

MEMORANDUM REPORT

by
Curtis H. Ault

OUTCROP IN BORDEN GROUP, TIPPECANOE COUNTY

Location: SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 15, T. 22 N., R. 6 W.

Date: November 6, 1985

Geology

Because of reports of pre-1900 quarries in the vicinity of Westpoint and a few inquiries to the Survey concerning sources of aggregate west of Westpoint along Flint Creek, a brief investigation was made of Borden outcrops from Flint Creek at Reserve Road to about 3/4 quarters of a mile ~~north~~ ^{east} of Reserve Road along the creek. Exposed in the creekbed are well jointed outcrops of siliceous siltstone (see attached rose histogram) that grade into chert beds and nodules in a few exposed creek-bank outcrops. The limestone reported by Gorby (1886) (see attached pages from the 1886 report) was not found, but Gorby made a much more extensive examination of the area than I did.

The suitability of the material for aggregate is minimal. Not enough reserves of either siliceous siltstone or limestone ^{are} ~~is~~ present to justify opening a quarry, and only local ^{use} ~~was~~ made of the stone in the late 1800's, according to Gorby.

Grab samples from stream bed and bank:

CA86-64 (samples numbered and submitted in January, 1986)

Siltstone, gray to brown-gray, argillaceous and some siliceous cement;
very well jointed - creek bed

CA86-65

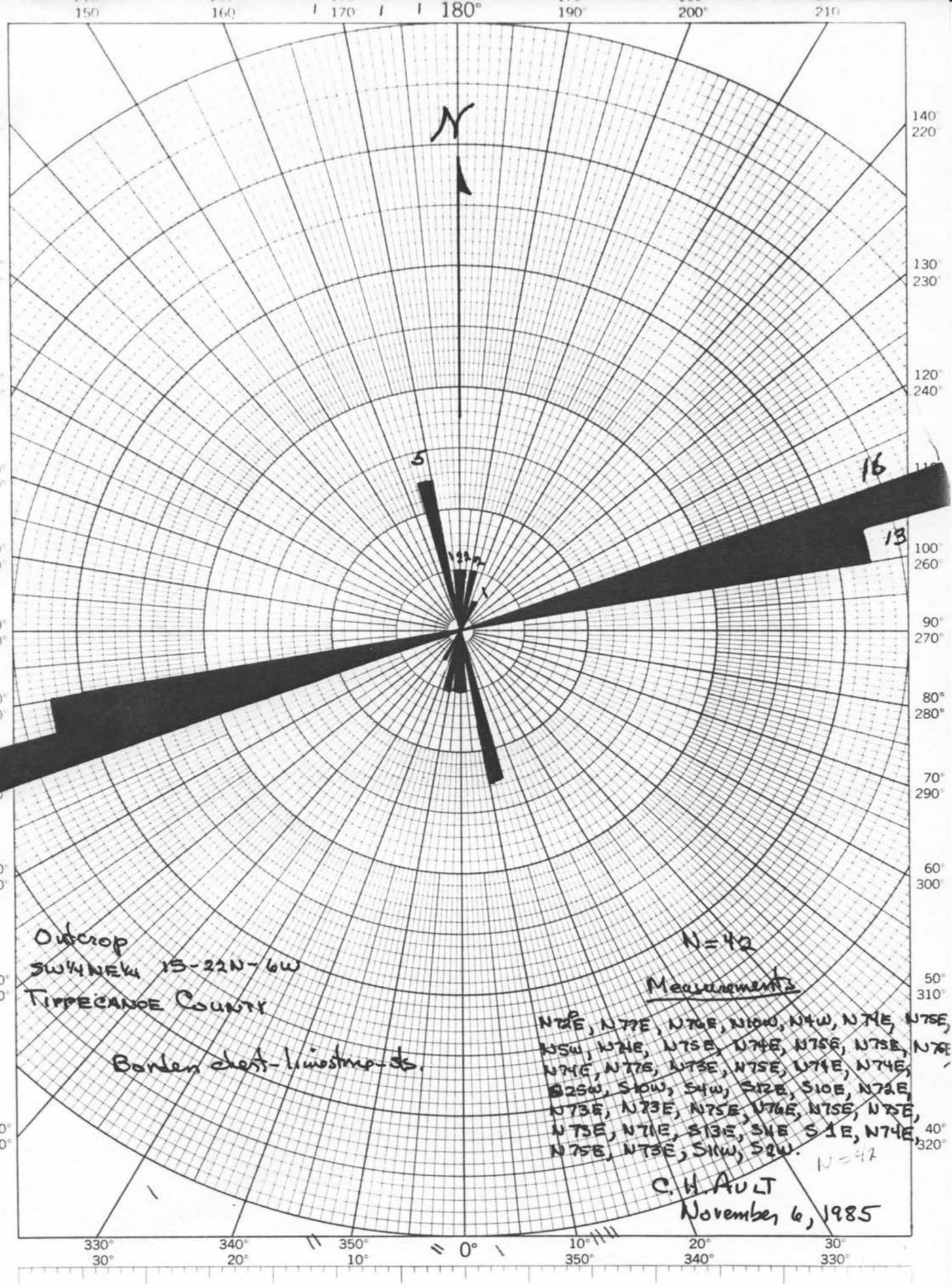
Chert, blue-gray and siltstone with silica cement, gray and brown-gray,
argillaceous in part

CA86-66

Siltstone, gray and gray-brown, fine grained, high proportion of silica cement, probably low percentage of clay; very blocky and prominent jointing system

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Outcrop
SW 1/4 NE 1/4 15-22N-6W
TIPPECANOE COUNTY

Borden chert-limestone ss.

N=42

Measurements

N20E, N77E, N76E, N100W, N4W, N74E, N75E,
N5W, N78E, N75E, N74E, N75E, N75E, N75E,
N74E, N77E, N73E, N75E, N74E, N74E,
S25W, S10W, S4W, S12E, S10E, N72E,
N73E, N73E, N75E, N76E, N75E, N75E,
N75E, N71E, S13E, S1E, S1E, N74E,
N75E, N75E, S1W, S2W.

N=47

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McKay, in his report on the well, calls it Coralline limestone. It is, indeed, a great mass of corals, somewhat silicified, composed largely of the genus *Favosites*. At the Falls of the Ohio, at Logansport and many other places in Indiana, this rock is exposed at the surface. It is found at a depth of 198 feet 6 inches in the Lafayette well—or at the height of 386 feet above ocean level. The same rock appears at the surface at Logansport 588 feet above the level of the sea. Its south-westerly dip from Logansport to Lafayette is at the rate of eight or nine feet to the mile.

KEOKUK BEDS.

These rocks are exposed on Indian Creek in Wabash Township, at the crossing of the Lake Erie & Western Railroad. They appear at the surface at no other point in the county. The outcrop may be observed about one mile east of Porter Station. There is a ledge of buff limestone on the top of the series, varying along the line of exposure from one foot to two and one-half feet in thickness. This buff-colored stone is usually found capping the outcrops in the counties west and north of Tippecanoe. Underlying the buff-colored ledge is a layer of gray, cherty stone, containing geodes, with an average thickness of about eight inches. Under the last is a layer about twelve inches in thickness that is highly ferruginous. This ledge is porous, spongy and more tenacious than the layers above it. Below this for three or four feet the stone is in thin layers. It is gray in color, soft, shaly, and contains more or less chert. Near the bottom of the exposure it is in thicker layers, gray in color, crystalline in structure, and better adapted to economic purposes. None of it, however, is of much value for building purposes. It cracks and scales off in weathering, and is, therefore, only adapted to use in rough foundation work, where it can be placed beneath the surface. It makes poor lime, on account of the great amount of silica in it; but it makes the best of metal for public roads. It is extensively used for the latter purpose, and, fortunately, it occurs in a part of the county where gravel suitable for that purpose is very scarce. No fossils were found in it, with the exception of a few crinoid stems and a few geodized shells, probably those of a *Spirifer*. The following section was obtained:

SECTION OF THE EXPOSED KEOKUK BEDS ON INDIAN CREEK.

Soil and clay	2 ft. 0 in.
Buff limestone	1 ft. 8 in.
Gray, cherty limestone	8 in.
Ferruginous limestone	1 ft. 0 in.
Clay parting	1 in.
Gray, cherty limestone	8 in.
Gray shale in thin ledges	3 ft. 0 in.
Compact, gray limestone with iron, in ledges from 8 to 14 inches thick	4 ft. 6 in.
Total	13 ft. 7 in.

The rocks are exposed here for the distance of about one hundred yards on the east bank of the creek, and on the north side of the railroad. Just south of the railroad, on the farm of Mr. John Allen, is an outcrop which shows a much greater thickness of buff-colored limestone capping the exposure. The exposure is shown as follows:

SECTION.

Soil and clay	3 ft. 0 in.
Buff limestone	3 ft. 6 in.
Gray, cherty limestone in thin layers	5 ft. 6 in.
Total	12 ft. 0 in.

This exposure is three or four hundred yards south of the one first described. The gray limestone has a few fragments of crinoid stems in it, but no other fossils were found. The stone is quarried to some extent at both places for foundations for out-buildings. It is also used generally for walling wells. It serves this purpose well. It breaks with an irregular fracture in the direction of the usual line of cleavage, except in the seams, but vertically it breaks down through several layers for a distance of four or five feet, forming a perpendicular wall with a smooth, even surface. At these lines of cleavage there seem to be vertical seams, extending down for several feet.

ST. LOUIS GROUP.

The stone of this group is extensively exposed along Flint Creek, in Wayne Township, for a distance of about four miles above the mouth of the stream. The rock consists largely of dark-colored or gray silicious shales, near the top of the strata, with an occasional layer of compact, gray or blue limestone two to six inches in thickness. At, or near the bottom of the exposures, the shales give place to a larger proportion of limestone, dark-gray or blue in color, the ledges varying in thickness from one inch to eight or ten inches. The limestones are fine-grained, hard and durable as foundation stone. An occasional layer is found twelve or fourteen inches in thickness. This stone is pretty generally quarried for local use. No shipments of it have ever been made. It is used largely for foundation work and bridge abutments. It weathers exceedingly well. It is not affected by climatic influences. In the examinations of the bridge abutments along Flint Creek, built of this stone some years ago, it was found that it does not scale, spawl off nor crack. The ledges are full of vertical seams, therefore the stone can not be quarried in blocks of very large size. Two to four feet in width, and four to six feet in length, are about the largest sizes that can be obtained. It is taken from the quarries in rhomboidal blocks. The vertical seams give the rhomb shape. The stone is largely silicious and makes a very poor quality of lime.

The shales disintegrate and decompose rapidly. They contain a small portion of lime. The water, percolating through the soil and gravel, reaches these shales, and carries the lime away in solution. The springs flowing out of the low bluffs, along Flint Creek, are strongly impregnated with lime. At many points along the creek small caves have been formed in the bluffs by this disintegrating and dissolving process. Upon reaching the atmosphere the lime, held in solution, combines with the carbonic acid gas of the air, and is precipitated upon the surface, forming beautiful concretions of carbonate of lime. These concretions projected from the roofs of the caves, in the form of icicles, are called stalactites. They form on the floors like water freezing as it drops steadily at one point upon the ground, and are called stalagmites. In many places the walls of these low bluffs are covered with a thick growth of beautiful green moss. The water trickling down through this delicate green robe deposits its pure, white crystals of lime on stem, and branch, and leaf. The moss continues to grow, and the concretions continue to form, till finally there are great masses of this calcareous tufa that perfectly preserve the form of leaf, branch and stem of this "petrified moss." Beautiful specimens of this tufa may be obtained at "The Caves," on the farm of Mr. Turner, near the mouth of Flint Creek. There are three of these caves but a short distance apart. They are very small, and aside from the beautiful concretions that are continually forming around them, they possess but few interesting features. The first is a small room about 10x20 feet in size; the second is about 15x30, and the dimensions of the last about 12x30. Their height is from five to seven feet. A section of the bluff at this point shows the following:

SECTION.

Soil and gravel	20 ft.
Dark gray and blue limestones, in thin ledges, with shaly partings	30 ft.
Total	50 ft.

The water is continually dropping from the roofs of the caves. The floor is hollowed out in one of them, and quite a pond is formed. The water, dropping from the roof, makes a continual splash, splash, splash, in the water beneath.

Flint Bar, in the Wabash bottom, about a mile below the mouth of Flint Creek, and just over the line in Fountain County, is a great mass of silicious deposits. The stone lies in ledges four to eight inches in thickness. It is evenly bedded, and the exposed layers have the appearance of compact silicious limestones. But they lack tenacity. A single blow with a light hammer will break a block one by two feet in size into 50 or 100 pieces. The "bar" covers many acres, and the whole surface is covered with small, angular fragments of these broken flints. The

pieces are usually in small flakes from one inch to four or five inches in length. No better metal is found anywhere for highway purposes or street improvements. The deposit is practically inexhaustible. The streets of Lafayette have been largely paved with this material, and its permanent qualities have been thoroughly tested. It packs evenly, and is the most durable material yet known. This deposit lies below the limestones and shales exposed on Flint Creek. These beds belong to Mr. Amos Welsch, of West Point, Tippecanoe County. The following section of the bar was obtained:

SECTION.

Bed of flint flakes	1 ft. 3 in.
First ledge of chert	6 in.
Second ledge, dark blue flint	8 in.
Third ledge, grayish color	4 in.
Fourth ledge, dark blue	8 in.
Fifth ledge, dark blue	8 in.
Total	4 ft. 1 in.

On the farm of Mr. A. J. Swaney, one mile south-east of West Point, on the main branch of Flint Creek, is an exposure of fifteen feet of soft, silicious shales. They form the east bluff of the creek at this point. The ledge is nearly perpendicular here. These shales are in layers two to ten inches in thickness. The top of the ledge contains no fossils, but for a thickness of about two feet at the bottom fossils are found quite plentifully. Among the fossils identified are: *Nautilus clarkanus*, poorly preserved; another *Nautilus*, species undetermined; *Spirifera striatiformis*, *Spirifera* like *camerata*, *Productus Indianensis*, *P. biserialis*, *P. semi-reticulatus*, *Discinas*, *Terebratulas*, *Lingulas*, and several species of Bryozoans. About one-fourth of a mile down the creek in the limestones are found *Allorismas*, *Grammysias*, *Nuculas*, *Spirifers*, *Producti*, crinoid stems, Bryozoans and well-preserved specimens of *Nautilus clarkanus*. About one-fourth of a mile north-east of West Point, immediately back of the cemetery, is a limestone bluff from ten to twenty feet in height. It is on the north side of the creek, and is about 200 yards in length. The ledge forming the bluff consists of shales and limestones in alternate layers near the top, but lower down the ledge consists of compact layers of limestone in layers four inches to one foot in thickness. This is the best foundation stone found in the county among the limestones. The abutments of the West Point bridge were made of this stone several years ago, and the thorough test given there proves its durability. None of this stone works easily. It breaks with an irregular fracture, and does not rough-dress well. Nearly all the fossils mentioned above were found at this quarry. The Bryozoans, alone, were absent. About 200 yards above the cemetery, in the limestone taken from the creek bed,

were found, in addition to the fossils already mentioned, several species of fucoids, *Euprops* ———? a *Phallipsia*, species undetermined, and another crustacean.

At West Point the limestone is found, in digging wells, from 8 to 12 feet below the surface. The following is the section of Mr. Welsch's well, on section 18, township 22, range 5:

SECTION OF MR. WELSCH'S WELL.

Soil	2 ft.
Sand and gravel.	16 ft.
Solid limestone	30 ft.
Water at	48 ft.

North of the residence of Mr. Welsch the limestone is not reached in the wells. Approaching the Wabash River the erosions have been deeper and deeper, and near the river wells bored to the depth of 130 feet do not pass through the immense deposit of gravel. At the residence of Dr. Adkins, one mile east of West Point, the limestone was found ten feet beneath the surface. The Doctor's residence is on High Gap Ridge. The following is a section of his well:

SECTION.

Soil and gravel.	10 ft.
Shaly limestone	12 ft.
Water at	22 ft.

In the Wabash bottoms, opposite Black Rock, on the farm of Mr. M. E. Sherry, these limestones are found from one to four feet below the surface. In draining the swamps and bogs near the bluffs, ditches have to be cut down through these shales from one to six feet in depth. No fossils were found here.

CHESTER GROUP.

The rocks of this group are not extensively exposed in Tippecanoe County. They are found only on Flint Creek at three points. They crop out on the farm of Mr. A. J. Swaney, about one and one-fourth miles south-east of West Point. They occur also on the main branch of Flint Creek, on the farm of Mr. J. C. Whitehead, near his saw-mill. They are also exposed on the South Fork of Flint Creek, about one mile south of West Point. These rocks, as they occur here, are of a bright yellow color, generally. They are a fine sandstone, very light and porous, yet very firm and elastic. They are very hard to break with a hammer. They do not split evenly, and are hard to work into any desired shape. These yellow stones are known locally as "fire-stone," as fire seems to have no effect upon them, except to make them harder. They have been

largely used in the place of fire brick for furnaces, and in the early settlement of the county, they were used exclusively for fire-places to chimneys. Wherever the old fashioned fire-places are yet in use these "fire-stones" form the jambs and back walls. They make durable foundation stones, and are largely used for that purpose also. They are found overlying the St. Louis limestones and shales, but separated from them by a stratum of sandstone about two to three feet in thickness, of a yellowish gray color. This gray stone has been manufactured into grindstones to some extent for local use, but it is too soft for satisfactory use. The finer qualities of it make a good, coarse whetstone. The greatest thickness of these beds yet found is about ten feet. An exposure on the farm of Mr. Swaney shows the following:

SECTION.

Yellow sandstone, layers 4 to 10 inches	8 ft.
Gray sandstone, layers 3 to 6 inches	2 ft.
Total	10 ft.

In a well at his residence, Mr. A. J. Swaney found this sandstone only four feet below the surface. The following is the section of Mr. Swaney's well:

SECTION.

Soil and gravel.	4 ft.
Yellow sandstone.	2 ft. 6 in.
Grayish sandstone	2 ft.
Limestone	10 ft.
Water at	18 ft. 6 in.

Near Mr. Whitehead's mill, two miles south-east of West Point, this stone is found in the bed of Flint Creek. There are only four feet of the yellow sandstone exposed. It has been quarried here to a limited extent. It is taken out in blocks 8 to 12 inches in thickness, and of almost any size desired. Mr. Whitehead uses it instead of fire brick in his mill furnaces. Aside from the purposes enumerated above, this stone possesses little value. The extent of the deposit seems to be limited to a small area. It is found only at the tops of the highest hills and ridges, extending over a few hundred acres, except at the one exposure at Mr. Whitehead's mill, on Flint Creek. No fossils of any kind were found in it.

CONGLOMERATE SANDSTONE.

Very little of this rock is found in this county. But two exposures are known, and it is probable that no others occur in the county. The two outcrops mentioned occur on the farms of Charles Schwomberger, and Charles Ad, just at the Warren County line, and but a mile or so north of the point where the Wabash River strikes the line of Warren County. On the farm of Charles Ad, the south bluff of a deep hollow that enters