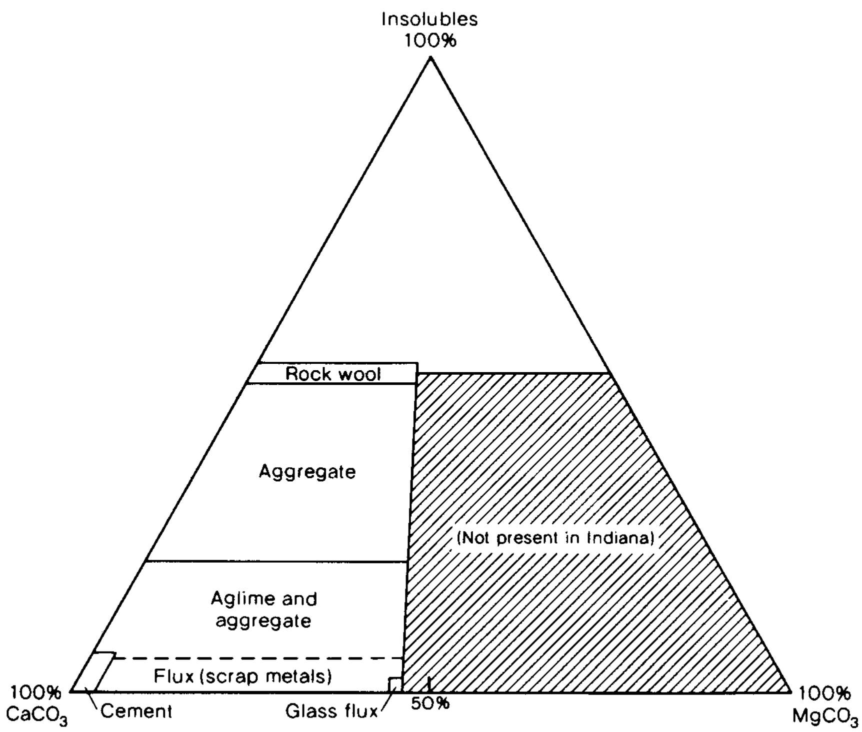

Figure 8. Ternary diagram showing chemical composition of crushed rock, by uses.

AGGREGATE

Crushed stone for use as aggregate in concrete or highway construction accounts for approximately 72.4 percent of the total Indiana production (table 2).

Of the nine major Devonian and Silurian units currently being used, the Geneva Dolomite and the Huntington Lithofacies are the most widely accepted in their respective outcrop areas. The remaining units provide aggregate material with a wide range of physical and mineralogic characteristics (table 3).

Table 2. Production and value of crushed stone and percentage used in concrete and highway construction in Indiana, 1959-64

Year	Quantity produced (X 1,000 tons)	Value (X $1,000)	Percentage used in concrete and highway construction
1964 - - -	21.664	27,236	72.5
1963 - - -	18,993	24,329	70.4
1962 - - -	18.055	22,745	74.2
1961 - - -	17, 375	21, 377	73.3
1960 - - -	18, 323	22,756	72.4
1959 - - -	17, 827	22, 348	72.9

The Silver Creek and the Mississinewa provide unsatisfactory aggregate for most purposes, as does the Waldron in southern Indiana. Deleterious constituents which usually cause unsatisfactory physical or chemical characteristics include shale in the Silver Creek, Mississinewa, Waldron, and Osgood; porous

Table 3. Typical range of physical properties of some Devonian and Silurian strata from northern and eastern Indiana[1]

Unit	Number of samples and locations		Specific gravity	Abrasion loss (pct)	Soundness (pct)	Absorption (pct)
Jeffersonville - - - - - - - - - - - - -	5	1	2.64-2.71	23.2 -31.8	3.6 - 45.7	0.9 -2.70
Geneva - - - - - - - - - - - - - - - - - -	4	2	2.34-2.68	33.3 -35.3	7.54-12.0	2.34-4.8
Huntington Lithofacies- - - - - - -	11	4	2.46-2.76	25.1 -30.2	1.29-20.2	0.7 -2.8
Liston Creek- - - - - - - - - - - - - -	3	3	2.48-2.78	26.5 -28.8	2.65-39.53	1.2 -3.5
Louisville- - - - - - - - - - - - - - - -	18	3	2.54-2.76	23.36 -35.6	6.8 -33.03	1.1 -2.7
Salamonie - - - - - - - - - - - - - - -	7	3	2.42-2.71	32.1 -52.1	0.54-23.7	1.6 -3.5
Laurel - - - - - - - - - - - - - - - - - - -	12	8	2.69-2.80	23.5 -29.1	4.0 -39.8	0.5 -2.74
Brassfield- - - - - - - - - - - - - - - -	2	1	2.69-2.75	28.3 -29.0	6.3 -8.03	1.1 -1.4

[1]All analyses were performed by the Bureau of Materials and Tests, Indiana State Highway Commission, Indianapolis. The writer is responsible for the extrapolation of data from Bureau records.

chert in the Kenneth, Liston Creek, and Laurel; carbonaceous laminae in the Jeffersonville and Kokomo; and silt in the basal part of the Geneva, in the upper part of the Louisville, and in the Mississinewa.

CEMENT

The natural or hydraulic cement properties of the Silver Creek Member of the North Vernon Limestone gave rise to a large cement industry in Clark County. At the turn of the century, 13 plants were producing approximately 3 million barrels of natural cement annually. Today only one company still exploits the Devonian strata for cement in Indiana. The Louisville Cement Co. plant at Speed, Clark County, established in 1871, is the oldest cement operation in the state. In 1906, with the advent of portland cement, the company directed its attention to the Jeffersonville Limestone and the Speed Member of the North Vernon Limestone (appendix 2, analyses 89-92). The Jeffersonville Limestone is approximately 37 feet thick at Speed. Shale is trucked from a captive pit to provide most of the silica, alumina, and iron required, but some aluminum dross as well as gypsum is imported. Natural cement and mortar (Brixment) are still produced from the Silver Creek in a separate kiln reserved for this purpose. The Speed plant is now able to produce approximately 5 million barrels of portland cement annually.

In 1962 the Louisville Cement Co. opened the first new cement plant to be constructed at a new site in Indiana for more than 50 years. Located near Logansport, Cass County, the new plant exploits the Kenneth Limestone Member of the Salina Formation. That part of the Kenneth which is suitable for cement is between 15 and 45 feet thick at most localities. A beneficiation process whereby the coarser silt and sand are removed from the thin soil zone allows the plant to use most of the overburden in the cement process. Aluminumdross, gypsum, and iron ore or mill scale are imported to complete the basic raw materials. Capacity production is 1, 250, 000 barrels of cement annually, but with the addition of a second kiln in 1966 the plant will be capable of producing more than 2 million barrels of cement a year.

Pure limestone is not required in manufacturing portland cement, but a consistent chemical composition is highly desirable in all raw materials. General specifications require that the crushed stone has less than 3 percent magnesia and a low iron and sulfur content. Table 4 shows the average composition of Devonian and Silurian limestones used for portland cement in Indiana.

Production of portland cement in Indiana declined from 14,245,000 barrels in 1959 to 12,878,000 barrels in 1962 but increased to 15,638,000 barrels in 1964 (table 5).

Table 4. Average composition (in percent) of the Devonian and Silurian limestones used for portland cement in Indiana

Unit	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_2	Fe_2O_3
Speed - - - - - - - -	84.2	5.0	7.6	1.9	0.6
Jeffersonville - - -	93.1	3.1	2.6	0.3	0.3
Kenneth - - - - - - -	92.0	0.9	6.5	0.4	0.2

Table 5. Production and value of portland cement in Indiana, 1959-64

Year	Quantity produced (X 1,000 barrels)[1]	Value (X $1,000)
1964- - - - - - - - -	15,038	48,695
1963- - - - - - - - -	13,165	43,220
1962- - - - - - - - -	12,878	42,572
1961- - - - - - - - -	13,780	47,024
1960- - - - - - - - -	14,052	48,310
1959- - - - - - - - -	14,245	47,231

[1] 376 pounds per barrel.

FERTILIZER AND SOIL CONDITIONER

Agricultural limestone serves as a plant nutrient, as a neutralizing agent and soil conditioner, and as a catalyst to other fertilizers. Total sales of limestone and dolomite used for agricultural purposes in Indiana have averaged 2,194,600 short tons, or $2,979,500 per year, for the past 10 years. This figure represents approximately 11.5 percent of the total crushed stone production by weight. Fifty percent of the agricultural limestone production is derived from Devonian and Silurian strata (fig. 9).

Devonian and Silurian carbonate rocks display a wide range of neutralizing power (calcium carbonate equivalent) as might be anticipated from such a diverse group of rock types (table 6). Strata which are outstanding for their high- calcium carbonate equivalent include the Jeffersonville, Geneva, Wabash (Huntington Lithofacies), Louisville, and Salamonie. Wide geographic distribution facilitates the use of these high quality dolomitic units throughout eastern and northern Indiana. Rock units having a low calcium carbonate equivalent are the Silver Creek and Waldron in southern Indiana and the Mississinewa in northern Indiana.

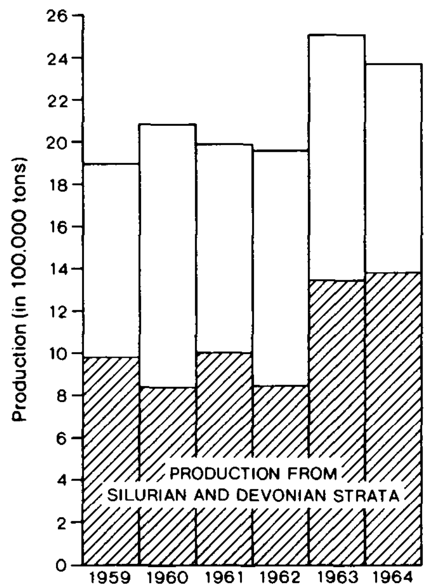

Figure 9. Histogram showing production of agricultural limestone in Indiana, 1959-64.

No law controls the quality of agricultural limestone marketed in Indiana at the present time. Many farmers, however, purchase "aglime" under the government cost-share arrangements which are supervised by the Agricultural Conservation Program of the United States Department of Agriculture. This program is administered and enforced in Indiana by the Agricultural Stabilization and Conservation Service State Committee, Indianapolis. The amount of federal assistance available depends upon the cost per ton, which is directly related to the haulage cost per ton-mile from the nearest source. In 1963 the program allowed a minimum of $1.10 per ton and a maximum of $3.20 per ton, depending upon geographic location. In order to receive benefits under the program the crushed

Table 6. Range of calcium carbonate equivalents of Devonian and Silurian strata from northern and eastern Indiana

Unit	Number of samples	Number of locations	Range of $CaCO_3$ equivalent
North Vernon- - - - - - - - - - - - - -	19	6	58.9 - 99.9
Jeffersonville- - - - - - - - - - - - - -	46	9	91.4 - 105.9
Geneva -	16	8	95.0 - 106.8
Kenneth - - - - - - - - - - - - - - - - - - -	4	1	89.3 - 97.1
Kokomo - - - - - - - - - - - - - - - - - - -	7	2	96.4 - 101.3
Liston Creek - - - - - - - - - - - - - -	9	3	46.6 - 85.0
Mississinewa - - - - - - - - - - - - - -	7	3	44.6 - 53.0
Wabash (Huntington Lithofacies) -	23	7	88.0 - 107.7
Louisville - - - - - - - - - - - - - - - -	29	10	82.9 - 107.7
Waldron - - - - - - - - - - - - - - - - -	6	4	46.1 - 85.0
Salamonie - - - - - - - - - - - - - - - -	10	4	104.1 - 108.6
Laurel - - - - - - - - - - - - - - - - - - -	34	10	74.8 - 104.3
Osgood - - - - - - - - - - - - - - - - - -	10	3	22.9 - 93.6
Brassfield - - - - - - - - - - - - - - - - -	6	5	81.6 - 97.9

stone must meet the following minimum specifications established by the Agricultural and Stabilization Service for agricultural limestone and dolomite:

1. Crushed stone must contain at least 80 percent calcium carbonate equivalent.

2. All fine particles obtained in crushing process must be retained.

3. A minimum of 25 percent of the material must pass through a U. S. Standard No. 60 sieve.

4. A minimum of 80 percent of the material must pass through a Us S. Standard No. 8 sieve.

5. Moisture content must not exceed 8 percent at the time of shipment.

6. Item 1 multiplied by item 4 must equal or exceed 7,200.

7. The cost-sharing program is not authorized for land which has received liming materials within the preceding 4 years, except when an approved soil test indicates the need of a minimum of 2 tons per acre of agricultural limestone. The test must be performed at least 2 years after the last application of agricultural limestone.

The staff of the Soil Testing Laboratory at Purdue University periodically examine, collect, and analyze crushed stone, marl, slag, and calcium carbide refuse samples from all vendors who sell liming materials within the state. Specifications for marl, slag, and calcium carbide refuse vary slightly from those of crushed stone.

Many crushed stone producers grind limestone and dolomite to agricultural limestone specifications by recycling the product through secondary or tertiary crushers, but some operators have found that the fine-grained fraction produced during normal crushing operations is often sufficient to satisfy market demands. But if the high demand of 1963 continues, it may prove economical for more producers, especially those with small isolated quarries, to produce agricultural limestone as a primary product.

FLUX

Approximately 26, 153 tons of crushed limestone and] dolomite were marketed by nine quarries for use as flux in numerous foundries and glass factories throughout the state in 1964. Among the Devonian and Silurian strata, the Jeffersonville, Liston Creek, Wabash (Huntington Lithofacies), Louisville, and Salamonie are the most widely used.

No crushed stone from the Devonian or Silurian strata of Indiana was used in 19 64 in the blast furnace, open hearth, or basic oxygen methods of iron smelting. A considerable quantity of crushed stone was marketed, however, for use as a fluxing agent in the cupola method of remelting scrap metals. Chemical specifications for this procedure are not well defined because the primary purpose of the flux is not to assist in removing contaminants but to create a more fluid charge. The rigid specifications necessary in the primary smelting of iron ore are therefore not applicable. But stone used in remelting scrap metal should be free of deleterious materials and should contain as little sulfur, phosphorus, alumina, and silica as possible. Approximately 55 to 65 pounds of flux stone per ton of metal charge is used, and stone 1 to 3 inches in diameter is often preferred.

Table 7. Chemical specifications for dolomite and limestone used for glass

	CaO and MgO	SiO_2	Al_2O_3	Fe_2O_3	Loss on ignition (pct)
Dolomite - - -	51.0 min	1. 0 max	0. 3 max	0. 3 max	42-44
Limestone - -	54.0 min[1]	2. 0 max	0. 5 max	0. 1 max	42-44

[1] MgO not to exceed 1 percent.

Chemical specifications for crushed stone used in glass industry are quite rigid, and only the purest carbonate strata are acceptable. Specifications for mite and limestone from a major glass-producing company are given in table 7.

BALLAST

In 1964, 386,000 tons of crushed stone valued at $481,000 was marketed by eight companies in Indiana for use as railroad ballast. Three companies derive their material from the Liston Creek member and Huntington facies of the Wabash and from the Laurel and Osgood.

Although specifications set forth by various railroads differ considerably, it is believed that most of the Devonian and Silurian rocks currently being exploited in Indiana are physically suitable for ballast (table 8).

Table 8. Physical specifications for railroad ballast [from Goldbeck, 1948]

Soundness ------------	10 percent maximum loss in five cycles of the sodium sulfate test.
Abrasion -------------	40 percent maximum loss in the Los Angeles Abrasion Test
Fines----------------	1 percent maximum material finer than No. 200 sieve.
Clay lumps------------	0.5 percent maximum.
Soft and friable material -	5 percent maximum.

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LIME AND LIME-SILICA BRICK

Indiana was the first state to produce lime-silica brick (Mance, 1915, p. 283), but the local industry did not survive. The present interest (Boynton, 1965, p. 88) in new processes, equipment, and research does, however, indicate the possibility of future developments where lime and clean quartz sand are plentiful.

The carbonate strata of the Mississippian, Devonian, and Silurian Systems were used extensively for lime during the early part of the century (Blatchley, 1904), but there is no current production in Indiana.

MINERAL WOOL

The rock wool industry in Indiana began in 1897 with a single company at Alexandria, Madision County. By 1937, 15 plants were producing rock wool and 1 plant was producing slag wool (Thornbury, 1938). The Mississinewa Shale Member (appendix 3, analyses 135-139) was the first source of raw material for the industry, but the calcium and silica constituents are also available from many other sources within the state. Companies and plants established in Wabash County to use the Mississinewa are now using steel mill slag and a small amount of dolomite from the Huntington Lithofacies.

MISCELLANEOUS USES

Approximately 115,000 tons of riprap valued at $157,000 was marketed by 22 companies in 1964. Devonian and Silurian rock units used include the Jeffersonville, Geneva, Kokomo, Wabash (Huntington Lithofacies), Louisville, Salamonie, and Brassfield. Physical specifications for riprap are primarily concerned with the durability of the crushed stone, which should be free from argillaceous laminae and from chert, pyrite, and other deleterious materials. Crushed stone which loses more than 25 percent by weight after 5 cycles of the sodium sulfate test or after 50 cycles of freezing and thawing is not generally acceptable.

A small amount of crushed stone for filter media which can serve as a host for sewage- purifying bacteria is sold by several companies currently exploiting rocks of the Huntington Lithofacies, the Louisville, and the Salamonie in northern and eastern Indiana. Crushed stone used for this purpose should generally be sound enough to pass 20 cycles of the sodium sulfate test and lose not more than 10 percent by weight. Specifications are variable, but the extreme physical and chemical conditions to which the stone is submitted require that deleterious material be kept at a minimum.

The high-purity dolomite (appendix 2, analyses 15) of the Salamonie from the Karch Stone Co. quarry, in Adams County, has been used experimentally in the past to produce magnesium metal. Several crushed stone plants in eastern Indiana produce tile, blocks, and brick from crushed stone and cement.

Less than 60 years ago rocks from many of the formations exposed in southeastern Indiana were used as dimension stone. This industry has diminished until now only two companies are concerned solely with the production of ashlar from Devonian and Silurian strata. These companies are in Rush and Shelby Counties, respectively, and have limited their operations to the upper 10 to 15 feet of thin-bedded Geneva, Louisville, and Laurel dolomites.

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Appendixes

Compilation date for the appendixes is 1964.

APPENDIX 1
Directory of Producers of Crushed Stone from Devonian and Silurian Strata

County	Quarry No.[1]	Producer	Location Sec.	T.	R.
Adams	1-1	John W. Karch Stone Co.	31	25 N	15 E
	1-2	Meshberger Bros. Stone Corp.	33	26 N	13 E
	1-3	Meshberger Bros. Stone Corp.	4	26 N	15 E
Allen	2-1	May Stone and Sand. Inc.	23	31 N	14 E
	2-2	May Stone and Sand, Inc.	29	30 N	12 E
	2-3	Midwest Aggregates, Inc.	8	30 N	15 E
Bartholomew	3-1	Meshberger Stone Co Inc.	6	8 N	7 E
Blackford	5-1	J and K Stone. Inc.	3	24 N	11 E
Carroll	8-1	Delphi Limestone Co.	19	25 N	2 W
Cass	9-1	Cass County Stone Co.	28	27 N	1 E
	9-2	France Stone Co.	27	27 N	2 E
	9-3	Louisville Cement Co.	32	27 N	I E
Clark	10-1	T. J. Atkins and Co., Inc.	CMG 10[2]	2 S	7 E
	10-2	Louisville Cement Co.	CMG 131, 132	1 S	7 E
	10-3	Louisville Sand and Gravel, Inc.	CMG 17	2 S	8 E
	10-4	Sellersburg Stone Co., Inc.	CMG 90	1 S	7 E
Decatur	16-1	Harris City Stone Co.	28	10 N	9 E
	16-2	New Point Stone Co.	8	10 N	11 E
Delaware	18-1	Irving Bros. Stone and Gravel Co., Inc.	25	21 N	10 E
	18-2	J and K Stone, Inc.	23	22 N	10 E
	18-3	J and K Stow, Inc.	20	20 N	10 E
	18-4	Muncie Stone and Lime Co.	20	20 N	10 E
Grant	27-1	Pipe Creek Stone Co.	35	25 N	6 E
Hamilton	29-1	Stony Creek Stone Co.	3	18 N	5 E
Howard	34-1	Yeoman Stone Co.	3	23 N	3 E
Huntington	35-1	Erie Stone Co.	12	28 N	9 E
	35-2	Heller Stone Co., Inc.	11	26 N	10 E
Jasper	37-1	W. C. Babcock Construction Co., Inc.	30	29 N	6 W
	37-2	Northern Indiana Stone, Inc.	27	29 N	6 W
Jay	38-1	Rockledge Products, Inc.	30	23 N	14 E
Jefferson	39-1	Standard Materials Div.	16	3 N	9 E
Jennings	40-1	Berry Materials Corp.	27	7 N	8 E
Madison	48-1	Standard Materials Div.	28	19 N	6 E
Pulaski	66-1	Western Indiana Aggregate Corp.	16	29 N	4 W
Randolph	68-1	H and R Stone Co.	12	21 N	13 E
	68-2	Portland Stone Co.	11	21 N	12 E
Ripley	69-1	Berry Materials Corp.	23	7 N	11 E
	69-2	New Point Stone Co.	29	9 N	11 E
	69-3	South Eastern Materials Corp.	22	8 N	11 E

Appendix 1--Continued

County	Quarry No.[4]	Producer	Location		
			Sec.	T.	R.
Rush	70-1	McCorkle Stone Co.		12 N	9 E
	70-2	Rush County Stone Co., Inc.		12 N	9 E
Scott	72-1	Scott County Stone Co.	20	3 N	8 E
Shelby	73-1	Cave Stone Co., Inc.	32	11 N	7 E
	73-2	St. Paul Quarries, Inc.	9	11 N	8 E
	73-3	Standard Materials Div.(abandoned 1966)	6	11 N	8 E
Switzerland	78-1	Tri-County Stone Co.	9	5 N	12 E
Wabash	85-1	Mill Creek Stone and Gravel Co.	PGR 11[3]	27 N	5 E
Wayne	89-1	DeBolt Concrete Co., Inc.	1	14 N	1W[4]
Wells	90-1	Erie Stone Co.	28	27 N	12 E
White	91-1	Monon Crushed Stone Co Inc.	28	28 N	4W

[1] Locations are shown on plate 2.

[2] CMG Clark Military Grant.

[3] POR Poqua Godfroy Reserve.

[4] Located with reference to first principal meridian. All other operations are located with reference to second principal meridian.

APPENDIX 2
Spectrochemical Analyses of Channel Samples Collected in Active Quarries
[Some analyses in Appendix 2 are taken from McGregor, 1963]

Adams County

Quarry No. 1-1 John W. Karch Stone Co. Location: SW¼SW¼ sec. 31, T. 25 N., R. 15 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
1	Salamonie	Py53-71	4.7	58.1	40.9	.55	.087	.11		.0081	46.9	.010	.003
2	Salamonie	Py53-69	10.1	56.4	42.7	.44	.15	.12		.0093	47.0	.016	.003
3	Salamonie	Py53-67	7.6	56.4	42.6	.41	.18	.15		.010	46.8	.014	.005
4	Salamonie	RF63-91	15.8	59.0	39.6	1.03	.04	.11		.011	47.0		
5	Salamonie	RF63-92	19.2	60.1	39.3	.18	.091	.12		.009	47.3		

Quarry No. 1-2 Meshberger Bros. Stone Corp. Location: SE¼ SE¼ sec. 33. T. 26 N., R. 13 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
6	Louisville	Py53-79	2.9	55.0	37.8	4.70	1.02	.36	.055	.011	44.0	.036	.005
7	Louisville	Py53-77	9.3	56.1	40.1	2.58	.44	.25	.033	.010	44.9	.088	.003
8	Louisville	Py53-75	5.0	56.5	40.9	1.60	.25	.21		.012	46.0	.016	.003
9	Louisville	Py53-73	12.4	56.7	40.4	1.93	.29	.19		.010	46.2	.035	.003
10	Waldron	AF63-98	3.0	59.0	37.7	1.86	.71	.21		.010	45.6		
11	Waldron	RF63-97	8.7	59.2	34.8	2.90	1.30	.70	.056	.011	43.6		
12	Salamonie	RF63-95	5.3	60.1	39.4	.14	.10	.10		.015	47.3		
13	Salamonie	RF63-96	3.5	58.1	41.4	.85	.52	.13		.021	47.2		
	Salamonie		2.0 (approx)[1]										
14	Salamonie	RF63-94	9.6	57.3	42.0	.28	.086	.11		.022	47.2		
15	Salamonle	RF63-93	11.8	58.5	41.0	.13	.084	.087		.011	46.8		

[1] Inaccessible.

Adams County- -Continued

Quarry No. 1-3 Meshberger Bros. Stone Corp.Location: Center sec. 4, T. 26 N., R. 15 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
16	Louisville	E 47-120	13.5	55.1	44.4	.24	.049	.066			47.4	.020	.001
17	Louisville	E 47-119	4.0	55.7	43.2	.76	.081	.098			46.9	.091	.003
18	Louisville	Py53-65	12.4	57.7	41.8	.09	.058	.098		.009	47.2	.012	.002
19	Louisville	Py53-63	7.1	58.4	41.0	.13	.099	.160		.009	47.0	.024	.002
20	Louisville	RF63-101	15.2	58.9	40.4	.23	.13	.088		.022	47.0		
21	Louisville	RF63-100	4.8	60.2	38.2	.71	.30	.10	.015	.011	47.2		

Allen County

Quarry No. 2-1 May Stone and Sand, Inc. Location: NW¼NE¼ sec. 23, T. 31 N., R. 14 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
22	Devonian (undifferentiated)	RF63-125	2.5	58.6	36.0	3.24	.97	.50		.17	44.6		
23	Devonian (undifferentiated)	RF63-124	3.0	55.2	42.3	1.07	.22	.30	.070	.29	46.9		
24	Devonian (undifferentiated)	RF63-123	17.5	55.5	31.5	10.4	.89	.98	.052	.17	40.2	.71	

Quarry No. 2-2 May Stone and Sand, Inc. Location: NW¼ NE¼ sec. 29, T. 30 N., R. 12 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$Al2O_3$	$Fe2O_3$	TiO_2	MnO	Chem. CO_2	S	P_2O_5
25	Middle Devonian (undifferentiated)	S 52-69	10.3	87.4	05.11	6.38	.36	.14	.040	.030	41.2	.081	.030
26	Salina	S 52-72	4.5	55.0	39.1	4.25	.80	.31	.032	.027	43.7	.17	.025
27	Salina	S 52-75	3.5	55.0	42.4	1.66	.31	.16		.037	46.4	.091	.013
28	Salina	Py53-60	3.3	54.7	37.2	6.07	.97	.48	.048	.025	43.7	.30	.023
29	Salina	Py53-58	4.1	56.7	39.4	3.20	.068	.11		.035	46.1	.057	.006
30	Salina	Py53-56	2.5	54.4	37.2	6.64	.82	.32	.041	.022	43.3	.20	.016
31	Salina	Py53-54	2.0	56.2	40.0	2.75	.38	.21		.031	45.7	.083	.013
32	Salina	Py53-52	2.0	54.1	43.8	1.36	.11	.11		.051	46.6	.13	.010
	Salina		8.8 (approx)[1]										
33	Wabash (Huntington Lithofacies)	Mc56- 2	15.9	53.5	39.0	6.85	.23	.17		.014	44.0	.13	
34	Wabash (Huntington Lithotacies)	Mc56- 4	13.6	54.9	43.9	0.62	.15	.22		.014	46.7	.14	.004
													.002
	Wabash (Huntington Lithofacies)		78.0 (approx)[2]										
35	Louisville?	RF63-128	32.0	56.7	34.2	7.21	1.05	.25	.075		42.2	.20	

[1]Not sampled.

[2]Inaccessible

Quarry No. 2- 3 Midwest Aggregates, Inc. Location: SW¼ NE¼ sec. 8, T. 30 N., R. 15 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$Al2O_3$	$Fe2O_3$	TiO_2	MnO	Chem. CO_2	S	P_2O_5
36	Devonian (undifferentiated)	RP63-127	35.0										
37	Devonian (undifferentiated)	RP63-126	28.0	82.8	14.9	1.71	.20	.079		.019	43.7		

Bartholomew County

Quarry No. 3-1 Meshberger Stone Co. Inc. Location: SE¼ NE¼ sec. 6, T. 8 N., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
38	North Vernon	P55-292	.6	92.0	1.93	2.82	.72	2.02		.041	40.5	1.31	.96
39	North Vernon	P55-293	1.8	94.3	1.54	2.66	.40	.510		.040	42.5	.33	.52
40	Jeffersonville	P55-295	.5	95.1	2.39	1.50	.19	.28		.034	43.0	.087	.43
41	Jeffersonville	P55-297	2.0	92.8	3.73	2.35	.10	.50		.033	43.6	.20	.05
42	Jeffersonville	P55-299	2.9	89.9	6.00	3.11	.078	.40		.032	43.8	.085	.02
43	Jeffersonville'	P55-301	.3								2.7	.026	.00
44	Jeffersonville	P55-302	1.0	86.2	8.71	3.91	.17	.38	.040	.034	43.2	.12	.15
45	Jeffersonville	P55-303	1.3	83.0	31.1	4.09	.74	.52	.048	.032	44.7	.18	.08
46	Jeffersonville	P55-304	3.7	55.9	31.8	11.0	.37	.38	.036	.027	40.2	.13	.01
47	Jeffersonville	P55-306	2.0	61.3	36.0	1.64	.092	.39		.034	46.6	.064	.00
48	Jeffersonville	P55-308	2.1	56.8	38.4	3.23	.55	.38	.039	.031	46.2	.14	.02
49	Jeffersonville	P55-310	.4	98.6	.54	.55	.030	.064		.032	43.6	.012	.00
50	Jeffersonville	P55-311	5.4	56.8	36.8	4.68	.68	.48	.037	.030	44.8	.17	.02
51	Jeffersonville	P55-313	1.1	60.2	35.1	2.82	.85	.45	.042	.030	45.6	.12	.02
52	Jeffersonville	P55-315	1.1	64.2	29.4	4.40	.85	.54	.055	.030	44.0	.21	.02
53	Jeffersonville	P55-317	5.8	59.8	33.9	3.38	.65	1.70	.039	.036	44.4	1.28	.01
54	Jeffersonville	P55-320	3.3	59.0	35.5	3.48	.28	1.20		.040	45.6	.26	.00
55	Jeffersonville	P55-322	1.6	92.1	1.32	5.70	.020	.37		.028	42.7	.073	.00
56	Jeffersonville	P55-324	.5	95.3	2.26	1.69	.043	.46		.032	43.9	.053	.00
57	Jeffersonville	P55-325	1.0	73.6	18.1	6.48	.18	1.10		.033	42.6	.54	.00

58	Geneva	P55-327	3.4	55.8	43.0	.57	.053	.40		.034	47.7	.038	.005
59	Geneva	P55-329	20.7	54.2	41.8	2.94	.13	.42		.026	46.8	.10	.004
60	Geneva	P55-332	4.5	52.1	37.4	9.43	.24	.27		.023	41.8	.10	.004
61	Louisville	P55-334	9.5	62.2	32.9	3.36	.45	.53	.038	.029	45.1	.22	.008
62	Louisville	P55-336	5.4	58.7	34.1	5.17	.97	.45	.059	.029	43.4	.15	.019
63	Louisville	P55-338	3.7	60.3	34.7	3.35	.59	.53	.042	.032	44.3	.23	.008

[1] Not fully analyzed.

Blackford County

Quarry No. 5-1 J and K Stone, Inc. Location: SW¼NW¼ sec. 3, T. 24 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
64	Wabash (Huntington Lithofacies)	Mc53-50	8.0	55.8	39.6	2.44	.74	.32	.045	.010	45.7	.370	.003
65	Wabash (Huntington Lithofacies)	Mc53-51	12.0	54.3	43.2	1.51	.24	.18		.010	46.3	.016	.002
66	Wabash (Huntington Lithofacies)	Mc53-53	8.0	53.1	41.3	3.24	.90	.35	.051	.010	45.3	.040	.004

Carroll County

Quarry No. 8-1 Delphi Limestone Co. Location: SE¼NE¼ sec. 3, T. 24 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
67	Wabash (Huntington Lithofacies)	Mc53-17	15.0	59.6	39.4	.38	.11	.27		036	47.0	.009	.004
68	Wabash (Huntington Lithofacies)	Mc53-16	15.0	57.3	41.9	.21	.075	.24		.029	47.5	.012	.004

Quarry No. 9-1 Cass County Stone Co.Location: NW¼SE¼ sec. 28, T. 27 N., R. 1 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
69	Kenneth	Mc57-5	8.9	86.9	.47	12.2	.16	.12	.017	.0087	39.3	.023	.004
70	Kenneth	Mc57-4	6.0	95.2	.65	3.63	.18	.13	.020	.0064	42.7	.023	.002
71	Kenneth	Mc57-3	5.3	92.5	.76	6.10	.30	.15	.026	.0059	40.5	.056	.002
72	Kenneth	Mc57-1	5.3	87.5	3.45	8.16	.20	.14	.020	.014	40.6	.058	.002
73	Kokomo	S 53-29	4.5	53.7	41.4	1.82	.52	1.41	.030	.072	45.1	.006	.013
74	Kokomo	S 53-25	18.7	55.9	41.8	.95	.23	.57		.075	46.5	.008	.007
75	Kokomo	S 53-21	15.9	55.7	40.3	2.17	.66	.58		.041	45.4	.027	.010
76	Kokomo	S 53-18	9.3	55.7	41.6	1.34	.36	.44		.032	46.2	.012	.008

Quarry No. 9-2 France Stone Co. Location: NE¼ sec. 27 T.27 N., R. 2 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
77	North Vernon	Py53-44	10.6	97.7	.89	1.15	.16	.056		.020	43.3	.41	.005
78	North Vernon	Py53-42	5.1	81.5	12.0	5.59	.27	.12		.013	41.4	.033	.003
79	North Vernon	Py53-40	1.8	98.6	.50	.47	.12	.043			43.6	.021	.002
80	North Vernon	Py53-37	7.9	70.8	27.5	.72	.21	.32		.038	45.7	.036	.004
81	Kokomo	Py53-34	17.9	54.0	43.3	1.35	.44	.38		.051	46.4	.053	.007

Quarry No. 9-3 Louisville Cement Co. Location: SE -41SE -I sec. 32, T. 27 N., R. 1 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	Sio 2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem CO_2	S	P_2O_5
82	Kenneth	RF63-115	9.0	95.2	1.00	2.54	.58	.17	.027		42.8	.006	
83	Kenneth	RF63-216	13.0	89.3	.57	9.08	.40	.13	.014		40.0	.014	

Clark County

Quarry No. 10-1 T. J. Atkins and Co., Inc. Location: W¼ Clark Military Grant 10, T. 2 S., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
84	North Vernon	P47-251	10.1	62.9	14.3	16.8	3.65	1.16	.25	.094	34.4	.80	.054
85	Jeffersonville	P47-253	11.8	93.2	2.86	3.19	.086	.21		.046	42.3	.093	.082
86	Jeffersonville	P47-255	10.1	95.2	1.73	2.47	.18	.22	.023	.024	42.7	.12	.006

Quarry No. 10-2 Louisville Cement Co.Location: Clark Military Grants 131, 132, T. 1 S. , R. 7

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
87	North Vernon	P47-228	7.8	53.2	25.5	15.8	3.24	1.22	.13	.044	36.9	.50	.038
88	North Vernon	P47-230	6.1	60.6	19.2	14.1	3.99	.92	.16	.043	35.9	.60	.069
89	North Vernon	P47-231	4.4	83.8	5.0	7.53	1.92	.63	.070	.036	38.8	.33	.42
90	Jeffersonville	P47-233	12.3	91.7	4.27	2.44	.21	.32	.022	.043	42.0	.19	.41
91	Jeffersonville	P47-235	8.6	91.9	3.81	2.66	.64	.46	.031	.022	42.6	.34	.008
92	Jeffersonville	P47-237	11.0	94.7	1.75	2.25	.43	.30	.027	.017	42. 5	.20	.006

Clark County- -Continued

Quarry No. 10-3 Louisville Sand and Gravel, Inc. Location: NE¼ SW¼ Clark Military Grant 17, T. 2 S., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
93	Jeffersonville	Su59-18	10.0	84.5	7.92	5.97	.72	.31		040	41.3	.15	.230
94	Jeffersonville	Su59-17	8.0	87.8	8.03	2.75	.63	.25		.033	41.8	.20	.013
95	Jeffersonville	Su59-16	4.6	91.4	2.20	5.55	.20	.16		.023	41.3	.13	.006
96	Jeffersonville	Su59-15	10.0	80.4	10.60	7.40	.77	.29		.024	40.8	.24	.005
97	Louisville	Su59-14	4.4	76.6	9.80	10.00	1.95	.55	.100	.026	39.5	.24	.006
98	Louisville	Su59-13	12.5	77.1	9.87	9.64	1.62	.65	.092	. 027	40.0	.21	.007
99	Louisville	Su59-12	10.0	91.8	4.82	2.21	.41	.25		.021	42.9	.14	.008
100	Louisville	Su59-11	7.0	86.2	8.55	3.32	1.12	.24		.017	42.3	.12	.008
101	Louisville	Su59- 10	3.2	72.7	10.40	10.80	3.05	.93	.130	.025	39.4	.29	.016
102	Waldron	RF65-105	11.0										
103	Laurel	RF65-106	6.0										
104	Laurel	RF65-107	.2										
105	Laurel	RF65-108	4.0										
106	Laurel	RF 5-109	9.0										

Quarry No. 10-4 Sellersburg Stone Co., Inc. Location W½ Clark Military Grant 90, T. 1 S., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
107	Beechwood	Mc55- 9	3.8	9019	4.15	3.82	.20	.38		.064	42.0	.073	.15
108	Silver Creek	Mc55- 8	.2	55.7	17.4	14.4	2.73	4.65	.13	.078	25.9	1.41	9.20
109	Silver Creek	Mc55- 7	5.5	53.7	29.0	11.5	2.33	2.26	.13	.075	38.8	.29	.042
110	Silver Creek	Mc55- 6	1.0	66.9	15.4	11.4	2.92	1.23	.16	.056	37.5	.33	.042
111	Silver Creek	Mc55- 5	3.0	60.5	19.0	13.50	3.19	1.59	.23	.067	36.7	.51	.047
112	Silver Creek	Mc55- 4	6.1	61.6	17.4	14. 1	3.26	1.39	.21	.060	35.8	.51	.064
113	Speed	Mc55- 3	1.8	82.9	5.08	7.21	1.60	.61	.065	.041	38.0	.33	1.81
114	Jeffersonville	Mc55- 2	5.6	88.4	5.81	2.97	.19	.53		.045	41.5	.36	.48
115	Jeffersonville	Mc55- 1	5.6	92.2	3. 58	3.41	.092	.18		.033	42.0	.034	.11
116	Jeffersonville	P47-218	10.3	92.1	3, 81	2.38	.68	.45	.034	.022	42.1	.31	.009
117	Jeffersonville	P47-222	10.0	95.4	.98	3.24	.083	.14			42.1	.078	.004
118	Wabash?	P47-224	11.3	65.4	15.0	14.5	3.22	.81	.12	.024	36.5	.42	.010
119	Wabash?	P47-226	11.1	66.6	13.9	14.5	3.22	.70	.12	.025	36.5	.25	.008

Decatur County

Quarry No. 16-1 Harris City Stone Co. Location: NE¼ SW¼ sec. 28, T. 10 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
120	Laurel	P48-167	10.2	73.4	20.6	4.27	.74	.39	.034	.030	42.8	.053	.009
121	Laurel	P47-267	4.1	81.5	12.3	4.47	.89	.38	.045	.027	42.3	.082	.011
122	Laurel	P47-265	6.9	84.4	9.60	4.32	.75	.31	.040	.024	42.0	.10	.006
123	Laurel	P48-165	6.7	90.0	4.68	3.51	.78	.44	.034	.026	42.1	.20	.012
124	Laurel	RF63-76	5.8	86.5	7.48	4.07	1.06	.36	.024	.021	42.0		

Decatur County- -Continued

Quarry No. 16-2 New Point Stone Co. Location: SW¼SW¼ sec. 8, T. 10 N., R. 11 E

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
125	Salamonie	P47-83	7.3	67.3	28.4	2.75	.69	.28	.032		44.6	.10	.008
126	Salamonie	P47-81	10.1	59.3	28.2	9.38	1.89	.55	.061		40.9	.21	.019
127	Salamonie	P47-79	9.1	70.8	16.4	8.36	2.57	.76	.090	.034	38.8	.22	.046
128	Brassfield	P47-77	4.5	97.0	1.09	.89	.34	.44	.025	.030	43.1	.11	.081
129	Whitewater	P47-75	3.5	87.5	3.34	5.38	2.04	.63	.083	.029	38.5	.28	.85

Delaware County

Quarry No. 18-1 Irving Bros. Stone and Gravel Co., Inc. Location: SE¼ NE¼ sec. 25, T. 21 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
130	Louisville	RF63779	15.9	54.6	42.2	1.88	.58	.22	.038		46.3	.024	
131	Louisville	RF63-108	2.0	57.3	39.1	1.77	.50	.24	.033		44.1	.15	
132	Louisville	RF63-107	15.2	57.7	39.2	1.78	.51	.24	.043		45.6	.10	
133	Louisville	RF63-106	3.0	54.0	36.4	5.85	1.71	.90	.089	.022	42.4	.27	
134	Louisville	RF63-105	16.6	53.4	43.5	1.88	.40	.27		.020	46.3	.096	

Quarry No. 18-2 J and K Stone, Inc. Location: NE¼SW¼ sec. 23, T. 22 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3		MnO	Chem. CO_2	S	P_2O_5
135	Louisville	Mc53-56	14.7	58.1	37.8	2.72	.52	.30	.044	.012	46.2	.077	.004
136	Louisville	Mc53-57	7.4	57.7	38.0	2.96	.54	.20	.040	.011	45.8	.020	.005
137	Louisville	Mc53-59	6.0	55.4	36.7	4.84	1.51	.49	.047	.011	43.9	.22	.012

Quarry No. 18-3 J and K Stone, Inc. Location: NW¼SE¼ sec. 20, T. 20 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
138	Louisville	F50-306	22.4	55.7	40.8	2.44	.41	.17			45.8	.019	.004
139	Louisville	F50-304	16.8	53.3	38.2	6.44	1.11	.40	.041		43.1	.12	.010

Quarry No. 18-4 Muncie Stone and Lime Co. Location: SW¼NE¼ sec. 20, T. 20 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
140	Louisville	F50-301	30.0	54.5	37.6	6.18	.97	.34	.039		43.8	.068	.011
141	Louisville	F50-335	21.5	53.5	43.6	2.00	.41	.19	.023		46.0	.020	.005

Quarry No. 27-1 Pipe Creek Stone Co. Location: SE¼ sec. 35, T. 25 N., R. 6 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CO_2	S	P_2O_5
142	Liston Creek	F50-262	16.7	66.0	17.80	13.80	1.25	.55	.065	.024	37.8	.111	.02
143	Liston Creek	F50-261	13.8	69.6	15.80	12.00	1.14	.79	.060	.027	38.7	.250	.03
144	Liston Creek	E47- 66	18.3	83.2	4.76	9.73	1.23	.39	.053	.023	37.8	.24	.02
145	Mississinewa	E47- 65	17.5	31.6	23.1	35.2	6.92	1.71	.22	.023	23.3	.12	.05

Hamilton County

Quarry No. 29-1 Stony Creek Stone Co. Location: NE¼ NE¼ sec. 8, T. 18 N., R. 5 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$CaCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
146	Liston Creek	Mc54-17	9.7	35.5	22.9	38.4	1.32	.75	.066	.024	26.1	.013	. 017
147	Liston Creek	Mc54-15	4.9	26.5	13.0	57.9	.88	.63	.047	.018	20.5	.20	.013
148	Liston Creek	Mc54-13	9.7	38.9	21.0	37.3	.98	.72	.059	.021	25.5	.20	.016
149	Liston Creek	Mc54-11	11.5	49.4	17.0	30.7	1.19	.60	.069	.022	29.9	.18	.019

Howard County

Quarry No. 34-1 Yeoman Stone Co. Location: NW¼ NE¼ sec. 3, T. 23 N., R. 3 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$CaCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
150	Kokomo	D50-22	21.0	55.5	29.2	11.0	2.24	.93	.088	.023	39.4	.40	.037
151	Kokomo	D50-20	1.5	83.8	7.90	5.86	1.31	.60	.061		40.9	.36	.020

Huntington County

Quarry No. 35-1 Erie Stone Co. Location: SW¼ SE¼ sec. 12, T. 28 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$CaCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
152	Liston Creek (Huntington Lithofacies)	Mc53-42	12.0	37.2	25.6	29.0	5.43	1.38	.45	.016	28.6	.44	.039
153	Liston Creek (Huntington Lithofacies)	Mc53-43	12.0	48.9	32.8	13.2	3.10	.82	.17	.013	37.4	.37	.018
154	Mississinewa (Huntington Lithofacies)	Mc53-44	13.0	53.7	44.2	1.18	.25	.20		.0091	46.6	.017	.005
155	Mississinewa (Huntington Lithofacies)	Mc53-45	13.0	57.9	41.2	.32	.13	.19		.0087	47.0	.020	.008
156	Mississinewa (Huntington Lithofacies)	Mc53-46	8.0	54.1	45.4	.09	.065	.16		.0086	47.4	.013	.002
157	Mississinewa (Huntington Lithofacies)	Mc53-47	9.7	59.4	39.7	.42	.18	.19		.0083	46.8	.012	.003
158	Mississinewa (Huntington Lithofacies)	RF63-111	26.5	53.1	45.2	.81	.26	.15			46.4	.024	

Quarry No. 35-2 Heller Stone Co., Inc. Location: SE¼ sec. 11, T. 26 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
159	Mississinewa(Huntington Lithofacies)	L61-180	7.6	57.0	42.2	.29	.12	.20		.016	47.0	.015	
160	Mississinewa (Huntington Lithofacies)	L61-178	12.4	56.5	42.4	.45	.19	.21			46.6	.008	
161	Mississinewa (Huntington Lithofacies)	L61-177	.6	58.2	41.0	.30	.14	.12			47.5	.016	
162	Mississinewa (Huntington Lithofacies)	L61-176	11.9	54.6	43.5	.85	.31	.25			46.1	.032	
163	Louisville?	L61-174	18.5	50.2	41.6	5.27	1.01	.78	.097		42.7	.210	

Jasper County

Quarry No. 37-1 W. C. Babcock Construction Co., Inc. Location: SE¼ SE¼ sec. 30, T. 29 N., R. 6 W.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
164	Devonian (undifferentiated)	Py53-14	3.3	52.7	41.3	3.31	.39	1.73		.066	44.8	.16	.030
165	Devonian (undifferentiated)	Py53-13	2.4	53.0	42.3	2.55	.56	1.09		.058	45.0	.31	.020
166	Devonian (undifferentiated)	Py53-12	7.8	50.8	41.2	4.43	.92	1.52	.043	.061	44.1	.31	.020
167	Devonian (undifferentiated)	Py53-11	1.9	53.1	44.6	.53	.064	1.20		.069	47.0	.10	.005
168	Salina	Py53- 9	.9	48.8	40.5	7.08	1.29	1.18	.046	.068	42.4	.38	.13
169	Salina	Py53- 7	6.1	50.6	37.1	7.65	1.59	1.91	.048	.061	42.6	.37	.037
170	Salina	Py53- 5	3.3	83.9	10.1	4.34	.56	.65		.027	42.4	.95	.010

Jasper County- -Continued

Quarry No. 37-2 Northern Indiana Stone, Inc. Location: SE¼ NE¼. sec. 27, T. 29 N., R. 6 W.

Analysis No.	Stratigraphic unit	Sample No.	Thickness Ft.	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
171	Devonian (undifferentiated)	RF63-120	6.8									.086	
172	Devonian (undifferentiated)	RF63-117	5.0	55.9	36.2	2.19	.69	4.21	.032	.26	44.4	1.35	
173	Devonian (undifferentiated)	RF63-118	10.0	54.2	38.5	2.33	.68	3.42	.031	.32	44.8	.81	
174	Devonian (undifferentiated)	RF63-119	7.0	52.9	36.0	4.99	1.44	3.22	.096	.30	42.4	.67	
			5.0[1]										
175	Silurian (undifferentiated)	RF63-121	5.0	45.6	31.4	17.6	1.78	2.41	.072	.25	36.7	.68	

[1] Not Sampled

Jay County

Quarry No. 38-1 Rockledge Products, Inc. Location: NW¼ NW¼ sec. 30, T. 23 N., R. 14 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness Ft.	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
175	Salamonie	F50-293	22.8	55.2	44.2	.22	.079	.089			47.3	.011	.002
177	Salamonie	F50-291	11.8	55.2	44.6	.05	.050	.079			47.2	.015	.002
178	Salamonie	P50-289	10.6	55.0	44.8	.05	.050	.087			47.8	.011	.002

Jefferson County

Quarry No. 39-1 Standard Materials Div. Location: SE¼ SE¼ sec. 16, T. 3 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
179	North Vernon	Py50-132	2.2	70.5	21.8	4.00	.83	1.71	.054	.099	42.2	1.32	.066
180	North Vernon	Py50-130	2.0	70.6	24.8	2.66	.47	.81	.047	.092	44.2	0.30	.042
181	North Vernon	Py50-128	10.0	77.0	16.6	3.77	.79	.63	.057	.077	42.3	0.34	.160
	North Vernon		5.8[1]										
	Jeffersonville		12.0[1]										
182	Jeffersonville	RF64-201	10.3	91.9	15.2	2.10	.16	.36		.033	43.4	.18	
183	Jeffersonville	RF63- 6	3.2	82.9	15.2	1.30	.099	.16		.046	44.5		
184	Geneva	RF63- 5	15.8	53.6	43.6	1.46	.35	.42		.079	46.3		
185	Geneva	RF63- 4	4.2	58.9	36.1	3.30	.79	.43		.057	44.5		
186	Laurel	RF63- 3	5.2	64.0	30.8	3.29	.73	.61	.020	.028	44.0		
187	Laurel	RF63- 2	8.6	59.9	33.7	4.47	.72	.60	.036	.051	44.2		
188	Laurel	RF63- 1	5.7	59.8	32.3	5.57	1.14	.58	.058	.037	42.8		

[1]Not sampled.

Jennings County

Quarry No. 40-1 Berry Materials Corp. Location: SW¼ SE¼ sec. 2 7, T. 7 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
189	North Vernon	P47-143	3.4	97.8	.50	.76	.12	.47		.10	42.2	.17	.65
190	North Vernon	P47-141	.2	71.0	13.0	8.00	2.50	1.20	.10	.084	35.8	.94	2.00
191	North Vernon	P50- 3	3.0	83.0	10.8	3.32	1.10	1.19	.050	.12	40.5	.90	.59
192	Jeffersonville	P50- 5	5.9	86.0	9.68	3.60	.085	.18		.078	42.4	.004	.076
193	Jeffersonville	P50- 7	4.4	64.8	32.0	1.88	.53	.34	.026	.044	45.2	.12	.016
194	Jeffersonville	P47-131	11.8	64.0	32.2	2.40	.53	.44	.030	.036	45.0	.15	.015
195	Jeffersonville	P47-135	5.6	65.0	33.4	.65	.088	.37		.053	46.5	.060	.005
190	Geneva	AP53- 1	3.1	56.0	41.1	1.88	.25	.25		.049	46.5	.062	.004
197	Geneva	AP53- 2	6.3	54.3	40.0	4.81	.024	.31		.060	45.4	.047	.002
I98	Geneva	AP53- 3	1.6	56.4	41.5	1.16	.15	.29		.047	46.8	.077	.005
199	Geneva	AP53- 4	.8	56.9	41.4	.77	.047	.36		.047	46.9	.13	.002

Madison County

Quarry No. 48-1 Standard Materials Div. Location: NW¼NE¼ sec. 28, T. 19 N., R. 6 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
200	Wabash (Huntington Lithofacies)	Py53- 98	15.3	54.7	33.0	8.09	2.27	.84	.11	.025	40.9	.24	.008
201	Wabash (Huntington Lithofacies)	Py53- 96	13.3	58.9	36.5	2.44	.95	.63	.049	.026	44.5	.061	.004
202	Wabash (Huntington Lithotactes)	Py53- 94	12.9	57.9	39.7	1.75	.67	.38	.038	.025	45.8	.026	.004
203	Wabash (Huntington Lithofacies)	Py53- 91	6.2	61.2	32.9	3.62	1.17	.53	.061	.023	44.0	.13	.005
204	Wabash (Huntington Lithofacies)	Py53- 89	5.1	61.9	34.6	1.75	.69	.53	.040	.024	45.4	.074	.002
205	Wabash (Huntington Lithofacies)	Py53- 87	11.1	64.4	31.6	2.30	.52	.55	.039	.024	44.6	.094	.003
206	Wabash (Huntington Lithofacies)	Py53- 85	10.9	44.8	23.9	22.9	4.70	1.43	.34	.023	29.9	.30	.032
207	Louisville	RF63-102	18.4	66.6	20.0	9.51	2.14	.57	.13	.048	39.0		
208	Louisville	RF63-103	18.4	55.3	21.9	16.9	3.00	.63	.16	.11	35.6		
209	Louisville	RF65-111	8.0										
210	Louisville	RF65-112	7.0										

Pulaski County

Quarry No. 66-1 Western Indiana Aggregates Corp. Location: NE¼ SW¼ sec. 16, T. 29 N., R. 4 W.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
211	Wabash (Huntington Lithofacies)	PSO-258	**37.6**	54.1	44.8	.46	.17	.26			46.6	.05	

Randolph County

Quarry No. 68-1 H and R Stone Co. Location: NE¼ SE¼ sec. 12, T. 21 N., R. 13 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
212	Salamonie,	F50-298	15.0	55.8	42.2	1.04	.31	.34			45.2	.013	.009
213	Salamonie	F50-295	15.5	55.6	42.6	1.20	.22	.19			46.7	.008	.005

Quarry No. 68-2 Portland Stone Co. Location: SW¼ NW¼ sec. 11, T. 21 N., R. 12 E.

No.	Stratigraphic unit	Sample No.	(ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	CO_2	S	P_2O_5
214	Salamonie,	Py53-83	13.5	54.5	43.7	1.11	.12	.13		.016	46.7	.012	.004
215	Salamonie	Py53-81	4.3	53.9	43.0	1.96	.36	.20		.015	45.8	.021	.005
216	Salamonie,	RF63-90	12.0	58.4	39.6	1.00	.19	.17		.013	47.0		

Ripley County

Quarry No. 69-1 Berry Materials Corp. Location: SW¼ SE¼ sec. 23, T. 7 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
217	Laurel	Mc55-28	5.1								39.1	.020	.015
218	Laurel	Mc55-26	6.9	57.4	34.0	6.03	.93	.54	.063	.029	44.7	.11	.020
219	Laurel	Mc55-24	5.0	57.3	36.9	4.01	.56	.62	.040	.034	45.5	.12	.007
220	Laurel	Mc55-22	5.9	60.9	33.9	3.41	.62	.55	.049	.030	45.9	.12	.012
221	Osgood	RF63-70	2.5	56.6	31.2	7.77	2.27	1.61	.10	.096	41.7		

Quarry No. 69-2 New Point Stone Co. Location: NE¼ NE¼ sec. 29, T. 9 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No .	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
222	Laurel	P47-63	6.7	85.8	9.84	2.83	.71	.25	.037	.021	42.6	.044	.008
223	Laurel	P47-61	11.5	81.2	8.80	7.92	1.22	.37	.047	.020	40.2	.037	.011

Quarry No. 69-3 South Eastern Materials Corp. Location: SW¼ SW¼ sec. 22, T. 8 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No .	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
224	Laurel	Py53-107	2.4	80.3	16.5	2.0	.19	.40			42.8	.071	.005
225	Laurel	P47- 67	10.4	84.6	10.3	3.40	.82	.32	.029	.022	42.4	.11	.008
226	Laurel	P47- 65	9.9	88.3	5.50	4.39	1.03	.26	.031	.018	41.8	.043	.011

Rush County

Quarry No. 70-1 McCorkle Stone Co. Location: SW¼ sec. 8, T. 12 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No .	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
227	Geneva	P47-127	8.7	61.5	37.2	.76	.15	.13			47.0	.012	.002
228	Geneva	P47-129	.8	55.8	42.6	1.00	.18	.13			46.5	.036	.002
229	Geneva	P47-131	6.3	58.8	39.5	.88	.14	.13			46.6	.039	.003
230	Geneva	P47-133	7.9	57.0	40.4	1.55	.27	.18	.015		46.3	.068	.004

Rush County- -Continued

Quarry No. 70-2 Rush County Stone Co., Inc. Location: SE¼ sec. 18, T. 12 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (it)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
231	Geneva	P47-163	7.7	59.1	39.0	.96	.15	.21	.019	.022	46.4	.016	.003
232	Geneva	P47-161	7.3	59.1	39.2	.91	.14	.17			46.5	.032	.004
233	Geneva (quarry floor)	P47-159	8.0	58.1	39.0	2.03	.17	.24		.039	46.1	.075	.005
234	Waldron	G59- 12	3.4	37.4	23.7	25.20	7.77	1.70	.220	.019	28.3	.820	.043
235	Waldron	G59- 10	1.7	43.5	28.2	18.90	4.95	1.78	.120	.020	33.6	1.270	.027
236	Laurel	G59- 8	5.5	64.7	28.5	4.46	.87	.48		.024	43.6	.290	.015
237	Laurel	G59- 6	4.8	47.0	24.4	26.60	.75	.58	.079	.025	32.9	.220	.015
238	Laurel	G59- 4	4.7	57.5	28.3	11.20	1.28	.59	.092	.029	40.0	.240	.015
239	Laurel	G59- 2	2.7	49.3	27.6	21.40	.69	.42		.028	36.2	.180	.014

Scott County

Quarry No. 72-1 Scott County Stone Co. Location: NE¼NW¼ sec. 20, T. 3 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
240	North Vernon	P47-105	4.9	81.5	14.2	2.53	.72	.52		.050	43.4	.27	.055
241	North Vernon	P47-107	.8	48.7	31.0	12.0	4.77	1.40	.19	.044	36.3	1.06	.18
242	North Vernon	P47-109	13.0	93.4	9.51	4.84	1.05	.67	.043	.088	41.2	.49	.31
243	Jeffersonville	P47-111	8.0	92.2	6.32	1.12	.068	.16		.042	43.7	.058	.096
244	Jeffersonville	P47-113	11.1	80.8	13.6	3.90	.65	.36	.033	.030	42.2	.20	.017
245	Jeffersonville	P47-115	11.1	92.9	4.40	1.83	.15	.20		.020	43.0	.097	.004
246	Jeffersonville	P47-117	9.8	85.2	13.2	.81	.14	.16		.019	44.3	.033	.002
247	Geneva?	Mc55- 12	2.8	64.4	26.1	5.96	1.87	.58	.064	.016	41.8	.24	.008
248	Geneva?	RF63- 10	6.6	57.5	33.1	5.88	1.58	.84	.085	.021	42.4		
	Louisville[1]	RF63- 11	2.9										
	Louisville[1]	RF63- 12	.2										
249	Louisville	RF63- 13	6.0	52.5	32.0	9.29	2.47	1.59	.10	.045	40.2		
	Waldron		7.5[2]										
250	Laurel	RF63- 14	9.8	76.2	18.5	3.37	.81	.51	.021	.023	43.1		
251	Laurel	RF63- 15	3.2										
252	Laurel	RF63- 16	8.5	71.4	22.4	4.20	.91	.51	.038	.024	42.8		

[1]Not analyzed.
[2]Not sampled.

Shelby County

Quarry No. 73-1 Cave Stone Co., Inc. Location: NE¼ NW¼ sec. 32, T. 11 N., R. 7 E. 4

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
253	Jeffersonville	F50-237	13.1	53.8	40.7	4.02	.56	.33		.028	45.2	.024	.019
254	Jeffersonville	P51- 25	7.4	56.4	39.1	2.94	.72	.32	.020	.022	45.1	.051	.014
255	Jeffersonville	P51- 23	11.1	62.2	36.5	.65	.20	.14		.014	46.1	.10	.004
256	Geneva	Py53-100	5.7	63. 3	35.7	.12	.057	.28		.041	45.9	.097	.003
257	Geneva	P54- 17	10.8	60.7	36.1	2.36	.13	.14		.025	46.2	.076	.004
258	Geneva	P54- 18	.1	14.8	9.89	72.0	2.02	.26	.041	.0063	12.4	.086	.003
259	Louisville	P54- 19	7.7	67.0	28.1	3.68	.36	.30	.034	.023	45.8	.28	.008
260	Louisville	P54- 20	5.0	66.8	25.7	5.28	1.20	.36	.066	.019	42.4	.23	.022
281	Louisville	P54- 21	5.8	72.6	22.2	3.30	.88	.49	.053	.023	43.0	.25	.012
262	Waldron	P54- 22	4.0	59.5	14.30	16.70	6.900	1.31	.330	.018	31.0	.65	.042
263	Laurel	P54- 23	.5	78.5	15.7	3.99	.91	.34	.049	.026	42.7	.13	.017

Quarry No. 73-2 St. Paul Quarries, Inc. Location: Center NE¼ sec. 9, T. 11 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
264	Laurel	P47-157	8.0	87.8	8.04	3.26	.48	.14	.024	.026	42.7	.053	.008
265	Laurel	P47-155	8.3	86.0	9.68	3.04	.53	.17	.026	.026	42.6	.078	.008
266	Laurel	P47-153	11.3	84.5	10.5	3.41	.80	.24	.034	.028	42.4	.094	.008
267	Osgood?	RF63- 89	10.5	84.9	5.50	6.36	1.46	.70	.043	.040	40.1	.45	

Quarry No. 73-3 Standard Materials Div. Location: NE¼ sec. 6, T. 11 N., R. 6 E.*

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
268	Geneva	RF63-86	7.0	59.9	37.3	1.71	.29	.22		.068	45.1		
269	Louisville	RF63-85	7.2	60.3	29.2	6.88	1.90	.67	.058	.024	41.8		
270	Waldron	RF63-84	6.4										
271	Laurel	RF63-88	1.7	57.2	26.4	11.7	2.30	1.24	.081	.044	39.2		
272	Laurel	RF63-83	3.1	86.2	8.17	4.21	.74	.18	.018	.026	42.5		
273	Laurel	RF63-87	4.5	83.5	12.8	2.56	.52	.16	.015	.016	43.9		
274	Laurel	RF63-82	3.3	62.0	22.4	13.4	.99	.59	.047	.054	39.1		
275	Laurel	RF63-81	5.5										
276	Laurel	RF63-80	8.5	80.9	11.8	5.46	.92	.33	.030	.039	42.0		

*Abandoned 1966

Switzerland County

Quarry No. 78-1 Tri-County Stone Co. Location: NE¼ NW¼ sec. 9, T. 5 N., R. 12 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
277	Osgood	S52- 79	1.6	48.9	28.0	14.3	4.60	2.35	.23	.036	34.9	.026	.060
278	Brassfield	S52- 81	11.6	76.5	19.4	1.68	.67	1.09	.032	.034	43.1	.13	.079
279	Whitewater	S52- 83	4.2	76.4	6.88	11.5	3.32	1.15	.17	.024	36.0	.35	.099
280	Whitewater	S52- 85	10.0	82.7	4.96	8.19	2.27	.79	.099	.020	38.5	.20	.085
281	Whitewater	Py53-126	4.3	80.5	5.51	9.34	2.51	.98	.14	.024	37.5	.40	.072

Wabash County

Quarry No. 85-1 Mill Creek Stone and Gravel Co. Location Poqua Godfroy Reserve 11, T. 27 N., R. 5 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
282	Liston Creek (Huntington Lithofacies)	RF63-112	35.0	92.4	2.92	2.88	1.01	5	.025	.010	42.5	.096	

Wayne County

Quarry No. 89-1 DeBolt Concrete Co., Inc. Location NE¼ sec. 1, T. 14 N., R. 1 W.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
283	Salamonie	RF64-DB3	3.6	61.87	35.75	0.94	0.49	0.77				.097	.043
284	Salamonfe	RF64-DB4	2.3	65.25	29.13	1.39	3.06	0.92				.090	.059
285	Salamonie	RF64-DB5	3.2	63.29	31.60	1.78	2.55	0.77				.068	.055
286	Salamonie	RF64-DB6	2.5	61.32	28.69	3.38	4.87	0.63				.129	.057
287	Salamonie	RF04-DB7	2.7	52.97	22.65	13.35	9.10	0.98				.124	.059
288	Salamonie	RF64-DB8	9.8	64.35	30.13	3.66	0.42	1.20				.231	.057
289	Salamonie	RF64-DB9	3.5	77.22	16.98	3.14	1.71	0.69				.213	.046
290	Salamonie	RF64-DB10	16.5	68.07	14.86	12.76	2.75	0.69				.218	.059
291	Salamonie	RF64-DB11	4.6	56.83	20.15	12.26	7.84	1.52				.334	.075
292	Brassfield	RF64-DB12	6.5	73.83	10.44	7.32	5.28	1.63				.473	.185
293	Brassfield	RF64-DB13	3.0	81.28	3.73	7.57	4.72	1.78				.435	.286

Wells County

Quarry No. 90-1 Erie Stone Co. Location: SE¼ NW¼ sec. 28, T. 27 N., R. 12 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
294	Mississinewa (Huntington Lithofacies)	Mc53- 48	14.0	42.0	32.1	22.5	1.69	.59	.084	.011	35.5	.19	.007
295	Mississinewa (Huntington Lithofacies)	Mc53- 49	19.0	54.9	44.0	.54	.32	.18			46.9	.016	.002
296	Mississinewa (Huntington Lithofacies)	F50-270	8.0	51.2	39.1	6.41	1.52	.59	.064		42.7	.24	.005

White County

Quarry No. 91-1 Monon Crushed Stone Co., Inc. Location: SE¼ NE¼ sec 28, T. 28 N., R. 4 W.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
297	Wabash (Huntington Lithofacies)	Py53-21	2.7	55.5	42.9	.62	.17	.28		.032	46.5	.019	.004
298	Wabash (Huntington Lithofacies)	Py53-19	17.3	55.1	43.2	.70	.19	.34		.026	46.6	.11	.004
299	Wabash (Huntington Lithofacies)	Py53-17	26.0	53.4	40.0	3.98	1.01	.52	.044	.022	44.4	.16	.006
	Wabash (Huntington Lithofacies)		5.0[1]										
300	Wabash (Huntington Lithofacies)	Py53-15	21.9	55.6	42.9	.56	.16	.27		.018	47.0	.078	.002

[1]Not sampled.

APPENDIX 3
Spectrochemical Analyses of Channel Samples Collected in Inactive Quarries and Outcrops

Bartholomew County

Outcrop: SW¼SW¼ sec. 2, T. 9 N., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
1	Louisville	F50-308	5.7	64.5	27.8	5.98	.77	.51			42.7	.033	.010

Outcrop: NW¼ NW¼ sec. 12, T. 9 N., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	CO_2	S	P_2O_5
2	Geneva	D50-42	7.5	58.1	40.0	1.44	.13	.19			45.9	.021	.014
3	Geneva	D50-40	3.4	59.6	36.1	3.33	.20	.27		.022	44.8	.022	.005
4	Laurel	D50-38	10.0	56.9	22.2	19.0	.86	.36	.059	.025	36.6	.048	.011

Clark County

Outcrop: Center of Clark Military Grant 145, T. 1 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
5	Jeffersonville	D50-78	7.7	97.3	1.88	.49	.040	.086		.042	43.6	.010	.008
6	Geneva	D50-76	4.9	58.2	39.0	1.42	.18	.75		.043	45.7	.031	.006

Outcrop: NE¼ SW¼sec- 30 4 T. 2 N. R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
7	Jeffersonville	D50-90	7.6	92.2	6.46	1.03	.044	.078		.037	43.8	.004	.004
8	Geneva	D50-88	5.5	63.8	33.7	1.27	.18	.44		.039	46.2	.020	.007
9	Geneva	D50-86	6.0	63.8	33.8	1.44	.15	.31			45.9	.054	.007
10	Louisville	D50-84	17.5	60.5	33.40	3.76	1.180	.59	.053	.023	44.0	.078	.008

Center of Clark Military Grant 157, T. I N., R. 8 E.
Abandoned quarry:

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
11	Speed	D50-56	7.2	85.9	4.18	7.34	1.36	.64	.064	.050	39.6	.060	.25

Abandoned quarry: Middle of NE line of Clark Military Grant 190, T. 1 N., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
12	Beechwood	D50-8	.5	88.0	7.21	3.38	.28	.46		.11	42.6	.12	.095
13	Beechwood	D50-6	5.0	97.0	.71	1.70	.12	.25		.14	42.9	.046	.014
14	Silver Creek	D50-5	.5	63.0	15.0	15.7	3.50	1.51	.30	.16	34.5	.040	.12
15	Silver Creek	D50-3	9.0	57.5	23.6	13.9	2.75	1.12	.18	.14	37.3	.42	.051
16	Speed	D50-1	3.8	87.3	3.01	7.35	1.27	.55	.046	.055	40.1	.29	.098

Clark County- -Continued

Abandoned quarry: West corner of Clark Military Grant 180. T. 1 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
17	Jeffersonville	D50-53	5.5	93.3	4.04	2.10	.14	.19		.049	43.2	.012	.084
18	Jeffersonville	D50-51	12.5	82.0	11.6	4.74	.58	.44		.037	42.3	.114	.029
19	Jeffersonville	D50-49	18.0	93.0	4.68	1.83	.12	.13		.024	43.2	.046	.004
20	Louisville	D50-47	13.5	85.6	10.2	2.51	.79	.39			42.8	.15	.004

Outcrop: SE side of Clark Military Grant 121, T. 1 S., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
21	Louisville	D50-70	20.0	55.4	40.8	2.06	.44	.70		.025	45.6	.040	.015
22	Louisville	D50-69	14.0	56.0	32.6	7.38	1.94	1.01	.069		42.1	.080	.012
23	Laurel	D50-67	27.0	55.2	36.4	5.04	1.30	1.44	.058	.027	43.6	.077	.016
24	04good	D50-65	5.8	52.3	33.4	8.86	2.64	1.68	.094	.032	40.4	.16	.063
25	Osgood	D50-63	10.3	47.4	28.7	16.3	4.56	1.72	.20	.029	35.3	.029	.061

Abandoned quarry: Center of SW½ of Clark Military Grant 81, T. 1 S., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
26	Laurel	D50-73	17.7	51.4	37.1	8.88	1.28	.88		.027	41.9	.062	.016
27	Laurel	D50-71	5.1	53.6	40.1	3.96	.85	.95			44.8	.34	.010

Decatur County

Abandoned quarry: NW¼ SE¼ sec. 11, T. 10 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
28	Laurel	P47-97	2.8	62.5	31.0	4.52	.63	.46	.036	.040	43.7	.10	.013
29	Laurel	P47-95	10.7	50.8	23.6	24.2	.44	.36	.032	.018	34.4	.12	.011
30	Laurel	P47-93	9.6	45.1	23.1	30.4	.51	.33	.041	.018	33.4	.13	.011
31	Laurel	P47-91	9.2	71.2	23.20	4.06	.66	.41	.040	.036	43.4	.14	.009
32	Laurel	P47-89	9.0	79.3	15.2	3.80	.69	.40	.044	.029	42.8	.13	.011
33	Laurel	P47-87	13.0	87.2	7.58	3.60	.73	.35	.037	.026	42.3	.107	.009
34	Osgood	P47-85	6.2	73.8	10.10	11.30	2.75	1.01	.096	.030	37.1	.419	.037

Abandoned quarry: SE¼ SE¼ sec. 2, T.11 N., R.8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
	Laurel		6.8[1]										
35	Laurel	RF63-77	16.8	77.3	16.0	4.83	.97	.36	.031	.044	42.5		
36	Osgood	RF63-78	4.8	79.0	14.3	4.79	1.02	.36	.040	.040	42.0		

[1]Not sampled.

Abandoned quarry: SW¼ NW¼ sec. 35, T. 10 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
37	Laurel	P47-211	8.0	79.4	15.8	3.32	.63	.31	.037	.029	43.2	.004	.012

Decatur County- -Continued

Abandoned quarry: NE¼ NW¼ sec. 12, T. 11 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
38	Louisville	F50-249	3.0	89.9	6.80	2.07	.29	.43		.028	43.4	.12	.008
39	Waldron	Py53- 3	3.1	84.1	9.67	4.46	.57	.66		.027	42.4	.25	.008
40	Laurel	Py53- 1	7.3	83.9	12.5	2.49	.37	.24		.029	43.3	.067	.007
41	Laurel	P47-149	10.7	89.8	6.67	2.32	.44	.26	.016	.024	42.5	.060	.006
42	Laurel	P47-147	7.8	81.9	13.0	4.08	.33	.22	.015	.027	42.7	.051	.006

Abandoned quarry: SE¼ NE¼ sec. 20, T. 9 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
43	Laurel	P47-103	7.9	81.0	12.8	4.44	.84	.33	.043	.024	42.1	.046	.008
44	Laurel	P47-101	6.3	85.3	5.35	7.98	.63	.22	.034	.022	40.2	.047	.005
45	Laurel	P47- 99	3.4	92.0	4.28	2.48	.78	.21	.034	.027	42.4	.050	.008
46	Laurel	Py53-104	8.0	93.4	3.36	2.17	.39	.17	.035	.019	42.8	.033	.007
47	Osgood	Py53-102	1.0	80.8	10.1	6.13	1.44	.44	.068	.024	40.6	.027	.031

Fayette County

Abandoned quarry: SE¼ NW¼ sec. 30, T. 14 N., R. 12 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
48	Laurel	F50-313	9.8	52.1	38.9	7.16	.73	.59		.019	43.1	.040	.011

Franklin County

Abandoned quarry: NW¼ NW¼ sec. 26, T.12 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
49	Osgood	F50-253	6.9	55.6	34.2	6.32	1.66	1.11	.061	.036	42.0	.075	.13
50	Brassfield	F50-251	7.1	80.1	16.2	1.36	.73	1.01		.036	43.3	.32	.12

Howard County

Abandoned quarry: SE¼ NW¼ sec. 17, T. 23 N., R. 4 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
51	Kenneth	E47-83	4.1	94.2	1.04	3.10	.94	.22	.035		40.9	.31	.019
52	Kokomo	E47-82	12.4	82.0	12.8	3.44	.90	.26	.032	.018	41.9	.13	.025

Abandoned quarry: SW¼ SW¼ sec. 36, T. 24 N., R. 3 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
53	Kokomo	E47-72	23.2	68.8	26.7	2.93	.71	.41	.033		44.0	.117	.014

Jefferson County

Outcrop: NW¼ SW¼ sec. 11, T. 2 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
54	Jeffersonville	D50-96	1.5	61.4	37.3	.43	.11	.54		.068	46.1	.024	.016
55	Geneva	D50-94	10.5	55.6	39.2	3.82	.13	.70		.091	44.9	.012	.008
56	Louisville	D50-92	8.5	59.2	33.9	4.51	1.12	.79		.033	44.1	.027	.009

Outcrop: Center E½ sec. 13, T. 4 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
57	Speed	D50-139	21.0	93.6	3.10	1.95	.53	.46		.084	42.5	.046	.14
58	Jeffersonville	D50-137	10.0	83.4	12.0	3.59	.13	.20		.068	42.8	.013	.090
59	Jeffersonville	D50-135	8.5	84.4	12.8	2.04	.035	.14		.061	43.5	.007	.042
60	Jeffersonville	D50-133	10.4	92.2	7.30	.15	.040	.10		.044	44.4	.012	.004
61	Geneva	D50-131	18.2	55.7	41.80	1.20	.21	.47		.035	46.2	.013	.008
62	Laurel	D50-129	23.8	61.0	32.8	4.57	.65	.55		.026	43.7	.063	.014

Outcrop: N½ sec. 29, T. 4 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	Ti02	MnO	Chem. CO_2	S	P_2O_5
63	Louisville	D50-114	7.0	60.3	37.6	6.82	.13	.62		.040	46.7	.010	.004
	Waldron		1.2[1]										
64	Laurel	D50-112	55.0	52.8	40.1	4.67	1.01	.78	.052	.031	44.4	.062	.015
65	Osgood	D50-110	4.5	51.9	31.3	10.8	3.14	1.64	.11	.030	39.0	.22	.042
66	Osgood	D50-108	.5	50.0	29.4	13.6	4.02	1.75	.18	.033	37.3	.20	.049
67	Brassfield	D50-106	1.5	54.5	32.8	7.55	2.31	1.62	.10	.035	41.2	.13	.064

[1]Not sampled.

Outcrop: NE¼ SE¼ sec. 32, T. 4 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	Ti02	MnO	Chem. CO_2	S	P_2O_5
68	Brassfield	D50-104	2.0	93.6	3.05	1.98	.77	.42		.024	42.5	.038	.064

Outcrop: N½ NE¼ sec. 31, T. 3 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	$A1_2O_3$	Fe_2O_3	Ti02	MnO	Chem. CO_2	S	P_2O_5
69	Osgood	D50-102	5.5	55.1	36.2	5.68	1.43	1.03	.057	.026	43.1	.023	.069
70	Osgood	D50-100	1.2	51.2	34.2	9.45	2.66	1.34	.11	.035	40.5	.021	.023
71	Brassfield	D50- 98	4.0	62.3	31.8	2.34	1.01	2.02		.052	44.3	.068	.11

Jefferson County- -Continued

Abandoned quarry: SW¼ NE¼ sec. 16, T. 3 N., R. 9 E.

Analysis No.	Statigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
72	Beechwood	Py50-132	2.2	70.5	21.8	4.00	.83	1.71	.054	.099	42.2	1.32	.056
73	Beechwood	Py50-130	2.0	70.6	24.8	2.66	.47	.81	.047	.092	44.2	.30	.042
74	Speed	Py50-128	10.5	77.0	16.6	3.77	.79	.63	.057	.077	42.3	.34	.16

Abandoned quarry: SW¼ SE¼ sec. 26, T. 5 N., R. 9 E.

Analysis No.	Statigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
75	Jeffersonville	P47-50	6.0	82. 4	10.3	6.58	.035	.072		.038	41.5	.002	.023
76	Jeffersonville	P47-48	3.2	88.6	8.68	2.05	.083	.18		.037	43.5	.131	.005
77	Geneva	P47-46	15.8	58.3	38.6	2.17	.16	.26			46.2	.021	.008
78	Laurel	P47-44	7.8	52. 7	29.0	16.8	.64	.26	.036	.030	38.4	.058	.011
79	Laurel	P47-42	10.3	61.5	32.8	3.76	.79	.58	.032		44.3	.31	.012
80	Laurel	P47-40	10.4	75.5	19.9	3.13	.77	.19	.032	.032	43.7	.094	.006

Abandoned quarry: NE¼ NW¼ sec. 21, T. 4 N., R. 8 E.

Analysis No.	Statigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
81	Speed?	D50-36	10.3	89.3	6.53	2.39	.76	.44		.091	42.4	.21	.16
82	Silver Creek	D50-34	0.7	72.9	16.8	6.84	1.79	1.10	.081	.084	40.2	.67	.081
83	Speed	DSO-32	4.2	84.5	8.85	4.14	1.19	.71	.059	.065	40.9	.26	.40

Jennings County

Outcrop: NE¼ NW¼ sec. 28, T. 8 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
84	Geneva	D50-44	17.5	56.6	39.3	3.11	.38	.34		.030	44.9	.017	.007

Outcrop: Center E½ sec. 29, T. 8 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
85	Jeffersonville	D50-147	2. 8	.9	.08	99.0	.21	.090	.018	.002	.2	006	001

Abandoned quarry N½ SW¼ sec. T. 6 N. R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
86	Geneva	D50-145	14.5	56.6	41.6	1.14	.13	.38		.044	46.6	.013	.007
87	Louisville	D50-143	9.4	62.5	31.8	3.57	.97	.73			43.8	.099	.007
	Waldron		3.5[1]										
88	Laurel	D50-141	18.7	65.8	21.4	10.4	1.26	.66			40.4	.077	.015

1 Not sampled.

Outcrop: SW¼ SW¼ sec. 34, T. 7 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
89	Geneva	D50-118	32.0	55.4	36.8	6.89	.18	.31		.050	43.8	.021	.007

Jennings County- -Continued

Outcrop: NE¼ NE¼ sec. 4, T. 6 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
90	Jeffersonville	D50-116	6.1	24.8	.20	74.7	.060	.10			11.1	.001	.005

Abandoned quarry: N½ SW¼ sec. 11, T. 6 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
91	Speed	S52-89	3.0	90.6	5.00	2.54	.56	.67	.025	.067	42.5	.33	.29
92	Jeffersonville	S53-94	6.5	83.2	14.1	1.79	.12	.21		.062	43.4	.029	.20
93	Jeffersonville	S53-95	3.6	61.7	32.8	3.96	.56	.35		.048	43.8	.14	.026
94	Jeffersonville	S53-96	6.3	62.5	34.4	1.98	.39	.24		.051	45.3	.068	.015
95	Jeffersonville	S53-97	1.8	68.5	29.3	1.21	.15	.21		.053	45.8	.088	.010
96	Jeffersonville	S52-100	3.0	93.6	5.78	.34	.041	.076		.035	44.2	.001	.002

Abandoned quarry: NE¼ SE¼ sec. 2 1, T. 5 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
97	Beechwood	Mc55-20	4.6	94.9	1.48	1.82	.66	.53	.037	.062	42.2	.15	.14
98	Beechwood	Mc55-18	2.8	86.5	8.04	2.79	1.04	.52	.051	.061	41.8	.37	.43
99	Silver Creek	Mc55-16	1.4	82.3	10.0	4.45	1.53	.68	.068	.068	41.3	.28	.19
100	Speed	Mc55-14	2.7	83.5	8.52	3.51	1.48	.87	.065	.055	39.8	.50	.98

Abandoned quarry and stream section: NW ¼NW¼ sec. 16, T. 7 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
101	Laurel	P48-162	8.1	42.4	22.9	33.2	.53	.35	.040	.051	31.7	.037	.009
102	Laurel	P48-160	9.6	65.9	28.6	3.88	.66	.46	.042	.042	44.3	.077	.010
103	Laurel	P48-158	10.8	81.0	12.7	4.80	.71	.26	.038	.025	42.4	.069	.007
104	Laurel	P48-156	8.3	81.8	9.68	6.44	1.14	.39	.051	.023	40.7	.16	.014
105	Laurel	RF63-72	7.6	83.8	8.93	5.37	1.00	.36	.031	.020	41.2		

Madison County

Abandoned quarry: SW¼ SE¼ sec. 25, T. 18 N., R. 6 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
106	Liston Creek	Mc53-23	12.0	64.0	24.8	8.70	.83	.52	.056	.034	41.6	.048	.012
107	Liston Creek	Mc53-24	5.5	72.0	13.5	11.9	1.07	.42	.062	.020	38.8	.044	.012
108	Liston Creek	Mc53-22	3.5	69.0	.45	29.4	.33	.27	.043	.0076	30.3	.067	.004
109	Liston Creek	Mc53-21	6.5	48.3	20.4	27.8	1.72	.64	.097	.028	31.1	.092	.022
110	Liston Creek	E47-407	32.3	46.4	11.2	39.2	1.57	.52	.085	.017	26.6	.081	.015

Ripley County

Outcrop: SW¼ NE¼ sec. 21, T. 6 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
111	Osgood	D50-125	3.9	75.6	14.0	6.01	1.93	1.29	.072	.043	40.0	.54	.065
112	Osgood	D50-123	11.3	53.4	24.4	14.2	4.26	2.52	.20	.043	35.7	.48	.060
113	Brassfield	D50-121	3.7	95.7	1.54	1.36	.47	.77			42.5	.14	.081

Abandoned quarry: SW¼ SE¼ sec. 14, T. 8 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
114	Osgood	D50-149	19.8	86.6	1.21	8.09	2.02	.98	.11	.027	38.8	.047	.057

Outcrop: NE¼ NW¼ sec. 31, T. 7 N., R. 12 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
115	Brassfield	D50-127	4.6	93.4	3.66	1.24	.64	.85		.022	42.9	.11	.066

Abandoned quarry: SE¼ SW¼ sec. 19, T. 6 N., R. 11 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
116	Laurel	Py53-138	4.3	59.5	34.8	3.87	.70	.56	.065	.033	44.5	.052	.010
117	Laurel	Py53-136	8.4	70.3	23.8	3.73	.63	.91	.062	.036	43.4	.54	.011
118	Laurel	Py53-134	4.4	85.5	9.92	3.11	.62	.27	.063	.020	43.0	.037	.005

Abandoned quarry: SW¼ SW¼ sec. 3, T. 7 N., R. 10 E. 4

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
119	Laurel	Py53-109	3.9	89.0	7.52	2.35	.26	.36	.037	.023	42.0	.058	.006
120	Laurel	P47-209	12.6	90.0	4.50	3.78	.84	.31	.042	.024	41.9	.062	.009
121	Laurel	P47-207	8.9	84.8	6.10	6.27	1.36	.38	.050	.022	39.9	.051	.026

Rush County

Abandoned quarry: NE¼ SW¼ sec. 13, T. 12 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
122	Geneva	F50-248	4.7	62. 2	35.6	1.08	.18	.36		036	45.9	.015	.007
	Waldron		.9[1]										
123	Laurel	F50-244	5.6	64.9	30.0	3.54	.52	.49		.031	44.4	.17	.011
124	Laurel	F50-242	3.0	61.6	28.6	8.16	.58	.42	.041	.025	42.3	.071	.010

[1] Not sampled

Scott County

Outcrop: NE¼ SE¼ sec. 14, T. 2 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
125	Beechwood	D50-14	2.0	92.8	1.04	1.50	.23	4.08		.12	40.5	3.04	.070
126	Silver Creek	D50-12	7.5	67.7	16.8	11.0	1.92	1.34	.12	.11	38.3	.64	.10
127	Speed	D50-10	5.5	91.8	2.83	3.97	.70	.51	.032	.065	41.7	.35	.21

Scott County- -Continued

Outcrop: NE¼ NE¼ sec. 25, T. 3 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
128	Beechwood	D50-18	3.7	77.6	18.0	2.37	.38	1.00		.15	43.7	.18	.049
129	Silver Creek	D50-16	2.4	48.4	30.8	14.7	3.12	1.78	.18	.12	37.1	.74	.078

Shelby County

Abandoned quarry: SW¼ NW¼ sec. 22, T. 11 N., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
130	Geneva	P48-172	5.1	58.5	40.6	.33	.10	.23		.044	46.8	.029	.005
131	Geneva	P48-170	8.0	54.4	41.80	2.86	.12	.15		.028	45.7	.028	.004

Abandoned quarry: SW¼ SE¼ sec. 29, T 11 N., R 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
132	Jeffersonville	P47-26	8.1	50.7	34.4	13.6	.46	.33	.030	.031	40.1	.031	.017
133	Jeffersonville	P47-24	8.2	55.6	41.5	1.81	.38	.19	.029	.035	46.4	.014	.014
134	Jeffersonville	P47-22	1.9	52.4	38.5	6.79	1.20	.52	.050	.033	43.4	.17	.026

Wabash County

Abandoned quarry: SW¼ SE¼, sec. 9. T. 27 N., R. 6 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
135	Mississinewa	E47-24	7.8	30.6	18.6	39.4	6.53	1.76	.97	.024	22.8	.098	.058
136	Mississinewa	E47-23	16.0	29.4	17.8	41.0	6.91	1.82	1.12	.022	21.5	.081	.064

Abandoned quarry: NE¼ NE¼ sec. 3, T. 27 N., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
137	Mississinewa	Mc53-20	10.0	29.3	22.6	36.6	7.26	1.93	.29	.050	20.8	.028	.061
138	Mississinewa	Mc53-19	12.0	33.6	23.6	32.0	6.64	1.85	.28	.040	23.3	.085	.056
139	Mississinewa	Mc53-18	12.0	33.9	21.7	32.7	7.46	1.77	.36	.041	23.4	.048	.060

Wayne County

Outcrop: SW¼ NW¼ sec. 25, T. 14 N., R. I W.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
140	Brassfield	F50-320	4.6	95.0	2.81	.78	.36	.72		.022	43.0	.14	.082

Abandoned quarry: NE¼ SW¼ sec. 11, T. 13 N., R. I W.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
141	Salamonie	P47-264	1.9	51.1	33.8	10.2	2.97	.87	.065		40.6	.11	.11
142	Brassfield	P47-262	7.3	84.0	12.2	1.63	.79	.76	.030	.028	42.9	.82	.049
143	Brassfield	P47-260	2.5	89.8	7.22	1.12	.52	.76	.024	.026	43.0	.90	.059

APPENDIX 4*
Spectrochemical Analyses of Cores

Allen County
Core 142 Quarry floor: NW¼NE¼ sec. 29, T. 30 N., R. 12 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
1	Louisville	P57-544	5.9	52.4	37.4	8.70	.70	.27	.046	.012	42.4	.13	.002
2	Louisville	P57-546	2.1	43.8	32.3	22.7	.46	.25	.034	.010	36.8	.11	.001
3	Louisville	P57-548	3.0	53.1	36.9	7.97	1.08	.35	.064	.011	42.4	.18	.002
4	Louisville	P57-550	5.9	51.9	38.0	9.28	.40	.19	.028	.011	42.7	.092	.001
5	Louisville	P57-552	5.6	52.2	38.5	8.56	.35	.12	.027	.012	42.8	.049	.001
6	Louisville	P57-554	3.0	54.8	40.0	3.90	.59	.16	.034	.012	45.6	.064	.003
7	Louisville	P57-556	22.1	54.3	40.2	4.84	.29	.16	.024	.012	44.9	.067	.002
8	Louisville	P57-558	14.8	54.9	42.3	2.04	.33	.16		.015	46.6	.073	.002
9	Louisville	P57-560	28.9	55.1	43.8	.70	.099	.088		.015	46.9	.029	.002
10	Louisville	P57-562	9.6	53.6	44.6	1.27	.16	.18		.016	47.1	.040	.004
11	Waldron	P57-564	1.5	52.2	39.1	5.27	1.92	.49	.042	.014	43.3	.27	.017
12	Waldron	P57-566	23.2	52.3	37.4	5.85	2.23	.67	.073	.016	43.2	.31	.015
13	Salamonie	P57-568	8.1	52.7	39.0	7.48	.43	.19	.030	.019	44.5	.093	.011
14	Salamonie	P57-570	6.8	54.6	44.0	1.02	.034	.082		.021	46.8	.019	.002
15	Salamonie	P57-572	12.4	55.6	43.9	.14	.029	.067		.020	47.5	.015	.002
16	Salamonie	P57-574	9.0	54.6	42.6	2.06	.38	.11	.031	.016	46.2	.024	.002
17	Salamonie	P57-576	1.1	55.0	43.6	.90	.16	.082		.016	46.9	.020	.001
18	Salamorde	P57-578	13.4	55.0	44.3	.35	.077	.088		.016	47.0	.15	.002

*Compiled in 1963-64.

Bartholomew County Core 128 Quarry floor: NE¼ sec. 6, T. 8 N., R. 7 E. 4

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
19	Waldron	P55-342	1.0	57.4	24.7	12.6	2.95	1.13	.15	.025	37.4	.71	.019
20	Waldron	P55-344	2.2	48.1	11.5	27.0	7.35	1.57	.47	.019	24.2	.88	.062
21	Waldron	P55-345	3.3	51.6	14.6	21.9	6.19	1.47	.28	.022	28.6	.89	.043
22	Laurel	P55-347	.8	49.7	29.5	13.6	3.66	1.28	.14	.026	36.1	.62	.029
23	Laurel	P55-349	2.9	75.2	20.0	3.16	.55	.48	.037	.030	44.1	.27	.011
24	Laurel	P55-351	4.5	82.0	14.3	1.90	.33	.90	.033	.027	43.9	.75	.004
25	Laurel	P55-353	12.9	73.2	19.6	4.67	.94	.48	.065	.036	42.9	.13	.008
26	Laurel	P55-355	4.0	80.2	11.6	5.47	1.16	.35	.080	.032	41.6	.084	.007
27	Laurel	P55-357	7.3	83.4	9.92	4.17	1.10	.29	.067	.035	42.3	.088	.016
28	Laurel	P55-359	1.0	81.5	9.61	5.70	1.66	.45	.079	.037	41.9	.11	.047
29	Laurel?	P55-361	.6	60.9	19.4	11.9	4.26	1.25	.18	.036	36.2	.45	.034
30	Laurel?	P55-363	1.2	89.7	5.52	2.29	.82	1.03	.048	.037	42.3	.74	.010
31	Osgood?	P55-365	4.4	76.4	11.9	7.86	2.11	.63	.099	.035	40.3	.12	.066
32	Osgood?	P55-367	2.3	65.6	22.6	7.74	1.93	.89	.10	.040	41.2	.13	.034
33	Osgood	P55-369	.1	21.6	13.7	48.2	9.15	2.34	.86	.035	13.4	.91	.029
34	Osgood	P55-370	2.1	75.7	13.9	6.97	1.58	.66	.11	.038	40.9	.085	.061
35	Osgood	P55-372	1.2	80.4	3.59	12.6	1.78	.45	.12	.022	37.0	.084	.031
36	Osgood	P55-374	.2	20.4	.66	77.6	.54	.26	.047	.009	10.1	.043	.002
37	Osgood	P55-375	2.8	68.3	8.61	16.5	3.37	.90	.20	.044	39.0	.048	.036
38	Osgood	P55-377	.2	5.4	.90	92.5	.41	.21	.048		4.0	.022	.004

Bartholomew County- -Continued
Core 128--Continued

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
39	Brassfield	P55-378	6.7	74.7	5.06	16.9	1.68	.55	.10	.025	35.9	.12	.026
40	Brassfield	P55-380	3.5	87.5	3.83	5.51	1.48	.58	.086	.033	40.3	.18	.042

Delaware County

Core 269 Quarry floor: SE¼NW¼ sec. 25, T. 21 N., R. 10 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
41	Louisville	RF64-340	.7	58.5	40.1	.76	.17	.29		.011	46.7	.036	
42	Waldron	RF64-341	7.4	49.0	34.2	10.7	2.54	1.46	.12	.011	39.0	.91	
43	Salamonie	RF64-342	2.9	55.9	40.6	2.30	.36	.36		.012	45.8	.044	
44	Salamonte	RF64-343	.9	53.5	37.5	6.02	1.34	.58	.10	.011	43.3	.33	
45	Salamonie	RF64-344	5.6	54.1	38.5	5.98	.54	.23	.068	.011	43.9	.019	
46	Salamonie	RF64-345	6.6	47.8	39.3	11.7	.53	.17		.012	41.3	.016	
47	Salamonie	RF64-346	7.4	54.1	43.7	1.71	.15	.16		.012	46.0	.016	
48	Salamonie	RF64-347	7.0	55.4	43.7	.40	.15	.14		.011	47.2	.003	
49	Salamonie	RF64-348	4.0	53.8	44.0	1.16	.33	.18			46.7	.023	
50	Salamonie	RF64-349	6.0	55.5	41.0	2.29	.41	.32			45.6	.028	
51	Salamonie	RF64-350	11.8	43.7	32.8	21.4	.89	.60	.081	.012	36.2	.15	
52	Salamonie	RF64-351	18.2	44.5	34.7	17.2	1.58	.93	.12	.016	37.2	.45	
53	Salamonie	RF64-352	1.6	53.4	41.5	3.34	.49	.56	.16	.017	45.3	.11	
54	Salamorde	RF64-353	6.9	53.5	39.2	5.25	.60	.90		.016	44.1	.57	
55	Salamonie	RF64-354	5.0	44.3	33.7	20.0	.84	.52	.082	.015	37.3	.28	
56	Salamonle,	RF64-355	9.9	49.6	38.5	10.3	.57	.50	.064	.017	41.9	.18	
57	Salamonie	RF64-356	8.3	53.2	39.3	5.06	1.06	.84	.073	.017	43.5	.48	
58	Brasafteld?	RF64-357	4.7	43.2	33.4	15.1	4.50	1.69	.20	.014	36.1	1.12	
59	Brassfield?	RF64-358	5.5	51.8	38.7	5.69	1.36	1.38	.081	.022	42.9	.35	
60	Brassfield?	RF64-359	8.1	52.9	43.4	1.91	.45	.82		.025	45.4	.27	

Hamilton County

Core 90: NE¼NE¼ sec. 3, T. 18 N., R. 5 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
61	Wabash	P52-51	2.7	55.7	39.6	3.09	.49	.63	.022	.028	44.8	.011	.008
62	Wabash	P52-52	3.8	50.8	34.6	11.5	1.21	.75	.047	.024	39.7	.021	.011
63	Wabash	P52-53	8.4	35.1	18.9	42.9	1.31	.73	.063	.018	24.7	.12	.018
64	Wabash	P52-54	22.1	32.7	16.9	48.1	.72	.64	.046	.017	23.7	.16	.013
65	Wabash	P52-55	9.2	61.6	15.3	20.3	1.04	.71	.049	.020	34.3	.26	.011
66	Wabash	P52-56	9.7	42.2	24.2	26.2	4.22	1.38	.25	.027	29.4	.22	.054
67	Wabash	P52-57	3.3	68.1	12.0	14.6	2.50	1.17	.12	.022	35.0	.55	.015
68	Wabash	P52-58	6.4	51.7	18.1	22.6	4.29	1.50	.24	.030	30.7	.10	.027
69	Wabash	P52-59	5.6	66.9	11.5	15.5	3.30	1.07	.17	.029	33.9	.051	.019

Core 88: sec. 14, T. 18 N. , R. 5 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
70	Wabash	P52-60	10.0	27.9	18.6	51.3	.96	.67	.056	.018	22.4	.008	78
71	Wabash	P52-61	26.3	40.9	22.9	33.3	1.09	.70	.049	.022	29.0	.15	.013
72	Wabash	P52-62	2.0	52.2	33.4	10.5	1.48	1.30	.068	.026	39.1	.58	.016
73	Wabash	P52-63	9.2	40.1	23.3	28.8	4.33	1.25	.27	.022	28.4	.19	.055

Core 89: NW¼ NW¼ sec. 8, T. 18 N., R. 5 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
74	Wabash	P52-64	10.0	34.6	24.2	39.1	.80	.64	.045	.016	27.9	.070	.014
75	Wabash	P52-65	14.6	32.2	22.9	42.8	.91	.62	.052	.014	25.6	.23	.013
76	Wabash	P52-66	10.0	35.3	25.1	37.8	.65	.61	.034	.017	28.1	.010	.013
77	Wabash	P52-67	6.2	27.3	20.2	49.1	1.46	.86	.068	.017	23.2	.22	.013
78	Wabash	P52-68	4.6	50.5	33.2	14.0	.87	.82	.045	.025	39.1	.019	.010
79	Wabash	P52-69	2.8	50.0	36.2	9.60	1.18	1.39	.049	.029	40.1	.36	.011
80	Wabash	P52-70	5.2	37.9	24.9	29.7	4.43	1.21	.29	.022	27.2	.17	.060

Core 109: NE¼ SE¼ sec. 28, T. 15 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
	Overburden		50.2										
81	Devonian . (undifferentiated)	P54-24	15.9	55.1	41.9	2.20	.11	.21		.023	46.1	.10	.005
82	Devonian (undifferentiated)	P54-25	4.2	38.6	30.3	30.3	.12	.20		.018	33.7	.13	002
83	Mississinewa	P54-26	8.5	46.4	36.0	12.5	3.06	.76	.18	.019	37.4	.41	.019
84	Louisville	P54-27	1.3	56.0	30.2	9.85	1.73	.59	.088	.023	40.8	.41	.011
85	Louisville	P54-28	.7	58.3	27.6	10.5	1.90	.52	.099	.022	39.4	.24	.028
86	Louisville	P54-29	14.6	80.6	14.1	3.91	.50	.28	.053	.019	43.8	.22	.008
87	Louisville	P54-30	5.1	66.4	25.6	5.54	1.32	.51	.066	.017	42.3	.33	.019
88	Louisville	P54-31	5.3	68.8	24.8	4.06	.69	1.13	.056	.018	42.6	.41	.008
89	Waldron	P54-32	1.5	58.7	9.69	22.9	5.40	2.05	.23	.012	29.2	1.65	.021
90	Waldron	P54-33	12.4	73.5	3.60	15.4	4.34	.97	.18	.0066	30.2	.42	.038
91	Waldron	P54-34	.8	37.1	11.4	36.8	1.07	1.75	.25	.013	21.8	.75	.040
92	Salamonie	P54-35	1.1	62.5	21.9	12.6	.53	1.47	.051	.019	38.8	1.23	.020
93	Salamonie	P54-36	20.9	51.3	18.2	29.2	.30	.41	.035	.011	31.9	.21	.012
94	Salamonie	P54-37	15.5	75.0	20.4	3.45	.34	.31	.043	.016	43.0	.17	.009
95	Salamonie	P54-38	7.5	75.8	19.0	3.71	.57	.31	.061	.019	42.9	.15	.010
96	Salamonie	P54-39	4.6	84.5	11.3	2.79	.45	.37	.049	.031	42.7	27	.011
97	Salamonie	P54-40	2.4	74.9	13.0	8.42	1.78	.81	.094	.031	39.2	.37	.054
98	Salamonie	P54-41	3.0	77.3	15.8	4.68	.80	.81	.06	.034	42.5	.35	.067
99	Salamonie	P54-42	4.2	52.8	4.81	29.6	8.88	1.85	.034	.017	24.5	.34	.15

100	Salammie	P54-43	3.0	57.1	8.85	24.1	5.94	1.63	.52	.021	27.9	.42	.088
101	Brassfield	P54-44	3.7	90.8	2.04	4.86	1.05	.62	.071	.025	40.7	20	.12
102	Brassfield	P54-45	3.3	96.2	2.39	.41	.15	.60		.032	43.4	.10	.080
103	Brassfield	P54-46	2.6	85.4	5.12	6.10	1.08	1.30		.029	41.6	.59	.042

Henry County

Core 275: SW¼SW¼ sec. 12. T. 16 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
104	Salamonie	RF64-331	9.0										
105	Salamonie	RF64-330	2.8	55.4	39.9	3.45	.35	.30		.017	45.6	.10	
106	Salamonie	RF64-329	4.2	44.5	29.7	24.8	.22	.29		.014	34.0	.094	
107	Salamonie	RF64-328	4.7	45.3	28.5	24.8	.48	.45		.014	34.6	.10	
108	Salamome	RF64-327	2.7	55.1	37.8	5.08	.85	.67	.065	.020	44.2	.23	
109	Salarnonie	RF64-326	3.4	55.2	37.6	5.31	.76	.55	.077	.021	44.4	.19	
110	Salamonue	RF64-325	7.3	54.4	38.9	4.81	.76	.61	.065	.025	44.7	.25	
111	Salamonie	RF64-324	2.6	53.1	39.1	5.39	1.04	.69	.095	.026	43.8	.38	
112	Salamonie	RF64-323	2.5	54.1	36.9	6.73	1.02	.58	.096	.025	43.7	.25	
113	Salamonie	RF64-322	5.8	55.8	37.1	5.13	.91	.47	.082	.023	44.0	.21	
114	Salamonie	RF64-321	.2										
115	Salamonie	RF64-320	4.9	55.2	38.8	4.25	.60	.47	.070	.029	45.2	.12	
116	Salamonie	RF64-319	2.7	51.4	36.2	9.85	1.01	.91	.070	.028	42.0	.46	
117	Salamonie	RF64-318	4.8	53.9	34.6	7.49	1.68	1.15	.090	.038	42.6	.36	
118	Salamome	RF64-317	.3										
119	Salamonie	RF64-316	.3	50.1	33.9	9.60	2.72	1.47	.13	.038	40.3	.68	
120	Salamonie	RF64-315	.2										
121	Salamonie	RF64-314	1.8	42.1	26.8	19.5	6.09	2.16	.27	.032	32.4	1.07	
122	Salamonie	RF64-313	.1	59.0	30.3	6.12	1.81	1.70	.10	.036	41.8	.69	
123	Brassfield	RF64-312	1.3										

124	Brassfield	RF64-311	3.3	60.1	28.8	6.79	1.82	1.31	.099	.033	40.9	.63	
125	Brassfield	RF64-310	1.4	84.2	11.8	2.19	.63	.71		.028	43.2	.34	
126	Brassfield	RF64-309	1.3										
127	Brassfield	RF64-308	2.3										
128	Brassfield	RF64-307	.2										

Core 277 Quarry floor: sec. 12, T. 28 N., R. 9 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
129	Wabash (Huntington Lithofacies)	RF64-206	7.5	54.2	40.9	3.16	.86	.31	.062	.010	45.0	.025	
130	Wabash (Huntington Lithofacies)	RF64-207	6.5	56.0	41.0	1.71	.62	.20	.049	.010	46.4	.040	
	Wabash (Huntington Lithofacies)		1.01										
131	Wabash (Huntington Lithofacies)	RF64-208	7.5	53.6	44.0	1.19	.47	.18	.044	.010	46.7	.009	
132	Wabash (Huntington Lithofacies)	RF64-209	7.5	55.2	42.6	1.00	.45	.21	.045	.010	46.8	.003	
133	Wabash (Huntington Lithotacies)	RF64-210	7.5	54.8	41.8	1.81	.70	.32	.058	.009	45.3	.010	
134	Wabash (Huntington Lithofacies)	RF64-211	7.0	53.9	43.6	1.40	.41	.15	.037	.011	46.5	.011	
135	Louisville	RF64-212	7.5	53.7	39.8	4.73	.84	.41	.063	.010	43.9	.23	
135	Louisville	RF64-213	10.3	48.8	40.4	8.75	1.03	.44	.081	.011	41.5	.21	
137	Louisville	RF64-214	8.3	51.9	41.6	4.80	.81	.31	.068	.011	44.4	.13	
	Louisville		2.21										
139	Louisville	RF64-215	5.7	54.5	38.2	5.16	1.23	.31	.099	.011	43.6	.09	
139	Louisville	RF64-216	10.0	55.5	42.8	.75	.23	.13		.011	46.3	.01	
140	Louisville	RF64-217	5.5	55.2	43.8	.59	.15	.12		.012	46.6	.013	
141	Louisville	RF64-218	4.0	55.0	41.9	2.36	.20	.11		.012	46.5	.005	
142	Louisville	RF64-219	7.3	54.2	41.1	3.54	.43	.19		.011	45.2	.047	
143	Louisville	RF64-220	7.7	56.0	39.4	2.88	.83	.36	.043	.011	44.7	.14	
144	Louisville	RF64-221	4.0	48.5	38.7	11.6	.46	.27		.010	41.5	.096	
145	Louisville	RF64-222	5.0	53.7	43.0	2.42	.18	.18		.011	45.9	.018	
146	Waldron	RF64-223	10.0	50.3	40.7	5.15	1.19	.79	.074	.012	42.6	.39	

147	Waldron	RF64-224	3.2	49.1	41.8	5.38	1.7	.86	.076	.014	42.4	.43
148	Salamonie	RF64-225	6.8	53.7	43.3	2.04	.35	.16		.012	47.4	.034
149	Salamonie	RF64-226	15.3	55.1	44.0	.44	.046	.16		.016	46.5	.002
150	Salamonie	RF64-227	6.5	55.6	40.3	2.94	.42	.24		.012	45.9	.013
151	Salamonie	RF64-228	7.3	51.1	45.0	2.87	.34	.19	.037	.012	45.7	.017
152	Salamonie	RF64-229	9.9	51.4	40.4	7.03	.44	.24		.011	42.8	.012
153	Salamcmie	RF64-230	6.5	54.9	43.3	1.04	.17	.14	.019	.011	46.5	.008
154	Salamonie	RP64-231	8.1	55.7	43.5	.33	.086	.15		.010	47.4	.008
155	Salamonie	RF64-232	7.9	55.5	44.0	.16	.036	.13		.011	47.2	.007

[1] Not sampled.

Huntington County- -Continued

Core 203: SE¼SE¼ sec. 11, T. 26 N., R. 10 E

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	MgC03	SiO_2	$A1_2O_3$	Fe_2O_3	Ti02	MnO	Chem. CO_2	S	P_2O_5
156	Wabash (Huntington Lithofacies)	L61-180	7.6	57.0	42.2	.29	.12	.20		.016	47.0	.015	
157	Wabash (Huntington Lithofacies)	L61-178	12.4	56.5	42.4	.45	.19	.21			46.6	.008	
158	Wabash (Huntington Lithofacies)	L61-177	.6	58.2	41.0	.30	.14	.12			47.5	.016	
159	Wabash (Huntington Lithofacies)	L61-176	11.9	54.6	43.5	.85	.31	.25			46.1	.032	
160	Louisville	L61-174	18.5	50.2	41.6	5.27	1.01	.78	.097		42.7	.21	
161	Louisville	L61-172	.2								8.2	.32	
162	Louisville	L61-170	9.8	51.4	38.5	7.29	1.11	.63	.096		42.2	.23	
163	Louisville	L61-168	2.5	52.0	40.0	5.04	1.21	.62	.096	.018	43.6	.20	
164	Louisville	L61-166	23.9	56.7	41.7	.89	.27	.27			46.3	.019	
165	Louisville	L61-164	13.6	55.1	44.1	.28	.13	.13		.019	47.3	.007	
166	Louisville	L61-162	6.6	54.4	44.3	.54	.29	.21			46.9	.056	
167	Louisville	L61-160	11.2	55.8	43.4	.29	.068	.18		.018	46.2	.023	
168	Waldron	L61-158	17.2	53.7	38.2	4.35	2.11	1.11		.024	42.4	.37	
169	Salamome	L61-156	4.0	55.6	39.3	3.50	.71	.35		.016	44.6	.12	
170	Salarnome	L61-154	1.0	53.6	40.2	4.48	.91	.29		.019	43.4	.009	
171	Salamonie	L61-152	2.5	57.0	42.3	.33	.071	.13		.016	47.2	.012	
172	Salamonie (oolitic zone)	L61-150	11.0	57.2	42.2	.22	.047	.18		.022	47.4	.007	
173	Salamonie	L61-148	2.5	56.0	42.5	1.01	.15	.14		.014	46.2	.012	
174	Salamonie	L61-146	6.2	56.8	42.6	.16	.064	.14			47.6	.023	
175	Salamonie	L61-144	7.8	55.2	44.1	.14	.045	.33			47.4	.011	

176	Salamonie	L61-142	10.0	56.2	43.2	.20	.080	.15			47.5	.013	
177	Salamonie	L61-140	10.0	55.4	44.0	.17	.057	.14		.016	47.2	.007	
178	Salamonie	L61-138	.2	56.0	43.3	.24	.098	.13			46.7	.012	
179	Salamonie	L61-136	5.6	56.3	43.0	.24	.093	.13			47.3	.009	
180	Salamonie	L61-134	2.2	56.8	42.5	.29	.13	.15			45.3	.021	

Core 164, taken at active quarry floor: NW¼ NW¼ sec. 30, T. 23 N., R. 14 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	Ti O_2	MnO	Chem. CO_2	S	PO_2O_5
181	Salamonie	L60-181	2.0	55.4	44.1	.16	.051	.12		.0089	47.3	.013	
182	Salamonie	L60-180	1.7	55.0	44.5	.14	.040	.12		.012	47.6	.012	
183	Salamonie	L60-179	.5	54.5	45.0	.13	.040	.10		.010	47.1	.005	
184	Salamonie	L60-178	3.8	54.5	45.0	.14	.047	.11		.011	47.5	.017	
185	Salamonie	L60-177	.5	54.3	45.1	.24	.092	.11		.011	47.3	.036	
186	Salamonie	L60-176	15.3	55.5	44.0	.16	.037	.11		.0089	47.2	.012	
187	Salamonie	L60-175	1.2	55.1	43.6	.40	.18	.21		.013	47.0	.017	
188	Salamonie	L60-174	1.4	53.5	44.4	.91	.52	.19	.044	.011	46.1	.010	
189	Salamonie	L60-173	.5	52.0	41.1	4.13	1.17	.51	.073	.010	43.7	.25	
190	Salamonie	L60-172	.4	52.4	41.7	3.72	.85	.30	.063	.010	44.3	.070	
191	Sala-onie	L60-171	2.1	53.4	41.1	3.10	.99	.38	.053	.013	44.4	.065	
192	Salamonie	L60-170	1.2	54.0	40.5	3.13	.92	.42	.070	.0076	44.4	.17	
193	Salamonie	L60-169	.8	52.4	42.5	2.93	.75	.39	.052	.013	45.1	.15	
194	Salamonie	L60-168	.5	53.1	42.2	2.63	.71	.35	.049	.014	45.3	.10	
195	Salamome	L60-167	7.1	53.9	40.4	3.39	.81	.41	.070	.015	44.5	.15	
196	Salamonie	L60-166	3.0	54.3	40.8	2.80	.59	.44	.054	.015	45.0	.18	
197	Salamonie	L60-165	.2	52.6	40.4	4.39	1.06	.56	.079	.016	43.0	.20	
198	Salamonie	L60-164	7.4	54.2	40.7	2.79	.82	.43	.060	.016	44.3	.15	
199	Salamonie	L60-163	1.4	56.4	36.7	4.31	1.04	.48	.068	.016	44.1	.15	
200	Salamome	L60-162	.7	57.9	36.5	3.59	.71	.31	.047	.017	45.1	.093	

201	Salamonie	L60-161	7.5	50.3	41.5	5.53	1.07	.49	.070	.015	44.2	.15
202	Salamonie	L60-160	2.2	53.7	44.3	.84	.24	.31	.027	.013	46.4	.082
203	Salamonie	L60-159	.7	53.6	44.5	.85	.27	.23	.031	.013	46.2	.052
204	Salamonie	L60-158	4.1	54.1	43.9	.80	.23	.42	.028	.015	46.3	.082
205	Salamonie	L60-157	1.3	51.1	41.4	5.11	.60	.67	.041	.018	43.9	.35
206	Brassfield	L60-156	1.4	46.5	36.7	13.2	1.76	.70	.10	.019	39.6	.060
207	Brassfield	L60-155	1.9	53.3	41.1	3.15	.06	.51	.064	.022	43.7	.17
208	Brassfield	L60-154	8.9	51.2	41.0	6.20	.57	.43	.045	.020	43.4	.14
209	Brassfield	L60-153	.1	53.8	42.7	2.36	.40	.20	.027	.024	45.9	.052
210	Brassfield	L60-152	.2								1. 1	.044
211	Brassfield	L60-151	.8	54.0	38.9	5.77	.46	.40	.039	.026	43.6	.096
212	Brassfield	L60-150	1.2	52.5	43.0	2.89	.46	.57	.043	.025	45.8	.22

Jennings County

Core 131: NW¼ SW¼NE¼ sec. 4, T. 5 N., R. 8 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chern. CO_2	S	P_2O_5
213	North Vernon	RF63-32	4.5	93.7	1.69	2.08	.51	1.42	.006	.064	41.0	.88	
214	North Vernon	RF63-34	2.8	94.0	2.84	1.93	.47	.23	.006	.060	42.7	.061	
215	North Vernon	RF63-35	2.7	88.2	5.48	3.12	1.36	.74	.018	.079	40.9	.56	
216	North Vernon	RF63-36	.3	82.4	6.00	5.15	3.07	1.26	.051	.10	39.8	.025	
217	North Vernon	RF63-37	4.5	84.8	7.51	4.00	1.87	.71	.029	.11	41.1	.51	
218	Jeffersonville	RF63-38	1.5	88.9	8.76	1.70	.15	.17		.095	43.8	.014	
219	Jeffersonville	RF63-40	3.1	87.8	8.88	2.85	.14	.15		.11	43.4	.044	
220	Jeffersonville	RF63-41	1.6	84.6	10.4	3.68	.41	.32		.12	43.0	.13	
221	Jeffersonville	RF63-42	3.4	64.9	31.0	2.50	.62	.28		.21	44.9	.042	
222	Jeffersonville	RF63-43	5.1	85.2	13.8	.43	.046	.20		.025	44.7	.025	
223	Jeffersonville	RF63-44	3.0	82.7	16.4	.25	.098	.24		.14	44.9	.029	
224	Jeffersonville	RF63-45	8.3	90.7	8.29	.59	.16	.075		.031	44.2	.022	
225	Geneva?	RF63-46	9.2	88.2	10.2	1.02	.14	.14		.026	44.2	.082	
226	Geneva?	RF63-48	3.4	75.5	19.1	4.35	.30	.27		.026	43.3	.15	
227	Louisville	RF63-50	8.0	83.3	11.7	3.59	.69	.21	.010	.016	43.0	.11	
228	Louisville	RF63-51	8.5	71.9	21.4	4.92	.82	.42	.028	.028	41.6	.14	
229	Louisville	RF63-52	3.6	66.6	20.1	8.65	2.47	1.04	.088	.022	41.1	.36	
230	Waldron	RF63-53	7.7									.71	
231	Waldron	RF63-54	4.2									.78	
232	Salamonie	RF63-56	2.3	84.3	10.3	3.89	.68	.34	.021	.017	42. 3	.11	

	Salamonie	RF63-57	6.4									.22
234	Salamonie	RF63-58	25.9	84.9	9.34	4.08	.96	.29	.031	.022	41.9	.055
235	Salamonie	RF63-59	2.1	72.3	12.8	10.5	2.32	.90	.094	.031	38.4	.14
236	Salamome	RF63-60	1.1									.26
237	Salamonic	RF63-61	4.4	79.3	8.68	7.94	2.37	.61	.093	.026	38.6	.11
238	Salamonie	RF63-62	3.6	57.7	20.4	14.0	3.33	2.30	.23	.091	36.7	.32
239	Salamonie	RF63-63	4.2	55.9	24.4	11.9	3.63	1.89	.24	.071	36.5	.068
240	Brassfield	RF63-64	3.1									.091
241	Brassfield	RF63-66	4.2	95.5	.40	2.52	.86	.14	.023	.022	41.8	.010

Johnson County

Core 125 SE¼ NW¼ sec. 17, T. 11 N., R. 5 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
242	Devonian (undifferentiated)	P55- 15	3.1	85.1	1.91	8.51	2.19	.71	.085	.035	38.7	.42	.068
243	Devonian (undifferentiated)	P55- 16	.2	92.8	2.05	1.89	.37	2.34	.036	.046	41.6	2.05	.082
244	Jeffersonville	P55- 17	2.5	93.0	1.73	4.03	.32	.33	.028	.043	41.1	.29	.020
245	Jeffersonville	P55- 18	1.3	96.5	1.20	1.15	.27	.37		.044	43.7	.30	.023
246	Jeffersonville	P55-265	.8	94.7	1.64	2.08	.70	.34	.037	.045	43.3	.19	.061
247	Jeffersonville	P55-266	.3	74.4	4.08	15.6	1.97	2.23	.10	.036	35.3	1.86	.054
248	Jeffersonville	P55-267	1.9	94.6	1.50	2.18	.87	.21	.055	.048	42.6	.22	.16
249	Jeffersonville	P55- 19	.7	94.9	1.70	1.67	.75	.43	.046	.055	42.9	.36	.89
250	Jeffersonville	P55-268	.5	76.8	5.22	12.5	2.51	1.26	.15	.043	35.6	.86	.19
251	Jeffersonville	P55-269	.8	82.6	6.88	7.83	.87	.69	.055	.044	39.7	.54	.11
252	Jeffersonville	P55- 20	4.0	87.0	4.59	7.39	.23	.29		.042	39.9	.25	.059
253	Jeffersonville	P55- 21	3.9	97.0	1.70	.59	.11	.12		.035	42.6	.087	.077
254	Jeffersonville	P55-270	.5	96.8	1.59	.99	.030	.027		.037	43.4	.013	.077
255	Jeffersonville	P55-271	.1	89.6	6.94	2.15	.14	.59		.040	43.3	.45	.20
256	Jeffersonville	P55-272	.7	96.5	1.80	.93	.070	.15		.035	43.1	.12	.15
257	Jeffersonville	P55-273	1.2	96.5	1.62	1.26	.027	.029		.030	43.1	.018	.10
258	Jeffersonville	P55-274	.7	95.2	2.43	1.42	.18	.23		.028	42.9	.23	.064
259	Jeffersonville	P55- 22	2.7	97.0	1.31	.98	.067	.080		.024	43.5	.088	.038
260	Jeffersonville	P55- 23	1.1	74.6	.86	23.9	.027	.10		.016	30.7	.060	.014
261	Jeffersonville	P55- 24	3.3	98.2	1.04	.43	.11	.037		.019	43.1	.055	.005

262	Jeffersonville	P55- 275	.9	97.4	1.33	.54	.19	.062		.022	43.7	.069	.005
263	Jeffersonville	P55- 276	1.6	97.5	1.50	.36	.080	.018		.024	43.9	.034	.005
264	Jeffersonville	P55- 25	1.0	88.7	6.23	3.84	.41	.29		.031	41.6	.22	.020
265	Jeffersonville	P55- 26	3.7	97.0	1.88	.54	.10	.10		.022	43.5	.028	.006
266	Jeffersonville	P55- 27	1.6	69.8	27.2	1.55	.59	.20	.026	.040	44.8	.15	.013
267	Jeffersonville	P55- 28	.5	48.9	31.4	12.2	3.36	1.84	.20	.029	37.2	.91	.020
268	Jeffersonville	P55- 29	2.0	57.4	38.2	3.30	.37	.22		.026	44.7	.18	.013
269	Jeffersonville	P55- 30	.9	41.3	25.0	32.7	.21	.18		.017	29.5	.12	.009
270	Jeffersonville	P55- 31	1.2	57.5	40.3	1.32	.16	.11		.030	46.6	.10	.011
271	Jeffersonville	P55- 278	4.5	56.5	39.5	2.97	.27	.21		.032	46.0	.20	.013
272	Jeffersonville	P55- 54	1.0	56.9	39.6	2.31	.43	.17	.029	.035	45.4	.12	.012
273	Jeffersonville	P55- 56	1.3	56.2	35.5	5.85	1.36	.47	.062	.029	44.7	.30	.031
274	Jeffersonville	P55- 58	1.5	55.5	37.0	5.66	.98	.30	.049	.046	44.3	.15	.019
275	Jeffersonville	P55- 60	3.5	57.4	35.9	4.70	1.08	.36	.049	.038	44.6	.20	.030
276	Jeffersonville	P55- 62	2.7	53.6	37.2	6.81	.94	.32	.044	.035	43.4	.17	.019
277	Jeffersonville	P55- 64	1.3	60.3	34.9	2.53	.95	.24	.039	.021	44.6	.21	.016
278	Geneva	P55- 66	3.1	62.2	35.7	1.11	.29	.19		.030	46.1	.13	.009
279	Geneva	P55- 68	2.8	61.0	38.3	.30	.073	.098		.038	46.9	.090	.004
280	Geneva	P55- 70	3.8	58.0	41.2	.29	.081	.16		.025	47.0	.057	.004
281	Geneva	P55- 72	3.7	67.9	31.4	.20	.046	.20		.029	46.3	.020	.004

Johnson County- -Continued

Core 125--Continued

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
282	Geneva	P55- 74	.6	77.1	21.7	.60	.023	.12		.026	45.1	.015	.003
283	Geneva	P55- 76	1.1	58.6	40.1	.66	.041	.12		. 020	47.2	.021	.004
284	Geneva	P55- 78	2.8	59.3	40.1	.21	.050	.15		.0030	47.4	.71	.004
285	Geneva	P55- 80	.5	57.3	41.1	.69	.11	.27		.030	47.2	.16	.004
286	Geneva	P55- 82	.9	60.5	37.8	.93	.16	.13		.029	46.4	.022	.007
287	Geneva	P55- 84	4.7	59.5	38.8	.89	.15	.17		.037	46.9	.12	.006
288	Geneva	P55- 86	1.2	55.2	42.6	1.16	.23	.26		.041	47.0	.097	.007
289	Geneva	P55- 88	1.7	56.6	41.6	.84	.17	.24		.042	46.4	.098	.005
290	Geneva	P55- 90	4.8	58.9	39.3	.81	.12	.28		.037	46.8	.11	.005
291	Geneva	P55- 92	1.1	59.1	37.9	1.34	.15	.96		.037	46.3	.42	.004
292	Mississinewa	P55- 94	.8	50.7	32.9	11.8	2.53	.97	.15	.023	38.9	.59	.014
293	Mississinewa	P55- 98	1.0	53.6	31.7	10.9	1.98	.69	.12	.021	39.7	.42	.011
294	Mississinewa	P55- 99	.3	43.9	29.9	18.2	4.39	1.15	.36	.020	33.0	.44	.018
295	Mississinewa	P55-101	1.7	51.9	30.8	11.9	2.24	.83	.14	.025	38.2	.52	.013
296	Mississinewa	P55-103	2.1	39.7	26.3	24.6	5.24	1.73	.44	.025	29.7	.76	.031
297	Mississinewa	P55-105	2.2	51.4	29.2	13.7	2.72	.89	.17	.024	36.6	.45	.016
298	Mississinewa	P55-107	.1	20.0	12.0	49.0	11.0	3.90	1.20	.020	12.1	2.16	.030
299	Mississinewa	P55-109	7.6	41.0	26.6	23.7	4.92	1.46	.38	.028	29.9	.62	.035
300	Mississinewa	P55-110	.4	64.3	20.3	11.2	2.19	.78	.15	.030	38.0	.34	.015
301	Mississinewa	P55-112	.6	81.7	9.07	6.45	1.27	.41	.078	.028	40.6	.15	.012

302	Mississinewa	P55-114	4.2	66.6	18.2	10.9	2.22	.84	.15	.029	38.0	.44	.011
303	Mississinewa	P55-116	1.8	47.0	25.8	19.2	4.44	1.26	.29	.028	32.8	.50	
304	Louisville	P55-118	9.4	75.8	12.0	8.64	1.86	.49	.12	.026	39.3	.17	.011
305	Louisville	P55-120	2.4	77.2	10.1	9.10	1.96	.52	.12	.024	38.4	.16	.019
306	Louisville	P55-122	1.4	90.2	3.07	4.56	1.05	.50	.070	.025	41.3	.29	.006
307	Louisville	P55-124	8.3	93.4	2.57	2.62	.55	.31	.041	.028	42.9	.14	.008
308	Louisville	P55-126	1.4	86.9	4.88	5.00	1.73	.43	.056	.023	41.1	.14	.017
309	Louisville	P55-128	.3	81.3	7.89	6.75	2.41	.56	.072	.024	39.7	.25	.017
310	Louisville	P55-130	1.4	82.6	10.7	4.17	1.08	.40	.068	.025	41.1	.13	.024
311	Louisville	P55-132	1.3	82.8	11.0	3.75	.89	.40	.054	.027	42.7	.12	.023
312	Louisville	P55-134	3.1	88.7	6.79	2.88	.58	.46	.046	.030	43.3	.20	.008
313	Louisville	P55-136	1.5	80.0	12.0	4.73	1.44	.75	.066	.024	41.4	.29	.015
314	Louisville	P55-138	.9	79.8	9.10	6.46	2.33	1.18	.10	.022	39.8	.92	.022
315	Waldron	P55-140	3.1	71.9	4.31	15.1	5.53	.90	24	.014	34.5	.35	.036
316	Waldron	P55-142	2.2	64.8	7.00	17.4	7.12	1.42	.29	.016	29.5	.63	.036
317	Waldron	P55-144	.4	54.9	13.8	19.8	7.68	1.57	.27	.022	29.4	.48	.026
318	Salamonie	P55-146	1.3	72.0	16.7	7.56	1.77	.78	.090	.027	41.1	.062	.034
319	Salamonie	P55-148	1.1	93.7	3.16	2.22	.047	.26	.049	.026	43.1	.039	.005
320	Salamonie	P55-150	3.3	87.5	8.75	2.20	.62	.34	.064	.027	43.5	.041	.010
321	Salamonie	P55-151	.3	94.2	2.26	2.05	.48	.38	.058	.024	42.1	.24	.007

Johnson County- -Continued

Core 125—Continued

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
322	Salamonie	P55-152	.8	86.6	9.10	2.69	.64	.34	.059	.028	42.9	.038	.009
323	Salamonie	P55-154	4.0	91.7	4.66	2.27	.53	.29	.057	.028	43.4	.053	.006
324	Salamonie	P55-156	1.1	84.2	9.10	4.13	1.04	.36	.088	.029	41.7	.035	.011
325	Salamonie	P55-158	2.8	85.3	8.30	4.60	.90	.34	.062	.026	42.6	.081	.010
326	Salamonie	P55-160	3.4	81.7	11.7	4.84	.75	.42	.056	.026	42.3	.050	.010
327	Salamonie,	P55-162	12.1	91.4	4.31	2.87	.60	.24	.042	.020	43.2	.036	.011
328	Solamonie	P55-166	2.3	83.4	5.71	7.38	2.02	.39	.082	.018	40.4	.045	.090
329	Salamonie	P55-168	3.5	84.7	9.24	4.15	.92	.38	.044	.023	43.2	.027	.037
330	Salamonie	P55-170	1.0	68.7	3.42	25.2	1.23	.35	.10	.012	32.3	.038	.018
331	Salarnonig	P55-172	.3	82.8	2.56	11.6	1.60	.33	.13	.012	37.3	.042	.042
332	Salamonie	P55-174	1.5	76.8	1.38	20.0	.95	.23	.092	.011	34.4	.027	.008
333	Salamonie	P55-176	1.3	77.9	1.06	19.7	.56	.18	.065	.0093	33.3	.017	.005
334	Salamonie	P55-178	2.4	63.2	1.44	34.0	.56	.25	.062	.0088	27.3	.017	.011
335	Salamonie	P55-179	.2								1.3	.027	.005
336	Salamonie	P55-180	.9	80.7	2.62	14.0	.97	.52	.097	.013	37.5	.28	.014
337	Salamonie	P55-182	21.6	59.7	3.65	34.3	.76	.51	.084	.012	28.2	.18	.016
338	Brassfield	P55-188	3.1	96.4	1.12	1.70	.21	.38		.032	44.0	.14	.069
339	Brassfield	P55-188	3.1	91.8	2.44	3.60	.70	.87	.048	.037	42.9	.33	.066
340	Brassfield	P55-190	4.2	77.9	6.34	11.3	2.30	1.04	.13	.030	38.6	.52	.10

Marion County

Core 145: NW¼ SW¼ sec. 18, T. 16 N., R. 4 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
	Sand and gravel		76.0										
341	North Vernon?	?	8.3										
342	North Vernon?	P57- 1	3.0	98.4	.40	.88	.081	.059		.016	43.7	.011	.005
343	North Vernon?	?	9.5										
344	North Vernon?	P57- 3	1.0	97.5	.28	1.92	.053	.039		.012	42.9	.008	.005
345	North Vernon?	?	1.7										
346	North Vernon?	P57- 5	.5	92.7	5.76	.74	.14	.093		.015	43.7	.011	.006
347	North Vernon?	P57- 6	1.0	99.0	.44	.25	.064	.042		.013	43.8	.006	.004
348	North Vernon?	F57- 8	5.3	99.0	.31	.38	.059	.070		.017	44.1	.005	.004
349	North Vernon?	P57-10	1.8	98.5	.56	.57	.059	.044		.016	43.9	.010	.010
350	North Vernon?	P57-12	1.9	98.0	1.13	.55	.045	.055		.017	44.0	.023	.013
352	North Vernon?	P57-13	4.3	97.9	1.07	.66	.057	.069		.016	43.9	.042	.016
352	Jeffersonville	P57-15	2.0	70.9	24.1	3.47	.54	.38	.051	.024	43.6	.11	.016
353	Jeffersonville	P57-17	3.0	54.7	36.3	6.39	1.13	.40	.058	.027	43.7	.14	.023
354	Jeffersonville	P57-19	5.1	53.8	36.8	7.74	.67	.38	.059	.024	42.8	.21	.023
355	Jeffersonville	P57-21	.8	56.1	40.2	2.69	.28	.19		.020	46.2	.040	.016
356	Jeffersonville	P57-23	.7	56.7	38.2	3.96	.31	.25	.044	.025	45.1	.032	.016
357	Jeffersonville	P57-25	.4	18.4	14.9	63.1	1.41	.62	.060	.016	16.5	.16	.013
358	Jeffersonville	P57-27	.5	52.1	37.2	7.86	1.04	.71	.057	.028	42.8	.16	.019
359	Jeffersonville	P57-29	.2								7.0	1.60	.12

Marion County- -Continued

Core 145--Continued

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
360	Jeffersonville	P57-30	.7	52.0	37.0	8.05	1.30	.57	.062	.022	42.3	.33	.048
361	Jeffersonville	P57-32	1. 7	52.2	33.4	10.8	1.43	.52	.078	.018	39.8	.32	.050
362	Jeffersonville	P57-34	.2	35.6	28.4	29.4	2.46	1.10	.11	.022	30.4	.59	.052
363	Jeffersonville	P57-35	.5	51.0	35.3	9.5	1.95	.63	.082	.021	40.9	.29	.056
364	Jeffersonville	P57-36	.1	37.9	27.4	26.6	3.39	1.59	.16	.022	29.8	.91	.052
365	Jeffersonville	P57-37	2. 1	53.0	37.6	6.52	1.20	.62	.088	.021	43.3	.30	.036
366	Jeffersonville	P57-39	1.8	51.9	39.4	6.54	.89	.68	.062	.020	43.3	.34	.027
367	Jeffersonville	P57-41	.6	53.9	37.8	6.69	.62	.42	.053	.018	44.7	.27	.030
368	Jeffersonville	P57-42	1.6	51.9	42.9	3.71	.40	.54		.022	45.4	.24	.019
369	Jeffersonville	P57-44	.7	55.2	35.5	7.95	.31	.44		.021	42.5	.22	.004
370	Jeffersonville	P57-46	2.7	56.6	41.0	1.36	.12	.42		.020	46.7	.18	.008
371	Geneva	P57-48	6.5	65.0	33.0	1.07	.078	.35		.023	45.9	.082	.002
372	Geneva	P57-50	3.6	69.3	29.7	.44	.060	.19		.026	45.0	.066	.004
373	Geneva	P57-52	4.8	60.7	36.6	1.55	.15	.45		.029	45.6	.14	.009
374	Geneva	P57-54	.1	54.4	40.2	4.08	.45	.29	.051	.016	44.3	.089	.008
375	Geneva	P57-56	.2	60.1	37.0	1.82	.17	.41		.027	45.7	.15	.010
376	Geneva	P57-57	.6	57.7	39.8	1.34	.12	.50		.028	46.1	.22	.006
377	Geneva	P57-58	3.4	55.7	35.3	8.01	.080	.36		.023	43.0	.12	.004
378	Geneva	P57-60	1.1	57.3	29.3	12.1	.18	.47		.023	40.2	.20	.004
379	Mississinewa	P57-62	.3	48.6	34.4	11.0	2.74	1.02	.13	.024	38.8	.45	.030

380	Mississinewa	P57-64	.2								11.3	.32	.010
381	Mississinewa	P57-65	1.7	40.9	29.0	20.4	4.91	1.52	.21	.028	32.4	.71	.046
382	Mississinewa	P57-67	2.0	33.1	25.3	29.8	6.62	1.83	.31	.027	28.0	.69	.061
383	Mississinewa	P57-69	12.6	46.0	27.6	18.5	4.28	1.38	.19	.026	33.4	.81	.034
384	Mississinewa	P57-71	.4	40.2	26.3	23.5	5.07	1.62	.23	.028	30.1	.55	.024
385	Mississinewa	P57-73	3.3	41.9	25.2	22.4	5.45	1.77	.22	.026	30.3	.90	.033
386	Mississinewa	P57-75	.4	38.0	25.3	26.4	5.47	1.52	.29	.026	29.5	.57	.021
387	Mississinewa	P57-77	2.7	45.8	29.6	16.8	4.08	1.47	.17	.028	34.0	.56	.024
	Louisville or Mississinewa		4.4[1]										
388	Louisville or Mississinewa	P57-79	5.9	59.4	16.7	18.2	3.29	1.18	.18	.024	35.2	.47	.014
389	Louisville or Mississinewa	P57-81	3.4	34.3	22.0	31.8	6.38	2.06	.32	.030	27.4	.38	.039
	Louisville or Mississinewa		8.3[1]										
390	Louisville or Mississinewa	P57-83	6.0	61.1	14.4	17.1	4.10	1.01	.24	.023	34.0	.11	.014
391	Louisville or Mississinewa	P57-85	.6	85.4	4.44	7.34	1.37	.31	.11	.020	39.4	.031	.006
392	Louisville or Mississinewa	P57-87	2.1	56.0	18.1	18.1	4.24	1.33	.21	.025	31.5	.12	.036
393	Louisville	P57-89	.4	79.4	6.19	10.8	2.02	.41	.14	.023	38.1	.036	.008
394	Louisville	P57-91	.4	65.6	15.1	13.6	2.75	.77	.16	.025	36.5	.045	.012
			3.9[1]										
395	Louisville	P57-93	.8	36.0	22.1	28.2	7.06	2.18	.32	.032	27.0	.20	.056
396	Louisville	P57-95	4.2	76.6	7.74	11.6	2.35	.52	.14	.025	38.0	.046	.011

Marion County- -Continued

Core 145--Continued

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
397	Louisville	P57-97	3.6	64.9	14.1	14.9	3.02	.79	.19	.025	36.9	.043	.014
398	Louisville	P57-99	1.5	83.8	4.78	8.46	1.48	.34	.12	.027	39.5	.029	.008
399	Louisville	P57-101	1.6	77.0	10.6	8.96	1.62	.42	.12	.028	39.2	.061	.010
400	Louisville	P57-103	1.0	58.0	20.2	15.6	3.08	.86	.17	.024	36.1	.056	.024
401	Louisville	P57-105	6.0	73.8	13.3	9.15	1.62	.50	.12	.025	39.7	.15	.012
402	Louisville	P57-107	.7	68.6	17.4	9.88	1.96	.56	.12	.026	39.1	.087	.020
403	Louisville	P57-109	4.0	88.2	6.30	3.75	.76	.43	.074	.024	41.6	.21	.007
404	Louisville	P57-111	.6	86.8	8.77	2.91	.61	.30	.068	.025	42.5	.092	.013
405	Louisville	P57-113	1.2	88.4	7.64	2.54	.58	.25	.064	.022	42.6	.097	
406	Louisville	P57-115	.9	86.7	10.4	1.77	.41	.22		.023	43.1	.24	
407	Louisville	P57-117	2.4	81.3	14.1	2.97	.76	.28	.056	.025	42.7	.10	.020
408	Louisville	P57-119	5.5	78.1	16.4	3.20	.89	.34	.090	.026	42.6	.13	.017
409	Louisville	P57-121	2.4	72.3	21.7	3.98	.71	.77	.064	.027	43.0	.28	.017
410	Louisville	P57-123	6.2	71.2	20.1	5.34	1.72	.58	.078	.026	40.8	.22	.018
411	Louisville	P57-125	1.5	55.8	33.4	7.81	1.27	.63	.089	.033	42.1	.34	.028
412	Louisville	P57-127	2.5	65.4	29.8	3.20	.60	.37	.063	.029	44.0	.19	.011
413	Waldron	P57-129	3.0	60.1	33.6	4.27	.85	.59	.072	.032	43.9	.16	.017
414	Waldron	P57-131	.7	53.4	28.4	11.7	3.45	.84	.13	.024	37.9	.33	.028
415	Waldron	P57-133	2.6	50.4	25.1	14.5	5.44	1.38	.16	.023	34.4	.79	.030
416	Salamome	P57-135	1.6	55.8	33.8	7.03	1.46	.80	.084	.029	42.3	.37	.026

417	Salamonie	P57-137	3.3	60.3	35.2	2.83	.54	.50	.060	.030	44.7	.20	.010
418	Salamonie	P57-139	12.8	60.3	34.4	3.56	.64	.45	.060	.028	44.3	.22	.007
419	Salamonie	P57-141	2.2	55.2	36.5	6.40	.76	.54	.072	.029	43.5	.19	.011
420	Salamonie	P57-143	14.8	59.5	35.3	3.39	.72	.51	.059	.028	44.2	.30	.031
421	Salamonie	P57-145	1.4	56.8	39.1	2.50	.53	.50	.057	.034	45.4	.18	.051
422	Salamonie	P57-147	1.0	53.1	37.3	6.37	1.32	.82	.074	.032	43.4	.36	.019
423	Salamonie	P57-149	.3	51.2	37.3	8.18	1.36	.82	.092	.029	41.8	.43	.066
424	Salamonie	P57-151	.3			97.5					0.9	.085	.001
425	Salamonie	P57-152	.1	52.7	38.5	6.69	.82	.87	.074	.031	43.4	.38	.043
426	Salamonit	P57-153	28.5	40.5	29.9	26.7	.87	.91	.073	.029	32.4	.26	.014
427	Brassfteld	P57-155	2.6	54.1	41.4	2.60	.42	.90	.050	.038	45.9	.28	.031
428	Brasafteld	P57-157	1.1	55.1	40.4	2.42	.36	1.20		.037	45.3	.43	.099
429	Brasafteld	P57-159	2.6	57.2	34.9	5.04	.78	1.45	.003	.034	43.2	.84	.070

Not sampled.

Marion County- -Continued

Core 113: NE¼NW¼ sec. 20. T. 17 N.. R. 4 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
	Sand and gravel		50.4										
430	Geneva	P54-54	2.4	61.5	36.4	.87	.20	.46	.045	.024	46.9	.015	.009
431	Geneva	P54-56	.2	60.3	36.5	1.56	.47	.63	.054	.027	46.1	.11	.014
432	Geneva	P54-58	1.2	63.4	33.9	1.39	.34	.37	.053	.027	46.2	.57	.007
433	Liston Creek	P54-60	8.2	60.5	33.3	4.54	.65	.47	.068	.024	45.6	.11	.007
434	Liston Creek	P54-62	3.5	58.2	34.3	5.88	.54	.45	.061	.026	45.2	.014	.007
435	Liston Creek	P54-64	2.3	43.2	26.2	28.3	.68	.32	.058	.022	34.3	.015	.008
436	Liston Creek	P54-66	33.5	35.1	21.6	40.0	1.44	.67	.091	.019	27.0	.25	.014
437	Liston Creek	P54-68	15.0	54.7	30.6	11.5	1.36	.77	.11	.026	42.0	.37	.013
438	Mississinewa	P54-70	6.0	44.1	26.5	21.8	4.37	.92	.21	.021	34.5	.32	.058
439	Mississinewa	P54-72	21.8	42.1	22.5	26.5	5.55	1.05	.27	.021	30.8	.29	.036
440	Mississinewa	P54-74	4.4	55.4	20.0	17.5	4.10	.77	.19	.021	36.3	.041	.016
441	Mississinewa	P54-76	10.9	43.4	21.7	25.8	5.65	1.06	.26	. 023	30.2	.12	.034
442	Mississinewa	P54-78	8.7	56.2	18.6	18.1	4.04	.81	.21	.024	35.3	.056	.017
443	Mississinewa	P54-80	11.1	64.5	17.7	12.9	3.03	.58	.17	.024	39.2	.075	.013
444	Louisville	P54-82	4.9	83.0	8.88	5.95	1.19	.39	.11	.025	42.2	.071	.008
445	Louisville	P54-84	5.1	77.0	12.0	7.16	2.13	.52	.10	.027	42.4	.12	.017
446	Louisville	P54-88	25.5	66.2	23.3	7.41	1.42	.54	.11	.027	42.7	.14	.015
441	Waldron	P54-90	2.3	56.7	15.1	19.0	6.29	1.09	.27	.019	33.6	.44	.028
448	Salamonie	P54-92	15.4	70.6	20.6	6.03	.99	.63	.10	.027	43.1	.33	.008

449	Salamonic	P54-95	22.8	63.3	27.7	6.17	1.15	.56	.098	.027	43.5	.24	.016
450	Salamonic	P54-98	1.9	41.4	15.3	41.4	.90	.39	.091	.015	23.5	.13	.010
451	Salamonic	P54-100	21.7	43.6	24.9	29.3	.90	.72	.089	.022	34.1	.22	.017
452	Salamonie	P54-103	4.6	57.5	35.6	4.70	.53	1.09	.057	.030	45.6	.36	.022
453	Salamonic	P54-105	1.2	57.4	35.6	4.31	.75	1.35	.065	.029	44.4	.57	.18
454	Salamonie	P54-107	1.5	59.0	32.4	5.39	.97	1.14	.078	.031	43.6	.73	.10
455	Brassfield	P54-109	3.0	66.8	2.94	20.7	6.48	.80	.25	.022	32.4	.084	.23
456	Brassfield	P54-111	2.1	85.9	2.38	8.03	2.00	.52	.13	.029	41.3	.045	.14

Shelby County

Core 110, starting at floor of active quarry: NE¼NW¼ sec 32, T. 11 N., R. 7 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
457	Geneva	P54-18	.1	14.8	9.89	72.0	2.02	.26	.041	.0063	12.4	.086	.003
458	Louisville	P54-19	7.7	67.0	28.1	3.68	. 36	.30	.034	.023	45.8	.28	.008
459	Louisville	P54-20	5.0	66.8	25.7	5.28	1.20	.36	.066	.019	42.4	.23	.022
460	Louisville	P54-21	5.8	72.6	22.2	3.30	. 88	.49	.053	.023	43.0	.25	.012
461	Waldron	P54-22	4.5	59.5	14.3	16.7	6.90	1.31	.33	.018	31.0	.65	.042
462	Laurel	P54-23	.5	78.5	15.7	3.99	.91	.34	.049	.026	42.7	.13	.017

Wells County

Core 276 Quarry floor: SE¼NW¼ sec 28, T. 27 N., R. 12 E.

Analysis No.	Stratigraphic unit	Sample No.	Thickness (ft)	$CaCO_3$	$MgCO_3$	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO	Chem. CO_2	S	P_2O_5
463	Wabash (Huntington Lithofacies)	RF64-233	7.3	52.8	38.0	7.49	.75	.40	.063	.008	42.6	.24	
464	Wabash (Huntington Lithofacies)	RF64-234	10.0	53.0	38.7	6.22	1.00	.49	.090	.009	42.6	.28	
465	Louisville	RF64-235	6.8	55.6	38.4	4.36	.70	.38	.062	.015	44.4	.23	
466	Louisville	RF64-236	10.0	52.4	36.1	9.28	.97	.65	.081	.014	41.7	.26	
407	Louisville	RF64-237	6.6	47.1	37.3	13.3	1.15	.57	.086	.012	38.9	.24	
468	Louisville	RF64-238	6.1	46.1	37.5	13.0	1.51	.67	.10	.011	39.1	.30	
	Louisville		.6[1]										
469	Louisville	RF64-239	6.7	48.6	35.3	12.8	1.42	.74	.092	.013	39.1	.31	
470	Louisville	RF64-240	10.5	52.0	34.7	8.29	1.29	.64	.11	.016	41.6	.34	
471	Louisville	RF64-241	9.5	55.4	39.1	3.83	.77	.33	.065	.011	45.2	.14	
472	Louisville	RF64-242	10.0	53.9	43.9	1.21	.24	.23		.011	46.8	.068	
473	Louisville	RF64-243	8.5	56.2	40.9	1.56	.54	.28		.010	46.2	.15	
474	Louisville	RF64-244	6.7	56.2	42.3	1.02	.15	.16		.012	47.1	.048	
475	Waldron	RP64-245	7.5	54.1	36.6	5.25	2.22	.85		.013	42.8	.43	
476	Waldron	RF64-246	7.7	53.1	35.9	5.89	2.12	.91	.087	.016	42.5	.42	
477	Salamonie	RF64-247	10.2	55.9	40.1	2.64	.51	.27		.022	45.7	.12	
	Salamonie		2.0[1]										
478	Satamonie (oolitic zone)	RF64-248	6.6	55.2	44.2	.16	.034	.15		.019	47.5	.007	
479	Salamonie	RF64-249	7.5	56.4	43.1	.12	.036	.11		.017	47.4	.003	
480	Salamonie	RF64-250	5.8	54.8	44.7	.12	.034	.13		.016	47.6	.003	

481	Salamonie	RF64-251	7.5	54.1	45.4	.12	.042	.11		.015	47.6	.005
482	Salamonie	RF64-252	6.0	52.7	46.8	.16	.061	.10		.014	47.3	.007
483	Salamcnie	RF64-253	6.5	53.8	45.8	.10	.040	.088		.014	47.2	.003
484	Salamonie	RF64-254	7.5	54.0	45.3	.37		.10		.015	47.6	.002
485	Salamonie	RF64-255	10.0	52.9	46.7	.15	.018	.089		.014	47.3	.002
486	Salamonie	RF64-256	6.4	54.4	45.5	.080		.10		.017	47.8	.002
487	Salamonie	RF54-257	3.9	52.7	46.8	.15	.026	.13		.016	48.0	.019
488	Salamonie	RF64-258	9.1	52.5	47.0	.14	.039	.12		.015	47.3	.003

[1] Not sampled.

APPENDIX 5
Selected Published Sections of Devonian and Silurian Strata

Bartholomew County

Abandoned quarry in sec. 36?, T. 10 N., R. 7 E., (Elrod, 1882)
Jeffersonville (9 ft), Waldron (3 ft), Laurel (4 ft).

Exposure in sec. 11, T. 9 N., R. 7 E., (Price, 1900)
Devonian (5. 5 ft), Louisville? (3.5 ft), Waldron (4 ft), Laurel (8 ft).

Carroll County

Abandoned quarry in sec. 34, T. 26 N., R. 1 E., (Cumings and Shrock, 1928)
Devonian rocks (7 ft), Kenneth (20 ft).

Cass County

Abandoned quarry in Reserve 8, T. 26 N., R. 1 E., (Elrod and Benedict, 1894)
Salina? (9.7 ft).

Exposure in sec. 31?, T. 27 N. , R. 3 E., (Cumings and Shrock, 1928)
Devonian rocks (8 ft), Salina (25 ft).

Clark County

Exposure in Clark Military Grant 190, T. 1 N., R. 7 E., (Patton, 1953)
New Albany (5 ft), North Vernon (18. 8 ft).

Abandoned quarry in Clark Military Grant 180, T. 1 N., R. 8 E., (Patton 1953)
Jeffersonville (36 ft), Louisville (13. 5 ft).

Exposure in Clark Military Grant 145, T. 1 N., R. 9 E., (Patton, 1953)
Jeffersonville (7.7 ft), Geneva (4. 9 ft).

Exposure in Clark Military Grant 121, T. 1 N., R. 8 E., (Patton and Dawson, 1955)[1]
Jeffersonville (19. 3 ft), Louisville (64 ft), Laurel (27. 9 ft), Osgood (15. 8 ft), Brassfield?.

Franklin County

Abandoned quarry in sec. 20, T. 12 N., R. 12 E., (Foerste, 1897)
Salamonie (25 ft), Brassfield (5 ft).

Grant County

Abandoned quarry in sec. 7, T. 24 N., R. 8 E., (Ward, 1906)
Mississinewa (12 ft).

Hamilton County
Abandoned quarry in sec. 29, T. 19 N., R. 6 E., (Kindle and Breger, 1904)
Wabash (6 ft).

Appendix 5--Continued

Jefferson County

Exposure in sec. 11, T. 2 N., R. 9 E., (Patton, 19 53)1
Jeffersonville (1.5 ft), Geneva (10.5 ft), Louisville (8.5 ft), Waldron (3 ft).

Abandoned quarry in sec. 31, T. 3 N., R. 10 E., (Patton, 1953)
Laurel (5 ft), Osgood (22.7 ft), Brassfield (4 ft).

Exposure in sec. 5, T. 3 N., R. 10 E., (Patton, 1953)[1]
Laurel (32 ft), Osgood (16. 1 ft), Brassfield (1. 5 ft).

Exposure in sec. 13, T. 4 N., R. 8 E., (Patton and Dawson, 1955)[1]
New Albany (1 ft), North Vernon (21 ft), Jeffersonville (28. 9 ft), Geneva (18. 2 ft), Waldron (5 ft), Laurel (23. 8 ft).

Jennings County

Abandoned quarry in sec. 14, T. 5 N., R. 7 E., (Effis, 1906)
North Vernon (11 ft).

Randolph County

Abandoned quarry in sec. 20, T. 20 N., R. 13 E., (Owen, 1862)[1]
Salamonie (25 ft).

Shelby County

Abandoned quarry in sec. 13, T. 11 N., R. 7 E., (Collett, 1882)

Wabash County

Exposure in sec. 24, T. 26 N., R, 5 E., (Cumings and Shrock, 1928)[1]
Wabash (60 ft).

Wells County

Abandoned quarry in sec. 29, T. 27 N., R. 11 E., (Shaver, 1961)[1]
Mississinewa (Huntington Lithofacies) (29. 7 ft).

[1]Location and stratigraphy field checked in 1963 or 1964.

APPENDIX 6*
Cores from the Devonian and Silurian Bedrock Area
on File at the Indiana Geological Survey
[Core sites are located on pl. 2]

County	File No.	Sec.	T.	R.	Interval cored
Adams	320	31	25 N	15 E	0-190
Adams	321	28	28 N	14 E	23-460
Allen	142	29	30 N	12 E	34-420
Allen	250	33	32 N	12 E	259-3571
Bartholomew	128	5	8 N	7 E	20-295
Bartholomew	129	9	10 N	6 E	58-63
Cass	242	31	27 N	1 E	2-150
Cass	241	32	27 N	1 E	5-189
Cass	248	36	27 N	1 W	0-214
Cass	227	10	28 N	1 W	85-2251
Delaware	240	14	20 N	9 E	18-199
Delaware	269	25	21 N	10 E	0-205
Delaware	209	25	21 N	10 E	26-166
Grant	223	6	22 N	7 E	16-155
Grant	221	12	23 N	6 E	13-183
Grant	222	12	23 N	6 E	14-198
Grant	207	12	23 N	6 E	14-148
Grant	208	5	23 N	7 E	8-88
Grant	132	2	24 N	6 E	11-324
Grant	134	35	25 N	6 E	11-116
Grant	135	35	25 N	6 E	19-63
Grant	136	35	25 N	6 E	28-130
Grant	137	35	25 N	6 E	17-85
Hamilton	245	2	18 N	5 E	0-54
Hamilton	90	3	18 N	5 E	3-80
Hamilton	270	3	18 N	5 E	0-207
Hamilton	89	8	18 N	5 E	12-75
Hamilton	88	14	18 N	5 E	17-69
Hancock	109	28	15 N	8 E	50-220
Henry	275	12	16 N	9 E	20-116
Howard	210	Reserve	24 N	3 E	7-407
Huntington	203	11	27 N	10 E	5-204
Huntington	277	12	28 N	9 E	0-204

Appendix 6--Continued

County	File No.	Sec.	T.	R.	Interval cored
Jasper	171	21	28 N	6 W	30-156
Jasper	170	22	28 N	6 W	27-107
Jasper	172	2	30 N	7 W	51-78
Jasper	173	22	31 N	7 W	44-70
Jay	164	30	23 N	14 E	11-233
Jennings	131	4	5 N	8 E	23-199
Jennings	180	4	6 N	9 E	35-68
Jennings	181	33	7 N	9 E	19-32
Johnson	125	17	11 N	5 E	61-408
Lake	233	32	33 N	9 W	120-704
Lake	231	3	35 N	9 W	140-797
LaPorte	187	4	36 N	1 W	215-1406
LaPorte	268	29	36 N	1 W	306-420
LaPorte	273	5	36 N	2 W	395-490
LaPorte	284	5	36 N	2 W	428-521
LaPorte	185	17	36 N	1 W	208-982
LaPorte	271	32	37 N	2 W	397-531
LaPorte	274	35	38 N	3 W	438-455
Madison	146	34	18 N	6 E	21-50
Marion	168	2	15 N	3 E	109-117
Marion	145	18	16 N	4 E	76-374
Marion	113	20	17 N	4 E	50-307
Marshall	53	6	34 N	1 E	256-262
Marshall	232	18	34 N	3 E	300-1894
Newton	234	15	31 N	8 W	108-1382
Newton	251	30	27 N	8 W	125-240
St. Joseph	54	28	36 N	1 E	280-295
Shelby	110	32	11 N	7 E	5-40
Tippecanoe	198	16	24 N	4 W	282-500
Tipton	160	17	22 N	3 E	140-555
Wayne	176	12	14 N	1 W	2-1083
Wells	204	4	27 N	11 E	3-46
Wells	205	4	27 N	11 E	5-205
Wells	202	29	27 N	11 E	0-93
Wells	276	28	27 N	12 E	0-204

*Compiled in 1963-64.

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JOHN B. PATTON, State Geologist

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DEPARTMENT OF NATURAL RESOURCES
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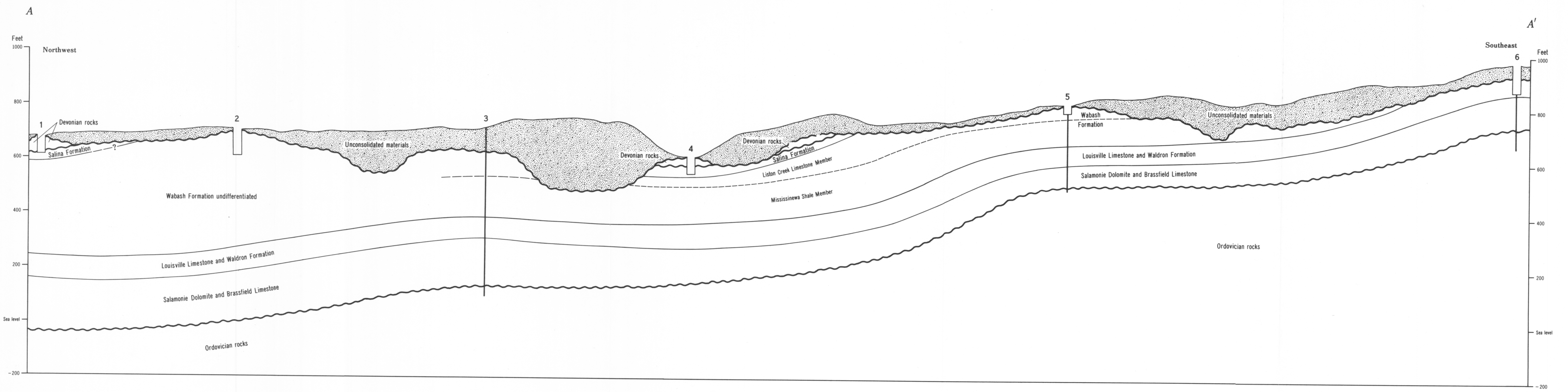
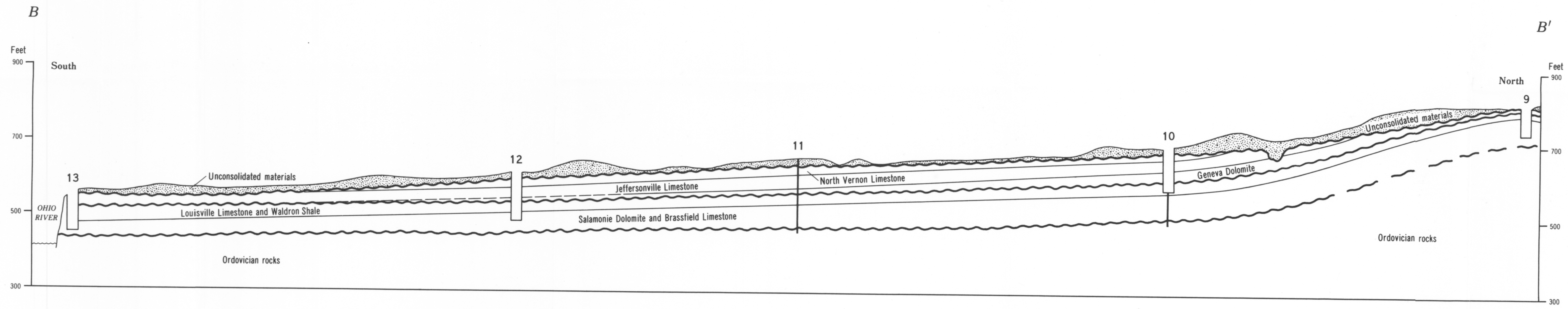
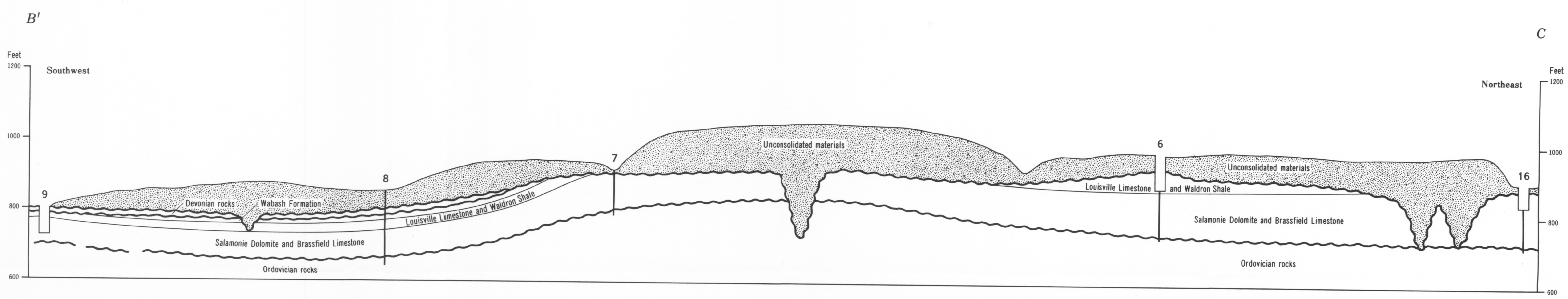
BULLETIN 37, PLATE 1







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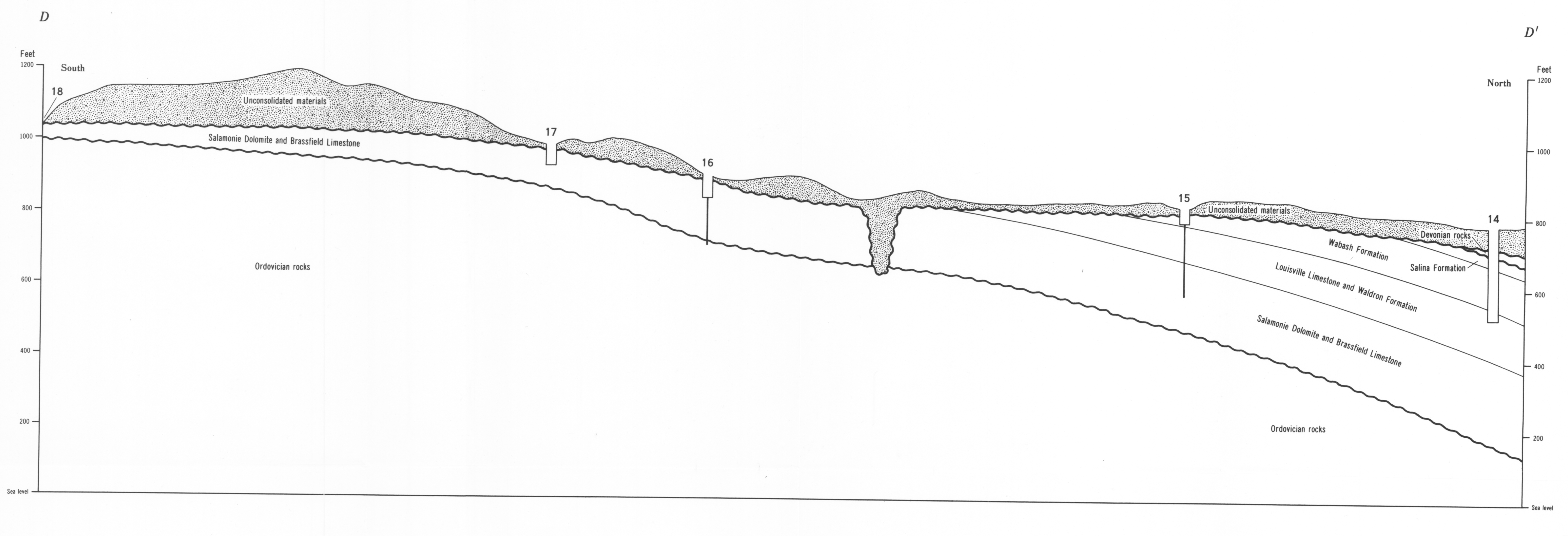

MAP OF INDIANA SHOWING LOCATION OF CROSS SECTIONS

GENERALIZED CROSS SECTIONS OF THE DEVONIAN AND SILURIAN SYSTEMS IN NORTHERN AND EASTERN INDIANA

By Robert R. French

1967

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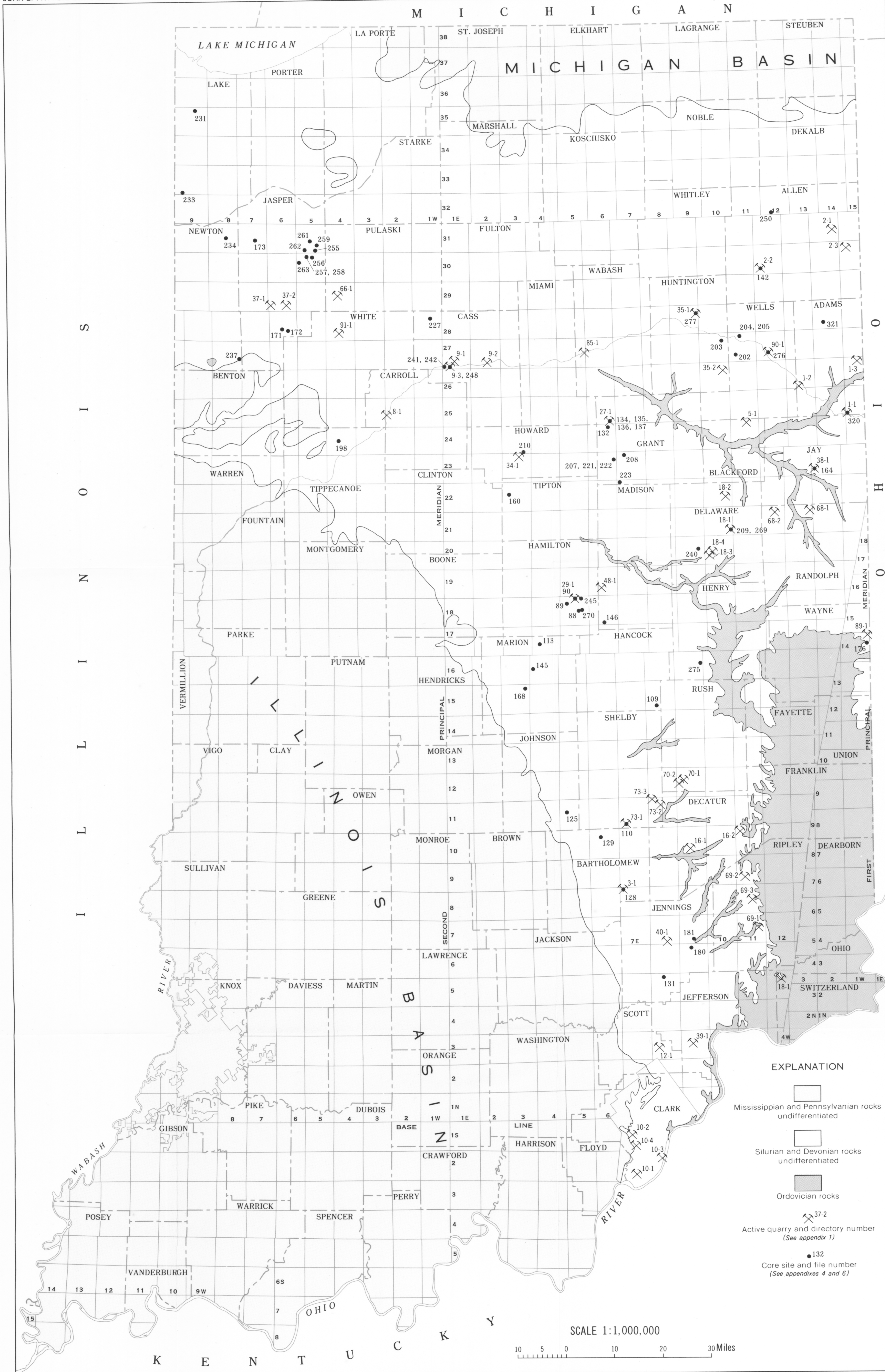

Base modified from U.S. Geological Survey Base map of Indiana, 1950.

MAP OF INDIANA SHOWING LOCATIONS OF ACTIVE QUARRIES AND CORE SITES IN THE DEVONIAN AND SILURIAN BEDROCK AREA

Compiled December 1965. In part modified from Patton and others (1956), Schneider and Gray (1966), and Burger and Wayne (in prep.). Drafted by Roger L. Purcell.

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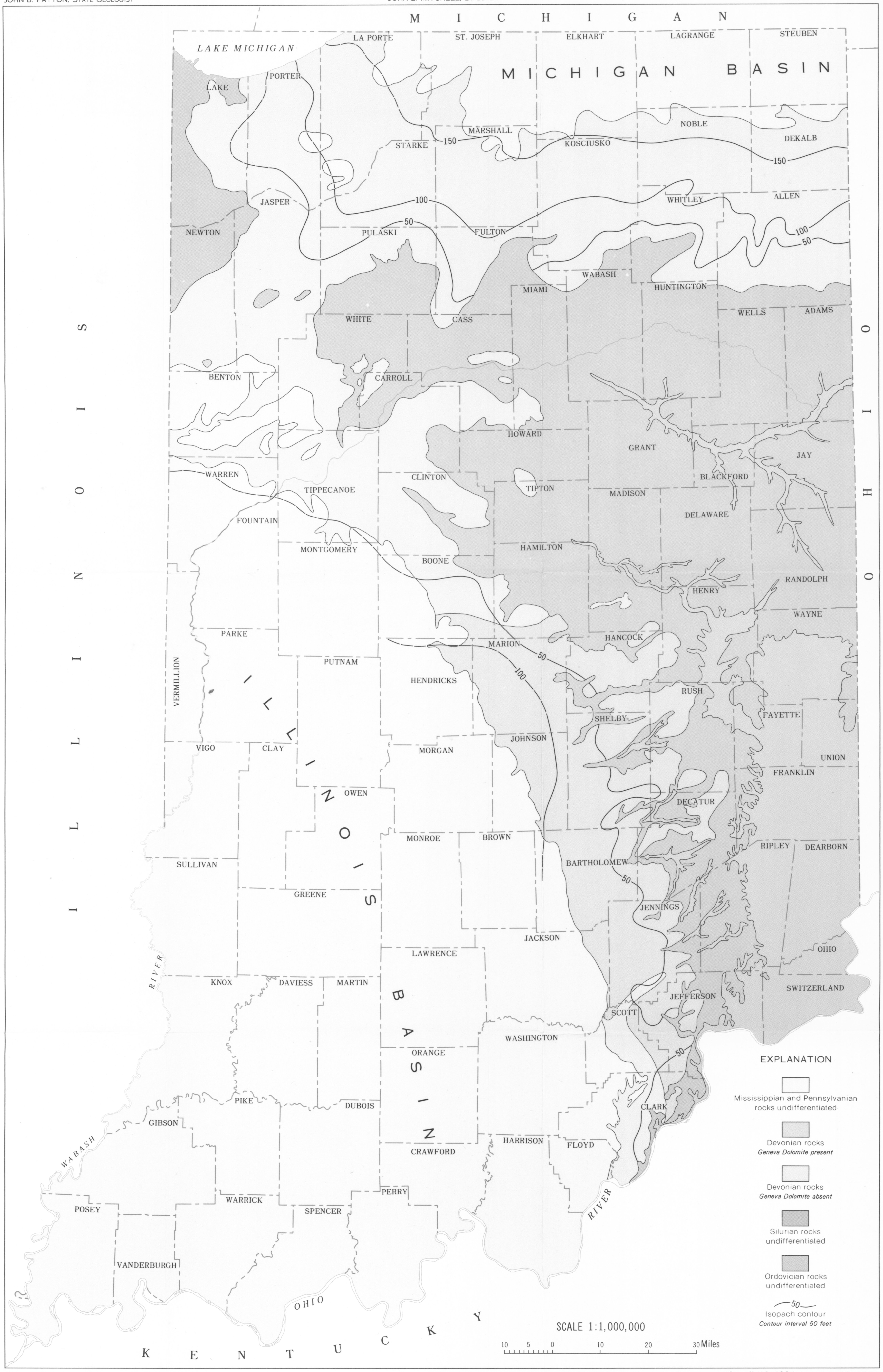

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MAP OF INDIANA SHOWING THICKNESS AND EXTENT OF DEVONIAN CARBONATE STRATA IN STUDY AREA

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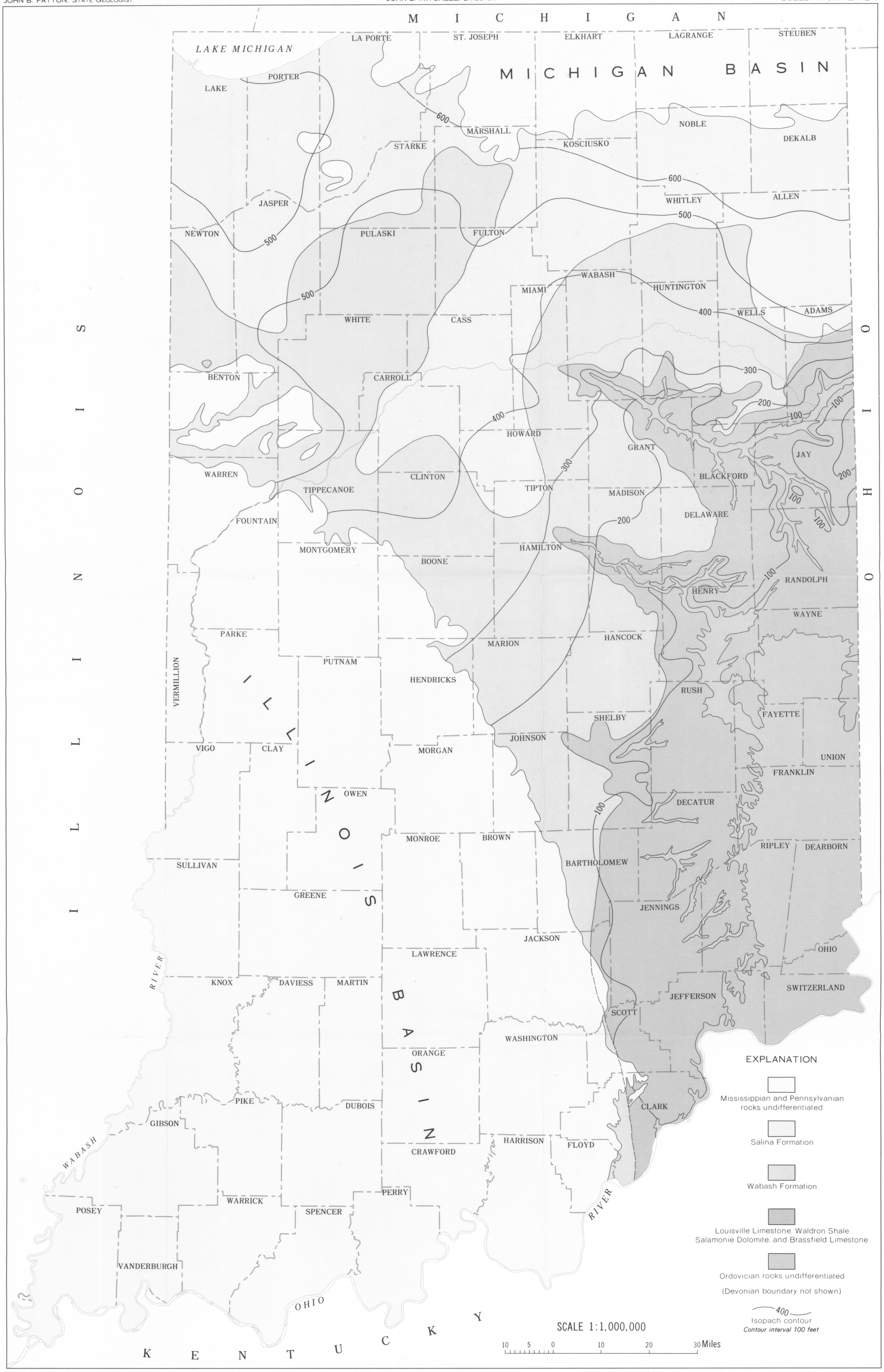

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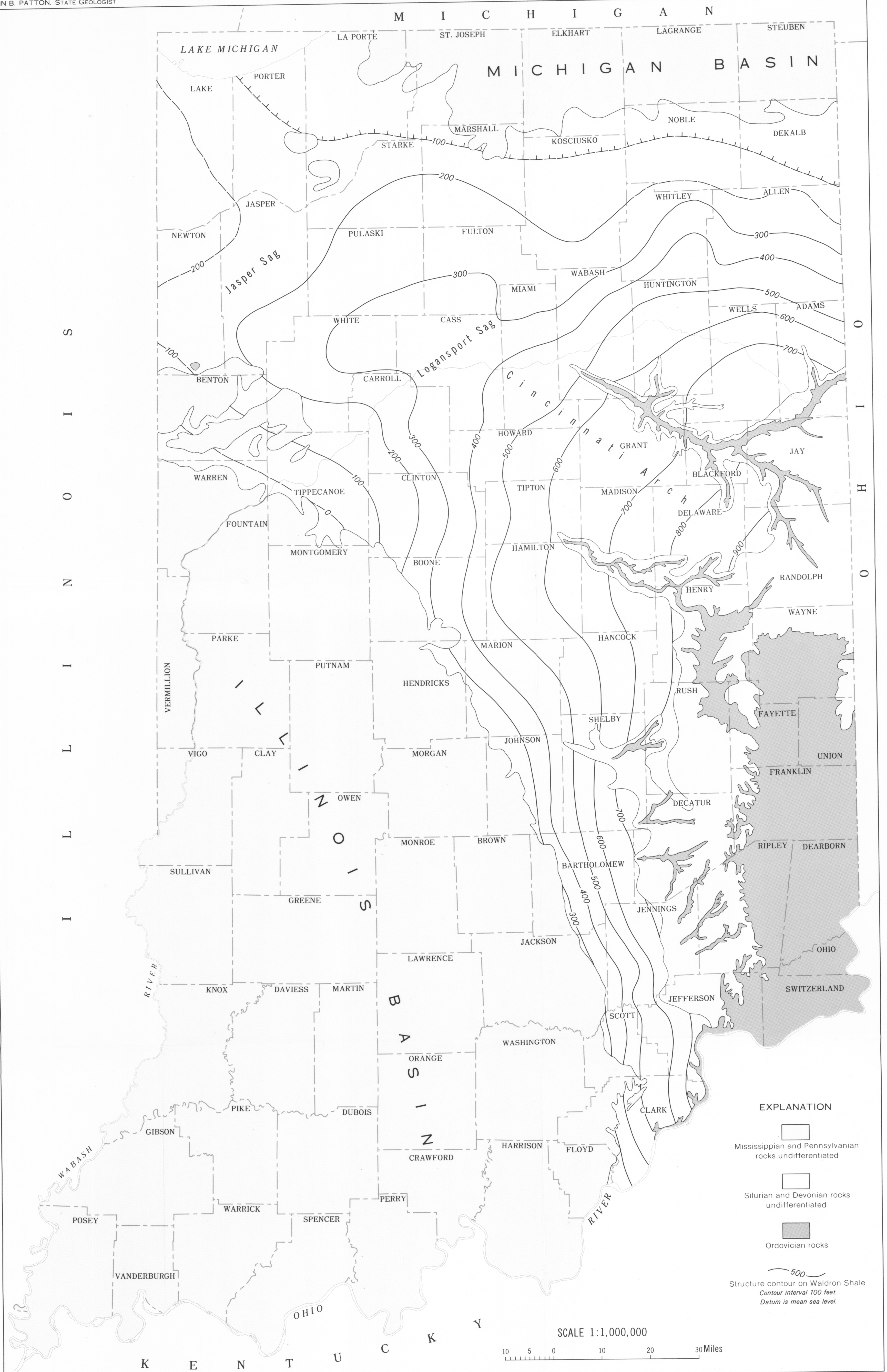

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MAP OF INDIANA SHOWING STRUCTURE ON THE WALDRON SHALE IN STUDY AREA

By Robert R. French

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