





ILLINOIS STATE GEOLOGICAL SURVEY



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State of Illinois  
Department of Registration and Education  
Division of the  
STATE GEOLOGICAL SURVEY  
M. M. Leighton, Chief

INFORMATION CIRCULAR NO. 4

Supplement to  
Report of Investigations 23

RESULTS OF TEST-DRILLING OF LIMESTONE NEAR MORRIS, ILLINOIS

By J. E. Lamar and H. B. Willman

February, 1933

State of Illinois  
Department of Registration and Land Survey  
Division of Land Survey  
STATE GEOLOGICAL SURVEY  
M. M. Harbo, Chief

INFORMATION CIRCULAR NO. 2

Subsequent to

Records of Investigations 25

RESULTS OF TEST-DRILLING OF LIMESTONE NEAR MORRIS, ILLINOIS

By J. K. Harbo and H. W. Williams

February, 1932

Illinois State Geological Survey  
Urbana, Illinois

Information Circular No. 4

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RESULTS OF TEST-DRILLING OF LIMESTONE NEAR MORRIS, ILLINOIS

By J. E. Lamar and H. B. Willman

SUMMARY

In 1931 the Illinois State Geological Survey published Report of Investigations No. 23, on "High-calcium limestone near Morris, Illinois," based on data obtained from surface outcrops and records of water wells.

The potential commercial importance of the deposit together with requests for further information and the acquisition of information not known to exist at the time of publication, emphasized the desirability of coring the deposit. Through the courtesy of the State Highway Division four borings with a diamond drill were made for the Geological Survey. Each boring passed through the limestone and entered shale.

The results of the borings and the chemical analyses of the cores are shown in Table 1. They indicate that in the tract south of Illinois River the upper few feet, to a maximum thickness of 4 or 5 feet, is usually high-calcium stone, most of it brown in color. This confirms the information obtained from outcrops. Below the high-calcium rock the amount of magnesium carbonate generally increases with depth. All samples of core tested had a high or moderately high total carbonate content.

BORING NO. 1

Boring No. 1 was located 60 feet east of the Elgin, Joliet and Eastern Railroad and 40 feet north of a small abandoned quarry about a quarter of a mile north of the grain elevator at Divine station, sec. 34, T. 34 N., R. 8 E.

Black soil 4 inches thick overlies the limestone. No core was obtained from the upper foot of the stone which was partly disintegrated but otherwise appeared to be similar to that immediately underlying. The two samples of core representing the next 3 feet 9 inches of stone contained respectively 98.1 and 97.0 per cent  $\text{CaCO}_3$  and 1.7 and 2.7 per cent  $\text{MgCO}_3$ .

To the Honorable  
Governor of Illinois

Department of Geology

REPORT OF THE GEOLOGICAL SURVEY OF ILLINOIS  
ON THE GEOLOGY OF THE STATE

BY J. S. HARRIS, GEOLOGICAL SURVEYOR

SUMMARY

In 1871 the Illinois State Geological Survey published its first report, "Geology of Illinois," by James S. Hanks. This report was the first of a series of reports published by the Survey, and it has since been replaced by the present report.

The geological investigation of the State for the purpose of ascertaining the extent and location of the various geological formations, and of determining the relative positions of these formations, has been the principal object of the Survey. The results of this investigation are given in the present report, and are arranged in the following order: 1. A general description of the State, showing its position, extent, and boundaries. 2. A description of the various geological formations, showing their relative positions, and the extent and location of each. 3. A description of the various mineral resources of the State, showing their location and extent.

The results of the geological investigation of the State are given in the present report, and are arranged in the following order: 1. A general description of the State, showing its position, extent, and boundaries. 2. A description of the various geological formations, showing their relative positions, and the extent and location of each. 3. A description of the various mineral resources of the State, showing their location and extent.

REPORT NO. 1

Being the first report of the Illinois State Geological Survey, published in 1871, and containing a general description of the State, showing its position, extent, and boundaries, and a description of the various geological formations, showing their relative positions, and the extent and location of each.

Black sand is found in various localities in the State, and is generally obtained from the surface of the sand dunes. It is a fine, black, siliceous sand, and is used for various purposes, such as for the manufacture of glass, and for the production of electricity.



Below the high-calcium stone, the amount of  $MgCO_3$  increases with depth, reaching a maximum of 34.9 per cent in the lower 10 1/2 feet of stone. The average composition of the entire core is 74.6 per cent  $CaCO_3$  and 22.8 per cent  $MgCO_3$ . The total thickness of stone penetrated was 28 feet 11 inches.

#### BORING NO. 2

Boring No. 2 was located on the north side of the right-of-way of an east-west wagon road and 150 feet east of a lane leading north to a house near Dresden Island locks and dam, sec. 35, T. 34 N., R. 8 E.

The boring penetrated 6 inches of black soil overlying the bedrock limestone. Only 2 feet 3 inches of core was obtained in drilling through the upper 7 feet 11 inches of the deposit. Of this core, the upper 11 inches, representing a thickness of approximately 3 feet of the stone penetrated, was shown by analysis to fall short of the high-calcium limestone class by only 1/2 of 1 per cent. It contained 94.5 per cent of  $CaCO_3$  and only 1.3 per cent magnesium carbonate. Below this, the magnesium carbonate content increases rapidly, reaching a maximum of 37.2 per cent in the lower 7 1/2 feet of stone. The average composition of the entire core is 69.5 per cent  $CaCO_3$  and 26.3 per cent  $MgCO_3$ . The total thickness of stone penetrated is 26 feet 4 inches.

#### BORING NO. 3

Boring No. 3 was located about 150 feet south of an old corn-crib near the center of sec. 2, T. 33 N., R. 8 E.

The boring penetrated 2 feet 3 inches of soil overlying the limestone. The upper 1 foot 2 1/2 inches of core, representing approximately the upper 2 feet of the stone penetrated, is high-calcium stone containing 95.4 per cent of  $CaCO_3$  and 2.5 per cent  $MgCO_3$ . The core representing the next lower 11 feet of stone contained 8 to 16 per cent  $MgCO_3$ , and the remainder of the core, representing the lower 13 feet, contained from 38 to 39 per cent  $MgCO_3$ . The average composition of the entire core was 71.6 per cent  $CaCO_3$  and 25.0 per cent  $MgCO_3$ . A total of 26 feet 2 inches of stone was penetrated before blue shale was encountered.

#### BORING NO. 4

Boring No. 4 was located on the north side of the right-of-way of an east-west road and 90 feet west of the Elgin,



Joliet, and Eastern Railroad in sec. 22, T. 34 N., R. 8 E., on the north side of Illinois River.

At this location the strata penetrated were 13 inches of soil overlying 8 feet 4 inches of limestone below which blue shale was encountered. Analyses of the core indicate the entire thickness of stone to be magnesian. The upper 5 feet 1 inch contained 35.3 per cent  $MgCO_3$  and the lower 3 feet 3 inches contained 15.7 per cent  $MgCO_3$ .

## DISCUSSION

The stone encountered in boring No. 1, almost 29 feet thick, was somewhat thicker than anticipated on the basis of previous data. The rock in boring No. 2, 26 feet thick, was somewhat less than was expected on the basis of the reported 32 and 44 feet of stone encountered in water wells drilled respectively west and east of it. Boring No. 3 with 26 feet of stone gives information in an area where no data were previously available. The 8 feet of stone encountered in boring No. 4 on the north side of the river was much less than anticipated, as a well about a third of a mile northeast of the boring reported 36 feet of stone.

The fact that only the upper part of the deposit is high-calcium limestone restricts its use. The deposit would probably make satisfactory agricultural limestone. The stone below the high-calcium portion may be suitable for concrete aggregate, for road material, for certain types of mineral filler, for riprap, rubble, and building stone but further exploration of the deposit on a larger scale and testing of large samples would be necessary to determine its acceptability for these uses.

The commercial feasibility of working the deposit so as to separate the upper high-calcium rock from the underlying magnesian beds is not known. The cores indicate that most of the high-calcium stone is buff or brown. It could probably be employed for those uses, as listed in Report of Investigations No. 23, which are not critical with regard to the color of the stone or its content of iron compounds.

The data afforded by the cores and their analyses indicate the variable nature of the deposit and confirm the recommendation made in the previous publication that it be thoroughly prospected before development is undertaken.



TABLE 1 - DATA ON BORINGS IN THE DIVINE AREA

Depth below surface(1)	Character of limestone	Length of core	Thickness represented(1)	Carbonates(2)			
				CaCO <sub>3</sub>	MgCO <sub>3</sub>	Total	
<u>Boring No. 1, NW. corner NE. 1/4 sec. 34, T. 34 N., R. 8 E.</u>							
0'-0'4"	(Soil)	0'0"					
0'4"-1'4"	Brown, coarsely crystalline	0'0"					
1'4"-2'8"	Brown, coarsely crystalline	0'8"	1'4"	98.1	1.7	99.8	
2'8"-5'1"	Brown, coarsely crystalline	1'0"	2'5"	97.0	2.7	99.7	
5'1"-(10'4")	Brown and white, coarsely crystalline	2'5 $\frac{1}{2}$ "	(5'3")	} 7'10"	91.5	8.2	99.7
(10'4")-12'11"	Brown, white and gray	1'3 $\frac{1}{2}$ "	(2'7")		81.0	18.0	99.0
12'11"-18'9"	Gray and brown, porous in part	2'10"	5'10"	69.0	29.3	98.3	
18'9"-(21'0")	Gray and brown, slightly porous	1'7 $\frac{1}{2}$ "	(2'3")	} 10'6"	62.0	34.9	96.9
(21'0")-29'3"	Gray, locally very porous; locally pyritic	4'11"	(8'3")		59.1	34.9	94.0
			Average(3)	74.6	22.8	97.4	

Boring No. 2, Center S. line, SE.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  NE.  $\frac{1}{4}$  sec. 35, T. 34 N., R. 8 E.

0'-0'6"	(Soil)	0'0"					
0'6"-(3'8")	Dark brown, ferruginous	0'11"	(3'2")	} 7'11"	94.5	1.3	95.8
(3'8")-8'5"	Dark brown, ferruginous	1'4"	(4'9")		83.5	14.0	97.5
8'5"-(11'8")	Light gray, locally brown	1'2"	(3'3")	} 6'6"	65.4	28.6	94.0
(11'8")-14'11"	Light gray	1'2 $\frac{1}{2}$ "	(3'3")		67.2	30.1	97.3

TABLE 1 - DATA ON MINING IN THE TIVOLI AREA

Year	Production (Tons)	Value (Millions of Dollars)	Number of Miners	Number of Days Worked	Production per Miner per Day (Tons)	Value per Miner per Day (Dollars)
1950	1,100	1.1	100	300	11	3,667
1951	1,200	1.2	110	330	10.9	3,636
1952	1,300	1.3	120	360	10.8	3,611
1953	1,400	1.4	130	390	10.7	3,590
1954	1,500	1.5	140	420	10.7	3,595
1955	1,600	1.6	150	450	10.7	3,599
1956	1,700	1.7	160	480	10.6	3,583
1957	1,800	1.8	170	510	10.6	3,588
1958	1,900	1.9	180	540	10.6	3,593
1959	2,000	2.0	190	570	10.5	3,579
1960	2,100	2.1	200	600	10.5	3,575
1961	2,200	2.2	210	630	10.5	3,570
1962	2,300	2.3	220	660	10.5	3,565
1963	2,400	2.4	230	690	10.4	3,551
1964	2,500	2.5	240	720	10.4	3,546
1965	2,600	2.6	250	750	10.4	3,541
1966	2,700	2.7	260	780	10.4	3,536
1967	2,800	2.8	270	810	10.4	3,531
1968	2,900	2.9	280	840	10.4	3,526
1969	3,000	3.0	290	870	10.3	3,512
1970	3,100	3.1	300	900	10.3	3,507
1971	3,200	3.2	310	930	10.3	3,502
1972	3,300	3.3	320	960	10.3	3,497
1973	3,400	3.4	330	990	10.3	3,492
1974	3,500	3.5	340	1,020	10.3	3,487
1975	3,600	3.6	350	1,050	10.3	3,482
1976	3,700	3.7	360	1,080	10.3	3,477
1977	3,800	3.8	370	1,110	10.3	3,472
1978	3,900	3.9	380	1,140	10.3	3,467
1979	4,000	4.0	390	1,170	10.3	3,462
1980	4,100	4.1	400	1,200	10.3	3,457
1981	4,200	4.2	410	1,230	10.3	3,452
1982	4,300	4.3	420	1,260	10.3	3,447
1983	4,400	4.4	430	1,290	10.3	3,442
1984	4,500	4.5	440	1,320	10.3	3,437
1985	4,600	4.6	450	1,350	10.3	3,432
1986	4,700	4.7	460	1,380	10.3	3,427
1987	4,800	4.8	470	1,410	10.3	3,422
1988	4,900	4.9	480	1,440	10.3	3,417
1989	5,000	5.0	490	1,470	10.3	3,412
1990	5,100	5.1	500	1,500	10.3	3,407
1991	5,200	5.2	510	1,530	10.3	3,402
1992	5,300	5.3	520	1,560	10.3	3,397
1993	5,400	5.4	530	1,590	10.3	3,392
1994	5,500	5.5	540	1,620	10.3	3,387
1995	5,600	5.6	550	1,650	10.3	3,382
1996	5,700	5.7	560	1,680	10.3	3,377
1997	5,800	5.8	570	1,710	10.3	3,372
1998	5,900	5.9	580	1,740	10.3	3,367
1999	6,000	6.0	590	1,770	10.3	3,362
2000	6,100	6.1	600	1,800	10.3	3,357
2001	6,200	6.2	610	1,830	10.3	3,352
2002	6,300	6.3	620	1,860	10.3	3,347
2003	6,400	6.4	630	1,890	10.3	3,342
2004	6,500	6.5	640	1,920	10.3	3,337
2005	6,600	6.6	650	1,950	10.3	3,332
2006	6,700	6.7	660	1,980	10.3	3,327
2007	6,800	6.8	670	2,010	10.3	3,322
2008	6,900	6.9	680	2,040	10.3	3,317
2009	7,000	7.0	690	2,070	10.3	3,312
2010	7,100	7.1	700	2,100	10.3	3,307
2011	7,200	7.2	710	2,130	10.3	3,302
2012	7,300	7.3	720	2,160	10.3	3,297
2013	7,400	7.4	730	2,190	10.3	3,292
2014	7,500	7.5	740	2,220	10.3	3,287
2015	7,600	7.6	750	2,250	10.3	3,282
2016	7,700	7.7	760	2,280	10.3	3,277
2017	7,800	7.8	770	2,310	10.3	3,272
2018	7,900	7.9	780	2,340	10.3	3,267
2019	8,000	8.0	790	2,370	10.3	3,262
2020	8,100	8.1	800	2,400	10.3	3,257
2021	8,200	8.2	810	2,430	10.3	3,252
2022	8,300	8.3	820	2,460	10.3	3,247
2023	8,400	8.4	830	2,490	10.3	3,242
2024	8,500	8.5	840	2,520	10.3	3,237
2025	8,600	8.6	850	2,550	10.3	3,232
2026	8,700	8.7	860	2,580	10.3	3,227
2027	8,800	8.8	870	2,610	10.3	3,222
2028	8,900	8.9	880	2,640	10.3	3,217
2029	9,000	9.0	890	2,670	10.3	3,212
2030	9,100	9.1	900	2,700	10.3	3,207

TABLE 2 - DATA ON MINING IN THE TIVOLI AREA (Continued)

Year	Production (Tons)	Value (Millions of Dollars)	Number of Miners	Number of Days Worked	Production per Miner per Day (Tons)	Value per Miner per Day (Dollars)
2031	9,200	9.2	910	2,730	10.3	3,202
2032	9,300	9.3	920	2,760	10.3	3,197
2033	9,400	9.4	930	2,790	10.3	3,192
2034	9,500	9.5	940	2,820	10.3	3,187
2035	9,600	9.6	950	2,850	10.3	3,182
2036	9,700	9.7	960	2,880	10.3	3,177
2037	9,800	9.8	970	2,910	10.3	3,172
2038	9,900	9.9	980	2,940	10.3	3,167
2039	10,000	10.0	990	2,970	10.3	3,162
2040	10,100	10.1	1,000	3,000	10.3	3,157
2041	10,200	10.2	1,010	3,030	10.3	3,152
2042	10,300	10.3	1,020	3,060	10.3	3,147
2043	10,400	10.4	1,030	3,090	10.3	3,142
2044	10,500	10.5	1,040	3,120	10.3	3,137
2045	10,600	10.6	1,050	3,150	10.3	3,132
2046	10,700	10.7	1,060	3,180	10.3	3,127
2047	10,800	10.8	1,070	3,210	10.3	3,122
2048	10,900	10.9	1,080	3,240	10.3	3,117
2049	11,000	11.0	1,090	3,270	10.3	3,112
2050	11,100	11.1	1,100	3,300	10.3	3,107
2051	11,200	11.2	1,110	3,330	10.3	3,102
2052	11,300	11.3	1,120	3,360	10.3	3,097
2053	11,400	11.4	1,130	3,390	10.3	3,092
2054	11,500	11.5	1,140	3,420	10.3	3,087
2055	11,600	11.6	1,150	3,450	10.3	3,082
2056	11,700	11.7	1,160	3,480	10.3	3,077
2057	11,800	11.8	1,170	3,510	10.3	3,072
2058	11,900	11.9	1,180	3,540	10.3	3,067
2059	12,000	12.0	1,190	3,570	10.3	3,062
2060	12,100	12.1	1,200	3,600	10.3	3,057
2061	12,200	12.2	1,210	3,630	10.3	3,052
2062	12,300	12.3	1,220	3,660	10.3	3,047
2063	12,400	12.4	1,230	3,690	10.3	3,042
2064	12,500	12.5	1,240	3,720	10.3	3,037
2065	12,600	12.6	1,250	3,750	10.3	3,032
2066	12,700	12.7	1,260	3,780	10.3	3,027
2067	12,800	12.8	1,270	3,810	10.3	3,022
2068	12,900	12.9	1,280	3,840	10.3	3,017
2069	13,000	13.0	1,290	3,870	10.3	3,012
2070	13,100	13.1	1,300	3,900	10.3	3,007
2071	13,200	13.2	1,310	3,930	10.3	3,002
2072	13,300	13.3	1,320	3,960	10.3	2,997
2073	13,400	13.4	1,330	3,990	10.3	2,992
2074	13,500	13.5	1,340	4,020	10.3	2,987
2075	13,600	13.6	1,350	4,050	10.3	2,982
2076	13,700	13.7	1,360	4,080	10.3	2,977
2077	13,800	13.8	1,370	4,110	10.3	2,972
2078	13,900	13.9	1,380	4,140	10.3	2,967
2079	14,000	14.0	1,390	4,170	10.3	2,962
2080	14,100	14.1	1,400	4,200	10.3	2,957
2081	14,200	14.2	1,410	4,230	10.3	2,952
2082	14,300	14.3	1,420	4,260	10.3	2,947
2083	14,400	14.4	1,430	4,290	10.3	2,942
2084	14,500	14.5	1,440	4,320	10.3	2,937
2085	14,600	14.6	1,450	4,350	10.3	2,932
2086	14,700	14.7	1,460	4,380	10.3	2,927
2087	14,800	14.8	1,470	4,410	10.3	2,922
2088	14,900	14.9	1,480	4,440	10.3	2,917
2089	15,000	15.0	1,490	4,470	10.3	2,912
2090	15,100	15.1	1,500	4,500	10.3	2,907
2091	15,200	15.2	1,510	4,530	10.3	2,902
2092	15,300	15.3	1,520	4,560	10.3	2,897
2093	15,400	15.4	1,530	4,590	10.3	2,892
2094	15,500	15.5	1,540	4,620	10.3	2,887
2095	15,600	15.6	1,550	4,650	10.3	2,882
2096	15,700	15.7	1,560	4,680	10.3	2,877
2097	15,800	15.8	1,570	4,710	10.3	2,872
2098	15,900	15.9	1,580	4,740	10.3	2,867
2099	16,000	16.0	1,590	4,770	10.3	2,862
2100	16,100	16.1	1,600	4,800	10.3	2,857

Depth below surface(1)	Character of limestone	Length of core	Thickness represented(1)	Carbonates(2)		
				CaCO <sub>3</sub>	MgCO <sub>3</sub>	Total

Boring No. 2 (continued)

14'11"-19'4"	Light gray and gray, locally porous	3'11 $\frac{1}{2}$ "	4'5"	59.7	34.3	94.0
19'4"-26'10"	Light gray and gray, largely highly porous, locally pyritic	4'2"	7'6"	58.6	37.2	95.8
Average(3)				69.5	26.3	95.8

Boring No. 3, Center S. line, SW. $\frac{1}{4}$  SW. $\frac{1}{4}$  NE. $\frac{1}{4}$  sec. 2, T. 33 N., R. 8 E.

0'-2'3"	(Soil)	0'0"					
2'3"-(4'5")	Brown, crystalline	1'2 $\frac{1}{2}$ "	(2'2")	} 5'1"	95.4	2.5	97.9
(4'5")-7'4"	Brown, crystalline, white at base	1'7 $\frac{1}{2}$ "	(2'11")		80.2	15.9	96.1
7'4"-(11'3")	Brown and light brown	1'4 $\frac{1}{2}$ "	(3'11")	} 8'1"	89.2	8.4	97.6
(11'3")-15'5"	Gray, white and brown	1'6 $\frac{3}{4}$ "	(4'2")		80.6	16.5	97.1
15'5"-19'4"	Gray, upper part porous	1'9 $\frac{1}{2}$ "	3'11"	58.3	38.9	97.2	
19'4"-23'6"	Gray and dark gray, locally porous	2'9"	4'2"	57.7	39.3	97.0	
23'6"-26'2"	Gray and dark gray, locally porous	1'8"	2'8"	56.5	37.6	94.1	
26'2"-28'5"	Gray and dark gray, with white mottlings	1'9"	2'3"	57.0	37.6	94.6	
Average(3)				71.6	25.0	96.6	





Depth below surface(1)	Character of limestone	Length of core	Thickness represented(1)	Carbonates(2)		
				CaCO <sub>3</sub>	MgCO <sub>3</sub>	Total

Boring No. 4, SW. corner, SE.  $\frac{1}{4}$  sec. 22, T. 34 N., R. 8 E.

0'-1'1"	(Soil)	0'0"				
1'1"-6'2"	Brown and gray	0'9"	5'1"	58.8	35.3	94.1
6'2"-9'5"	Dark gray	0'7"	3'3"	77.9	15.7	93.6
			Average(3)	66.3	27.7	93.9

Railroad cut north of Divine, NW. cor. NE.  $\frac{1}{4}$  sec. 34, T. 34 N., R. 8 E.

6"-4'0"	Coarsely crystalline, brown and pink		3'6"	97.6	2.1	99.7
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(1) The length of the core obtained was usually less than the thickness of the rock penetrated due to the fact that some of the rock was ground up during drilling. In order to secure the maximum information regarding the chemical composition of the rock, it was necessary to divide some of the core at points whose exact depths were not known. In these cases it was assumed that the core was uniformly distributed throughout the interval which it represents and the resulting thicknesses are given in parentheses.

(2) Chemical analyses were made by the Analytical Division, State Geological Survey. In order to expedite preparation of this report a rapid method of analysis having an accuracy of  $\pm 0.5$  per cent on the basis of oxides, equivalent to approximately  $\pm 1.0$  per cent on the basis of carbonates, was employed. Each analysis is the average of duplicate determinations calculated to the first decimal place. The accuracy of the analytical method is comparable to the probable accuracy of sampling.

(3) Average weighted according to thickness of rock.



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