

STATE OF MICHIGAN  
MICHIGAN GEOLOGICAL AND BIOLOGICAL  
SURVEY.

Publication 22. Geological Series 18.  
BIENNIAL REPORT OF THE DIRECTOR  
AND  
REPORT ON RETRACEMENT AND PERMANENT  
MONUMENTING OF THE MICHIGAN-OHIO  
BOUNDARY.

Published as a part of the Annual Report of the Board of  
Geological and Biological Survey for 1916.

Lansing, Michigan  
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1916

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**LETTER OF TRANSMITTAL.**

*To the Honorable, the Board of Geological and  
Biological Survey of the State of Michigan:*

Gov. Woodbridge N. Ferris.  
Hon. Fred L. Keeler.  
Hon. Thomas W. Nadal.

Gentlemen:—I have the honor to transmit herewith an  
administrative report for the biennium ending June 30th,  
1916, with the recommendation that it be printed and  
bound as Publication 22, Geological Series 18.

Very respectfully,  
R. C. ALLEN,  
Director.

Lansing, Michigan,  
July 30, 1916.

**ORGANIZATION OF THE  
GEOLOGICAL AND BIOLOGICAL  
SURVEY.**

The Board of Geological Survey was created in 1869 for  
the purpose of making a thorough geological and  
mineralogical survey of the state. In 1905 the Board was  
authorized and directed to make "a thorough biological  
survey of the state" and to engage with the federal  
government in a co-operative topographic survey of  
Michigan. In 1911 the duties which prior had devolved  
on a Commissioner of Mineral Statistics were transferred  
to the Board of Geological Survey, and in 1913 co-  
operative relations were established with the Board of  
State Tax Commissioners for the appraisal of mines and  
mineral lands for taxation.

The present organization of the Survey embraces three  
departments, viz.:

- (1) The Geological Survey, including three separate  
divisions, which are
  - (a) Division of Geology,
  - (b) Division of Appraisals,
  - (c) Division of Mineral Statistics.
- (2) The Topographic Survey.
- (3) The Biological Survey.

**EXPENDITURES.**

The act of 1869 provides a fund of \$8,000.00 per annum  
for the Board of Geological Survey, but since 1905 this

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Name	Position	Amount of salary received	Period of time employed	How employed					
				Mineral resources	Geology	Appraisal of mines	Topography	Biology	Michigan-Ohio boundary
Allen, H. J.	Rodman	\$172 56	4 months, 10 days						
Allen, R. C.	Director, State Geologist, Appraiser of Mines	6,957 90	2 years	*	*	*	*	*	*
Ayersson, Miles C.	Rodman	75 00	2 months						
Andrews, A. W.	Naturalist	75 00	Contract						
Barrett, L. P.	Assistant Geologist	2,319 00	2 years	*	*	*	*	*	*
Batson, Geo. R.	Rodman	101 94	31 months						
Bauschamp, Rogie	Gage Reader	77 90	1 year, 1 month, 6 days						
Bemis, E. L.	Topographic Aid	29 00	60 days						
Bibson, E. C.	Topographic Aid	461 94	6 months						
Brown, Floyd B.	Compassman	94 67	2 months, 11 days						
Bunge, Wm. H.	Rodman	30 67	23 days						
Burney, Alfred R.	Topographic Aid	24 10	13 days						
Burney, E. E.	Junior Topographer	173 20	2 months, 22 days						
Burrell, P. H.	Rodman	181 50	41 months						
Campbell, C. Alfred	Compassman	100 00	2 months						
Christie, Wm. J.	Rodman	40 00	3 months						
Coy, Edmund S.	Rodman	162 00	4 months, 3 days						
Davis, C. M.	Rodman	110 00	41 months						
Dolan, C. H.	Rodman	173 20	Contract						
Ehlen, Geo. M.	Palaeontologist	150 25	Contract						
Felland, Christopher	Rodman	20 00	1 month						
Fennell, Samuel S.	Palaeontologist	450 00	18 hours						
Graban, A. W.	Palaeontologist	450 00	Contract						
Graban, John	Palaeontologist	8 50	16 hours and contract						
Hagle, Mand	Copier	8 50	16 hours and contract						

EMPLOYEES OF THE BOARD OF GEOLOGICAL SURVEY FOR THE FISCAL YEARS JULY 1, 1914 TO JUNE 30, 1915 AND JULY 1, 1915 TO JUNE 30, 1916.—Continued.

Name	Position	Amount of salary received	Period of time employed	How employed					
				Mineral resources	Geology	Appraisal of mines	Topography	Biology	Michigan-Ohio boundary
Hahn, E. L.	Assistant Topographer	\$75 00	2 months, 8 days						
Hall, M. J.	Topographer	250 84	11 months						
Hankinson, G. H.	Mining Engineer	4,800 00	2 years	*	*	*	*	*	*
Harris, George	Rodman	29 20	Contract						
Hicks, Wm. H.	Rodman	21 94	17 days						
Hodge, Guy	Rodman	51 61	1 month, 9 days						
Hodges, W. E.	Rodman	20 00	1 month						
Hyde, Jos.	Compassman	500 00	2 years	*	*	*	*	*	*
Jackson, E. H.	Rodman	20 67	1 month, 18 days						
Johnson, A. H.	Rodman	20 84	20 days						
Jones, Oscar	Topographic Engineer	283 08	11 months						
Kavanaugh, A. J.	Junior Topographer	184 30	1 month, 18 days						
Kendrick, Geo. F.	Rodman	50 81	22 days						
Krisie, Wm. Earl	Rodman	31 94	22 days						
Lair, Louis	Rodman	178 44	1 month, 12 days						
Lansing, Howard S.	Rodman	20 00	1 month						
Lee, L.	Assistant Topographer	757 08	8 months						
Leiston, L.	Recorder	150 00	2 months						
McKee, Don. T.	Rodman	248 67	41 months						
Madison, Robert	Topographic Engineer	766 12	4 months						
Murphy, J. J.	Rodman	20 65	18 days						
Nason, Alfred	Rodman	20 00	1 month						
Navy, Frank	Naturalist	82 00	Contract						
Nutt, H. Harrison	Rodman	20 00	1 month						
Ogden, Alfred L.	Topographic Aid	40 00	31 months						
Phillips, R. H.	Rodman	20 00	1 month						
Pratt, R. W. Alfab	Rodman	20 00	Contract						
Richardson, G. R.	Rodman	20 00	Contract						
Richmond, Marian	Office Assistant	6 00	6 days						
Richmond, Mrs. R. V.	Stenographer	1,788 00	2 years	*	*	*	*	*	*
Rulison, A. G.	Chief Naturalist	800 00	2 years	*	*	*	*	*	*
Sedler, C. L.	Topographic Engineer	400 00	1 month, 9 days						
Sawyer, Mrs. M. M.	Office Assistant	6 00	6 days						
Saxon, William, Jr.	Rodman	20 00	1 month						
Scott, William, Jr.	Rodman	27 68	11 months						
Schwartz, Joe	Cook	270 00	41 months						
Scott, L. D.	Geologist	280 00	3 months, 4 days						
Seimney, H. S.	Topographer	37 50	1 month						
Sherman, E. R.	Inspector	200 00	Contract						
Sherrin, H.	Rodman	70 00	1 month, 12 days						
Sherrin, H.	Geologist	3,384 66	2 years	*	*	*	*	*	*
Sorenson, E. G.	Chairman	60 00	1 month, 5 days						
Spencer, O. L.	Biologist	200 00	Contract						
Stack, J. O.	Topographic Engineer	70 12	1 month						
Stane, Harry H.	Rodman	75 62	2 months						
Steele, Frank B.	Naturalist	150 00	Contract						
Thompson, Crystal	Naturalist	200 00	Contract						
Tubin, James	Cook and Compassman	110 00	1 month, 11 days						
Trueman, E. N.	Biologist	150 00	Contract						
Turnbull, W. D.	Draftsman	50 23	3 days						
Vance, E. E.	Draftsman	2,400 00	2 years	*	*	*	*	*	*
Walsh, W.	Copier	17 45	3 days						
Wellington, C. F.	Rodman	74 02	1 month, 27 days						
Whitmore, Morris T.	Rodman	58 77	1 month, 13 days						
Wight, Harry R.	Secretary	2,400 00	2 years	*	*	*	*	*	*
Wilson, J. H.	Assistant Topographer	75 87	12 days						
Wood, N. J.	Naturalist	200 00	Contract						
Yokum, R. H.	Topographic Aid	253 37	4 months, 21 days						

The Michigan Geological Survey co-operates with other departments of the government which have use for its services. Such co-operation now extends to the Board of State Tax Commissioners in appraising mineral lands and mines for taxation, to the Michigan Securities Commission in the administration of certain phases of the "blue sky" law, to the Public Domain Commission in certain matters affecting the state lands and waters, and to the Mackinac Island State Park Commission in certain work in progress on Mackinac Island. An account of this co-operative work during the biennium is given below:

## COOPERATIVE WORK.

**Cooperation with the Board of State Tax Commissioners.** In 1913 the Board of Geological Survey entered into co-operation with the Board of State Tax Commissioners, at the request of the former, in making appraisals of mines and mineral lands for taxation. The results of this co-operation are fully accounted for in the current biennial report of the Board of State Tax Commissioners.

The appraisal of mines and mineral lands for taxation is an important responsibility and demands the best efforts and professional skill of the Survey. The permanent record of this work during the biennium is embraced in two annual reports to the Board of State Tax Commissioners comprising several volumes of typewritten matter, plats, statistical tables, reports of the mining companies, and a number of communications on special subjects.

### REPORTS OF THE STATE GEOLOGIST TO THE BOARD OF STATE TAX COMMISSIONERS.

1914.

Volume 1. Contains formally executed general and financial statements of owners and operators of iron mines for the five years preceding January 1, 1914. 510 pages.

Volume 2. Contains complete record of appraisals of iron mines and iron ore bearing lands, and appraiser's descriptions and discussions of the properties. 484 pages.

Volume 3. Contains complete statistical tables for reference. 36 pages.

Volume 4. Contains statements of tonnage and value of ore in stock at the mines. 146 pages.

1915.

Volume 1. Contains formally executed general and financial statements of owners and operators of iron mines for the five years preceding January 1, 1915. 620 pages.

Volume 2. Contains complete record of appraisal of iron mines and iron ore bearing lands, and appraiser's descriptions and discussions of these properties. 560 pages.

## PROGRESS OF THE GEOLOGICAL SURVEY.

Modern trends in the work of the state and federal geological surveys indicate a rapid awakening to opportunities for useful adaptations of their activities to administrative needs of the governments. Another significant trend is toward a closer adaptation of survey work to industrial progress, particularly in the development, use, and perpetuation of natural wealth in soils, rocks, and minerals, and in some states, including Michigan, game life.

These more direct services to the government and people are made possible, however, only through investigations of a strictly scientific character and it should not be overlooked by legislatures and governing boards that progress in purely scientific geology and biology is and will ever remain the basis of progress in economic directions. A survey which fails to make the most of its resources in both of these directions, fails to discharge the obligations which opportunity and public need place upon it.

Volume 3. Contains complete statistical tables for reference. 37 pages.

Volume 4. Contains complete statistical tables for iron mines, 1906-1915 inclusive. 128 pages.

Mr. O. R. Hamilton, Mining Engineer, has rendered efficient service throughout all of the work of mine appraisals.

### Co-operation with the Public Domain

**Commission.** The resources of the Survey and the services of some of its members have been utilized by the Public Domain Commission in various ways, more especially in comparative valuations of lands involved in exchange with private parties in furtherance of its policy of consolidating the state lands and forests. The State Geologist has also acted for the Commission in investigation of trespass of sand and gravel dredgers in Lake Superior, Lake Michigan, and Lake St. Clair, and in consideration of royalty rates on sand and gravel dredged from waters wholly or partially under control of the state. On a number of occasions the State Geologist has attended meetings of the Commission, and has at all times endeavored to assist in those matters wherein his services are requested.

### Co-operation with the Michigan Securities

**Commission.** The general work of the Geological Survey and the services of some of its members are useful to the Michigan Securities Commission in the administration of the "blue sky law," particularly in considering applications of mining companies and, in some cases, land companies, for permission for sale of stocks and bonds in Michigan. Some of the matters on which advice is asked by the Commission from time to time demand very careful treatment involving investigations extending over a considerable time. In such cases the cost is borne by the applicant and paid to the individual charged with the work, who, under the regulations of the Board of Geological Survey, has the option of relief from duties without pay while engaged in such work or a corresponding reduction in vacation and sick leave.

During the biennium ending June 30, 1916, reports on the applications of the following companies were rendered to the Michigan Securities Commission:

Date.	Name and Address of Company.	Report by.
1914.		
Nov. 17	Regal Collieries, Ltd., Taber, Alberta, Canada.....	R. C. Allen.
Jan. 9	Lake Superior Land Co.....	R. C. Allen.
1915.		
June 10	White Pine Extension Copper Co.....	R. C. Allen.
July 31	Central Michigan Clay Products Co., Williamston, Michigan.....	R. C. Allen.
Sept. 24	Chelveygan County Limestone Products Co., Mackinaw City, Michigan.....	R. A. Smith.
1916.		
Jan. 24	Minook Gold Dredging Co., Seattle, Wash.....	L. P. Barrett.
April 3	Assets Realizing Mines Corporation.....	R. C. Allen.
April 25	Jerome Victor Extension Copper Co. of Arizona.....	R. C. Allen.
April 27	Butte-Elk Park Extension Mining Co. of Montana.....	R. C. Allen.
May 5	Plattville Consolidated Lead & Zinc Mining Co., Beloit, Wisconsin.....	R. C. Allen.
May 9	Silica Brick Co., Detroit, Mich.....	R. A. Smith.
June 9	Breitung Hematite Mining Co., Ltd.....	R. C. Allen.
June 29	Fullers Earth Company of America.....	R. C. Allen.

### Co-operation with the Mackinac Island State Park Commission.

The following is quoted from my last biennial report: "Probably no other locality in Michigan holds more of historical interest than the Island of Mackinac. Its natural beauty combined with its location have made it the most popular of Michigan's summer recreation grounds. A considerable part of the island is under the administration of the Mackinac Island State Park Commission, which is doing a commendable work of improvement and beautification and is maintaining and preserving the old buildings and military works of historical interest.

The geologic history of Mackinac Island is no less fascinating than its human history for there is recorded in the series of abandoned beaches, bars, spits, stacks, sea cliffs, and other shore features, a large part of the history of the ancestral Great Lakes. At the highest or Algonquin stage of the Great Lakes, Mackinac Island consisted of only a few acres of ground forming the highermost part now occupied by old Fort Holmes. As the waters of the ancient Great Lakes receded from their earlier shore lines and fell to lower and lower levels until the present stage was reached each successive lower stage was marked by its corresponding shore line features on the Island of Mackinac.

In the mapping and interpretation of these natural features of Mackinac Island the Geological Survey is not only doing an important educational work but is also furthering the plan of the Mackinac Island State Park Commission to add to the interest and enjoyment of the several hundred thousand people who annually visit the island. During the summer season of 1914 field investigations were completed, and it is planned during the winter to construct a map of the Island on a rather large scale on which the geologic and physiographic features will be delineated, this map to be accompanied by a brief descriptive text. It is also planned to call attention to the meaning and interpretation of the natural features of the island through a system of guide posts and signs to be erected by the Mackinac Island State Park Commission. The work on Mackinac Island is in charge of Mr. Frank B. Taylor to whose indefatigable labors we are indebted for much of our present knowledge of the history of the Great Lakes."

I regret to state that Mr. Taylor's health has been such that he has been unable to complete his monograph, but it is expected that publication will be made before the end of another year.

### GEOLOGICAL WORK.

The geological work accomplished during the biennium includes, (1) preparation and completion of a general geologic map of Michigan, (2) completion of investigations and report on Michigan commercial limestones, (3) continuation of field and laboratory studies of the pre-Cambrian rocks of the Northern Peninsula and preparation of a report covering these

investigations in 1910-14, (4) completion of studies and preparation of a report in two volumes on the Devonian formations of Michigan, (5) continuation of studies of the Mississippian formations, (6) preparation of a report on the physiography of the inland lakes, (7) current work in connection with publication of the annual report on mineral resources and statistics of mineral production and (8) miscellaneous investigations connected with correspondence and conferences.

**A Geological Map of Michigan.** I am pleased to report that a geological map of Michigan has been compiled and is now in the hands of the engraver and printer. Surprising as the statement may seem, it must be said that no adequate geological map of this state has ever been published. Certain parts of the state, particularly the iron and copper districts and a few counties, have been studied in detail and correspondingly accurate geological maps of these areas have been published. But for many years there has been a great need for a general geological map of the whole state representing in considerable detail the distribution and order of succession of the rock formations. We have had the compilation of such a map under way for several years but publication has been postponed pending study of certain districts in which information has been meagre or unsatisfactory, particularly in the Northern Peninsula. There still remain certain areas in which the mapping is doubtful and others in which satisfactory differentiation between the formations of different ages is impossible. It is not deemed advisable, however, to longer delay the publication of a general map pending solution of doubtful questions of geology, some of which will require years of study. The map in its present form will be very useful, particularly in connection with an amply explanatory legend which accompanies it. This legend is an epitome of the geological history of the state and describes the different formations and their economic products in popular terms. The map will be especially valuable for instructional work in the schools and colleges of Michigan.

**A Report on Michigan Limestone.** Limestone is one of the important resources of Michigan. The production, particularly of the higher grades, is steadily increasing and will continue to increase as demanded in the expansion of the iron, chemical, paper and sugar industries. Michigan is peculiarly favored in the occurrence of extensive beds of high grade limestone on and near Lakes Huron and Michigan within reach by low cost transportation of the great limestone consuming industries of the Great Lakes region.

I am pleased to report that the investigation of the limestone resources of the state, which has been in progress since 1913 under charge of Mr. R. A. Smith, has been completed. Mr. Smith's report appears in Publication 21, Mineral Resources of Michigan. It was expected that this report would be published in 1915 but it was found necessary to extend the investigations into 1916 to insure a thorough treatment of the entire subject.

Mr. Smith has made a field examination of all of the districts and localities wherein limestone of commercial grade occurs, and has mapped the areas underlain, by commercial limestone in those regions to which development has not yet extended. The field investigations have been supplemented by thorough laboratory studies. In this work we have had the co-operation of all of the companies and individuals engaged in the Michigan limestone industry. Hundreds of drill records and thousands of limestone analyses have been supplied by the limestone operators. Without this co-operation the report would have been much less complete and valuable.

**Studies of the pre-Cambrian Rocks of the Northern Peninsula.** Field and laboratory studies of the pre-Cambrian rocks of the Northern Peninsula have been continued throughout the biennium. The main results of these investigations in 1910-14 have been summarized and published in Publication 18, Geological Series 15. During the summer of 1915 Mr. L. P. Barrett assisted by Messrs. Bela Hubbard, Don T. McKone, and Floyd B. Brown, were engaged in field mapping in the area between Gogebic Lake and the west end of the Marquette iron range. During the summer of 1916 these studies will be continued in the field by Mr. Barrett, in charge, assisted by O. R. Hamilton and Prof. I. D. Scott, geologists, and Messrs. Don T. McKone, James Tobin, and Joseph Hyde, compassmen. The area to be studied extends from the west end of the Marquette iron range westward and northward around the Huron Mountains, attention being mainly concentrated on the rocks of Huronian age and their relations to the overlying Keweenawan and underlying Archean terranes.

**Studies of the Devonian Formations.** During the biennium Dr. A. W. Grabau completed his studies on the Dundee, Traverse, and Antrim formations and has presented his report for publication. Dr. Grabau's work is an exhaustive treatment of the entire Devonian section and is abundantly illustrated, particularly the description of the faunal life of the Devonian seas. The work will be published in two volumes during the next biennium as the second of a series of monographs on the Paleozoic formations of the state.

**Studies of the Mississippian Formations.** Under a co-operative arrangement with the United States Geological Survey Dr. Geo. H. Girty, Paleontologist, has continued his studies of the Mississippian, comprising the formations known as the Coldwater shale and Marshall sandstone. Up to this time Dr. Girty's studies have been mainly concentrated on the Marshall fauna and his report on this formation is almost completed. During the summer of 1915 Mr. George M. Ehlers was employed in field examinations of the Mississippian and the collection of fossils from its exposures under the supervision of Dr. Girty. It is probable that some additional collections will need to be made from the Coldwater formation.

**Studies of the Paleozoic Formations of the Northern Peninsula.** Our knowledge of the lower Paleozoic formations which form the Northern Peninsula east of a line from Marquette to Menominee is unsatisfactory. It is based on early observations of Houghton, Winchell, and Rominger supplemented by later somewhat cursory study by A. C. Lane and others. This area connects the much more studied and better known areas of correlative formations in Ontario and New York on the east and Wisconsin on the west and the solution of a number of important problems awaits a comprehensive investigation of the Michigan section. It would hardly be worth while to undertake a study of this large area except under a general plan providing for several years continuous field and laboratory studies by competent straitgraphers and paleontologists. Such a plan is under consideration. Pending the formulation of a definite program for this work Mr. Geo. M. Ehlers has been employed to make extensive fossil collections and general field study of the Niagaran formations during the summer of 1916 under the supervision of Prof. E. C. Case and R. A. Smith.

**A Study of the Physiography of Michigan Inland Lakes.** In my last biennial report a full account was made of the work of Dr. I. D. Scott on the physiography of Michigan inland lakes. Dr. Scott has had the preparation of a report on this subject under way during the biennium and should be able to finish it before the end of the present year.

The report will consist of two parts. Part 1 is intended to familiarize the lay reader with the manner of formation of lake basins, the forces which are active on the shores, the effects of these forces, and the processes through which lakes eventually become extinct. It includes a general statement of the topography of Michigan, a brief discussion of the work of running water and glaciers, a classification of lake basins and the manner of formation of the types found in this state, a statement of the work of waves, currents and ice and the resultant forms. Part 2 will contain descriptions of the shores of the various lakes treated individually. The pysiographic forms and the manner of their formation will be discussed together with an account of the origin of the basin and the factors working towards the extinction of the lake.

**Mineral Resources and Statistics.** The annual report on statistics of production and progress of the mineral industries is one of the most generally useful and popular publications of the Survey. In this work we have the indispensable co-operation of the mineral producers as well as that of the United States Geological Survey. In addition to the statistical matter this report contains a directory of all of the mineral producers, statements of progress of the industries and each year a leading article on one of the mineral resources. The report for 1914 contains a very useful treatment of the copper deposits by Mr. R. E. Hore, the report for 1915 a valuable contribution on Michigan commercial limestones by Mr. R. A. Smith.

## PROGRESS OF THE TOPOGRAPHIC SURVEY.

The topographic mapping of Michigan is part of a general plan which embraces all of the states and territories. The work is being executed by the United States government acting through the United States Geological Survey and in co-operation with many of the states. The plan of the survey in Michigan provides for the construction of a topographic map of the state in units or quadrangles of 15' of latitude by 15' of longitude. The area of a quadrangle is about 200 square miles. Each quadrangle map will be published on a scale of 1:62500 and will register with those of adjacent quadrangles making it easy to combine the separate sheets to form a map of a larger area such as a county, drainage system, or natural physiographic province. The vertical distance between contours will, however, not be the same for all quadrangles but will vary with the character of the topography. Flat lands, such as constitute the Saginaw basin, are mapped with a contour interval of five feet, hilly areas with twenty feet and other areas with ten feet.

It has been found by experience in many states that the best results in topographic mapping are obtained through co-operation with the federal government. The United States Geological Survey maintains a large organization of trained topographic engineers with ample equipment and experience necessary for the attainment of lowest possible cost consistent with a high standard of work. Furthermore the United States government desires to make a topographic survey of the whole country under a uniform plan applicable to all of the states and it is desirable that such topographic work as may be undertaken by the several states or by them in co-operation with the United States should conform to this general plan or should be of such character that it may be adapted to this plan without additional expense for field surveys.

The topographic survey of Michigan under the co-operative plan now in force began in 1903. Following are the expenditures by the state and federal governments including appropriations for the fiscal year 1916.

### EXPENDITURES OF THE CO-OPERATIVE TOPOGRAPHIC SURVEY OF MICHIGAN.

Year.	By the State of Michigan.	By the United States Geological Survey.
1903	\$800 00	\$800 00
1905	2,000 00	2,000 00
1906	3,000 00	3,000 00
1907	3,000 00	3,000 00
1908	2,000 00	2,000 00
1909	2,000 00	2,000 00
1910	2,000 00	2,000 00

1911	2,000 00	2,000 00
1912	2,000 00	2,000 00
1913	2,500 00	2,500 00
1914	2,500 00	2,500 00
1915	15,000 00	15,000 00
1916	15,000 00	15,000 00

On June 30, 1916 there had been mapped in Michigan 7554 square miles or 13 per cent of the area of the state. The accompanying map shows the areas which have been completed and those in which work is in progress. In addition, many miles of transit and level lines have been run through areas to which topographic mapping has not extended.

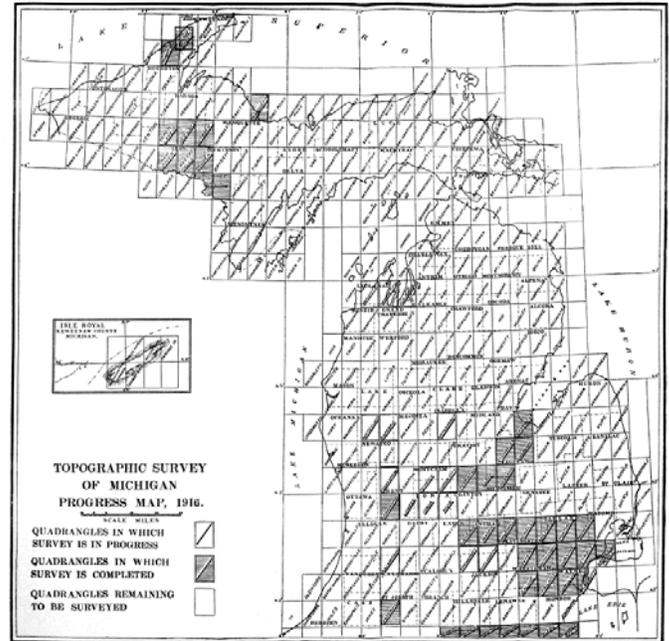
**Importance of the Topographic Survey to the Development of the State.** The permanent bench or elevation marks, established by the topographic survey and the surveyors' notes are useful to county and state road engineers, particularly as all of these are on sea level datum. The use of a common datum in drainage, road, and other engineering will make possible direct correlation of level work throughout the state. In so far as possible the topographic survey adjusts its level lines to the needs of the State Highway Commissioner wherever a direct saving can be made by so doing.

The topographic survey of the whole country is one of the most important of the preparedness measures which are now occupying the attention of Congress and the nation. Only an insignificant fraction of the national border is topographically mapped and less than 40% of the country as a whole. A topographic map is essential to strategic distribution of troops and offensive and defensive maneuvers of infantry, artillery and cavalry. In regions where topographic maps are unavailable the needs of the military are not met with such hurried sketch maps as the army engineers are able to construct often in immediate advance of moving troops. The topographic survey today is not only responsible for the construction of an accurate topographic map, but also for a minute inspection of the country from a military viewpoint under the guidance of the army engineers. A great deal of information of important military value is obtained each year by the topographers for the permanent records of the War Department.

The cost of topographic mapping of the United States is insignificant considering its importance from a military standpoint alone. It has been calculated that a zone twenty miles wide paralleling the entire national border could be made for the cost of a small cruiser. The topographic map of the state of Michigan can be completed for the cost to the state of mobilizing and supporting the Michigan National Guard at war strength for two months.

The topographic survey is an important aid to agricultural development because it renders possible the correlation,

field study and mapping of soils with respect to topography and drainage. It is particularly valuable to development of artificial drainage because a good topographic map not only shows the areas which have natural and artificial drainage and those which need drainage but is also an adequate basis for drainage plans and saves the cost of preliminary drainage surveys. A topographic map is almost indispensable in prorating costs of drain work to beneficiaries and between two or more local governmental units as townships and counties.



Topographic maps are an indispensable aid to all kinds of hydrographic studies, local and general. They are needed by villages and cities for location and development of water supplies and in various forms of sanitary engineering. They are indispensable for a general investigation of stream flow, stream gaging, flood control, water powers, artesian flow, and general water supplies.

In road building and road improvements topographic maps are essential. They eliminate the cost of many preliminary surveys. They are especially useful in choosing routes for new roads and trunk lines for development and improvement.

There are many other important uses for topographic maps among which may be mentioned:

For improving rivers and smaller waterways.

In making investigations for the improvement of the plant and animal industries, and in a comprehensive study of physical and biological conditions in connection with the stocking of interior water with good fish and the locating of fish culture stations.

In locating and mapping the boundaries of life and crop zones, and in mapping the geographic distribution of plants and animals.

In plotting the distribution and spread of injurious insects and germs.

As a base map for the plotting of information relative to the geology and mineral resources.

In connection with questions relating to state, county and town boundaries.

As a means of promoting an exact knowledge of the country and serving teachers and pupils in geographic studies.

As base maps for the graphic representation of all facts relating

to population, industries, and products or other statistical information.

In connection with legislation involving the granting of charters, rights, etc., when a physical knowledge of the country may be desirable or necessary.

## PROGRESS OF THE BIOLOGICAL SURVEY.

A. G. RUTHVEN, Chief Naturalist.

The biological work of the Survey has made satisfactory progress during the last two years. As stated in the last biennial report (pgs. 83-7), a five year plan was recommended by the Board of Advisors to begin in 1915, and this plan has been followed with slight modifications. The field work may be listed as follows:  
1914.

Investigation of the reptile-amphibian fauna of the Manistee Region, by Crystal Thompson.

A biological survey of the Whitefish Point Region, by N. A. Wood (birds and mammals), A. W. Andrews (beetles and flies), C. K. Dodge (flowering plants), A. H. Povah (lower plants).

1915.

Investigations toward a monograph on Michigan Algae, by E. N. Transeau.

Investigations toward a monograph on Michigan Fish, by T. L. Hankinson.

Investigations on the distribution of the phanerogamic plants of Michigan, by C. K. Dodge.

Excepting the work of Prof. Kaufman on the Agaracacae of Michigan, the manuscript of which has been submitted for publication in two volumes, none of the larger investigations were completed during the two years, and but one report was published by this division—a volume of miscellaneous papers on the zoology of Michigan. Manuscript reports upon the progress of the various pieces of work are in the hands of the Chief Naturalist, and a number of short papers have been published elsewhere with his permission. The papers based

entirely or in part upon Survey material which have appeared during 1914 and 1915 are as follows:

Gaige, Frederick M. The Birds of Dickinson County, Michigan. 16th Rept. Mich. Acad. Sci., 74-91.

Gaige, Frederick M. The Formicidae of the Shiras Expedition to Whitefish Point, Michigan, in 1914. Occ. Papers Mus. of Zool., Univ. of Mich., No. 25, 1-4.

Wood, Norman A. Results of the Shiras Expeditions to Whitefish Point, Michigan. Mammals. 16th Rept. Mich. Acad. Sci., 92-97; Birds, 55-73.

Thompson, Crystal. The Reptiles and Amphibians of Manistee County, Michigan. Occ. Pap. Mus. of Zool., Univ. of Mich., No. 18, 1-6.

Thompson, Crystal and Ruthven, A. G. On the Occurrence of *Clemmys insculpta* (LeConte) in Michigan. Ibid., No. 12, 1-2.

Cockerell, T. D. A. Bees from the Northern Peninsula of Michigan. Ibid., No. 23, 1-10.

Haxikinson, T. L. Young Whitefish in Lake Superior. Science, Vol. XL, No. 1024, 239-240.

Miscellaneous Papers on the Zoology of Michigan. Michigan Geological and Biological Survey, Publication 20, Biological Series 4.

Andrews, A. W. The Beetles of Charity Island, Michigan.

Hankinson, T. L. The Fish of Whitefish Point, Michigan.

Hankinson, T. L. The Fish of Houghton County, Michigan.

Colbert, Roy J. An Ecological Study of the Fish Fauna of the Douglas Lake Region, with Special Reference to the Mortality of the Species.

Evans, Arthur T. Dragonflies of the Douglas Lake Region, Michigan.

Thompson, Crystal. The Reptiles and Amphibians of Monroe County, Michigan.

### PLANS FOR 1916.

As stated, the five year plan becomes effective on July 1, 1915. This plan provides for the following investigations in 1916:

Continuation of the survey of Michigan wood-lots.  
Investigations of the phanerogamic flora of the State.  
Investigations toward a monograph of the fishes of Michigan.

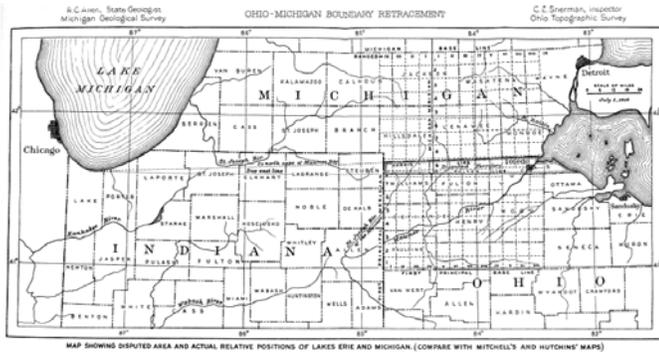
The wood-lot survey will be under the direction of O. L. Sponsler, the study of the distribution of the higher plants of the state will be made by C. K. Dodge, and the work on the fishes will be done by T. L. Hankinson.

The Chief Naturalist desires to call attention to the loyal support which is being given to the Survey by the naturalists who are making the investigations for this division. Every man has included in his estimates of the cost of proposed investigations only field expenses. It is

the interest and cooperation of these men, which have not seldom been attended by real sacrifices, that makes it possible to obtain the maximum results upon the available appropriations.

## RETRACEMENT AND PERMANENT MONUMENTING OF THE MICHIGAN - OHIO BOUNDARY

S. S. GANNETT, Engineer.  
R. C. ALLEN, C. E. SHERMAN, Commissioners.



### LETTER OF TRANSMITTAL.

July 1, 1916.

To Their Excellencies:

Hon. Frank B. Willis, Governor of Ohio.  
Hon. Woodbridge N. Ferris, Governor of Michigan.  
Hon. Board of Geological Survey of Michigan.

Sirs:—The undersigned beg to submit the following report on the relocation and permanent monumenting of the Ohio-Michigan boundary, and recommend the adoption of the following report with the joint resolution therein contained, by the legislatures of both states.

Very respectfully,

C. E. SHERMAN, Inspector,  
Ohio Topographic Survey.  
R. C. ALLEN, Director,  
Michigan Geological Survey.

### PART I. REPORT OF COMMISSIONERS.

Authority for executing the work of the commissioners is contained in the following legislation:

Forty-eighth Legislature of Michigan.  
Act 84, Public Acts of 1915.

To provide appropriations for the State Board of Geological Survey for the fiscal years ending June 30, 1916, and June 30, 1917, and to provide a tax to meet the same

*The People of the State of Michigan enact:*

Section 1. There is hereby appropriated to the State Board of Geological Survey for the fiscal year ending June 30, 1916, the sum of twenty-eight thousand six hundred dollars for purposes and by amounts as follows:  
\* \* \* \*

For relocation, establishment and imperishable monumenting of the boundary between Michigan and Ohio, three thousand six hundred dollars: Provided, That the state of Ohio shall jointly with Michigan bear an equal share of the cost thereof, otherwise no portion of the appropriation herewith made shall be expended for said joint boundary survey \* \* \* \*

Sec. 3. The several sums appropriated by the provisions of this act shall be paid out of the general fund in the state treasury at such times and in such amounts as the general accounting laws of the state prescribe, and the disbursing officer shall render his account to the auditor general thereunder.

Sec. 4. The auditor general shall incorporate in the state tax for the year 1915, the sum of twenty-eight thousand six hundred dollars, and for the year 1916, the sum of twenty-five thousand dollars, which amounts, when collected, shall be credited to the general fund to reimburse the same for the moneys hereby appropriated.

Passed April 20, 1915.  
Approved April 27, 1915.

WOODBIDGE N. FERRIS,  
Governor.

Eighty-first General Assembly of Ohio.  
House Bill No. 701.

*Be it Enacted by the General Assembly of the State of Ohio:*

Section 1. The sums set forth in sections 2 and 3 of this act in the columns therein designated "Appropriations" for the purpose therein specified, are hereby appropriated out of any moneys in the state treasury not otherwise appropriated. \* \* \* \*

Sec. 2. The following sums shall not be expended to pay liabilities or deficiencies existing prior to July 1, 1915, or incurred subsequent to June 30, 1917. \* \* \* \*

#### TOPOGRAPHIC SURVEY.

F Contract and Open Order Service—  
F 9. General Plant—

To be paid upon vouchers approved by the governor who is hereby authorized to arrange for carrying on such work, including surveying and monumenting jointly Ohio-Michigan boundary line with the representatives of the United States geological survey. The governor may accept or reject the work of the United States Geological Survey and if he finds it necessary to have an assistant in this work he may employ a competent person and pay him a reasonable compensation out of the appropriation.

This appropriation shall include one-half of the cost of surveying and monumenting Ohio-Michigan boundary, \$27,500.00.

\* \* \* \*

Sec. 4. The sums set forth in the column designated "items" in sections 2 and 3 of this act opposite the several classifications of detailed purposes shall not be expended for any other purposes except as herein provided. \* \* \* \*

Sec. 10. This act shall not take effect until July 1, 1915.

CHARLES D. CONOVER,  
Speaker of the House of Representatives.

JOHN H. ARNOLD,  
President of the Senate.

Passed May 27, 1915.

Filed in the office of the Secretary of State at Columbus, Ohio, on the 5th day of June, A. D. 1915.

\* \* \* \*

House Bill No. 701 (with exceptions not including the above, C. E. S.) is filed herewith in the office of the secretary of state with my approval.

FRANK B. WILLIS,  
Governor.  
June 5, 1915.

Promptly after the foregoing enabling laws were passed, arrangements were made, with the permission of Dr. George Otis Smith, Director of the United States Geological Survey, for the employment of Mr. S. S. Gannett, to act as engineer in executing the field work under the direction of the commission. Mr. Gannett was eminently fitted for this work by his long experience on topographic surveys for the United States Geological Survey and in surveying the Maryland-West Virginia, and North Carolina-Tennessee boundaries, both of which surveys were so well done that they were approved in every detail by the United States Supreme Court.

On July 7, 1915, Messrs. Gannett and W. H. Herron, Geographer in charge of the Central Division, Topographic Branch of the United States Geological Survey, and the Commissioners met in conference at Toledo, Ohio, and devised and adopted the general plan on which the work was prosecuted to completion. Mr. Gannett and party took the field on July 12, and on October 26 following had completed all surveying, including the placing of all monuments, as described in his report following.

The previous uncertainty of the exact location of the state boundary, due to the disappearance of all original monuments, had caused considerable uneasiness, especially near the eastern end of the line in the vicinity of Toledo, where land has been rapidly increasing in value.

Little difficulty was encountered in establishing the line throughout its entire length. Such matters as were questionable were settled by joint conferences of the

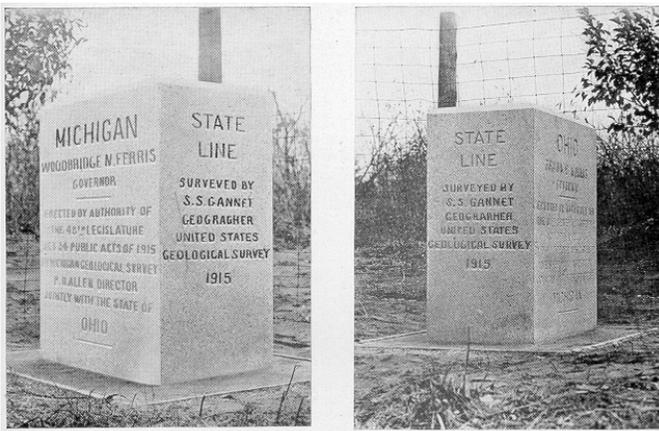
commissioners and engineer during the progress of the work, at Pioneer on July 26, and at Toledo on September 13, 1915. Agreement was reached in all cases on the work of the engineer which is formally approved as presented in Part II herewith, and on the nine maps attached hereto. The maps are hereby certified to be true productions of the originals now on file in the archives of the Ohio Archaeological and Historical Society. A description of each monument is given in the engineer's report, and the accompanying photographs and cuts show their general appearance. The posts are numbered consecutively, from the western terminal (initial) monument, toward Lake Erie.

The work of computing the geographic positions of the monuments, and the drawing of the maps was done at Toledo by Mr. Gannett assisted by C. A. Campbell and L. L. Linton. The copies of the engineer's nine original maps herewith reproduced were prepared in Columbus, by Prof. W. D. Turnbull of Ohio State University, assisted by Mr. Campbell.

The completion of the field work and the setting of the big monument, marked post 70, was celebrated with appropriate ceremonies under the auspices of the Toledo Society of Engineers at the site of the monument on November 24, 1915. At the exercises Ohio was represented by Governor Willis, President Wright of the Ohio State Archaeological and Historical Society, President W. F. Schepflin of the Ohio Engineering Society, Captain Orrin Henry of the State Land Office, and Prof. C. E. Sherman of the Ohio Topographic Survey. Michigan was represented by Governor Ferris, Rt. Rev. Msgr. F. A. O'Brien of the Michigan Historical Commission, Hon. Junius E. Beal of the Public Domain Commission, Prof. C. T. Johnson of the Michigan Engineering Society, and State Geologist, R. C. Allen.

To complete this report the commissioners engaged Mr. Arthur M. Schlesinger, Assistant Professor of American History at Ohio State University, to prepare historical matter which is appended hereto as Part III. Professor Schlesinger has carefully examined the documents relating to the boundary line, and has made an especial study of the early maps which were the cause of the later controversy. Facsimile copies of those portions of Mitchell's map of 1755 and Hutchin's map of 1778 which show the region between Lakes Erie and Michigan have been reproduced to accompany Part III.

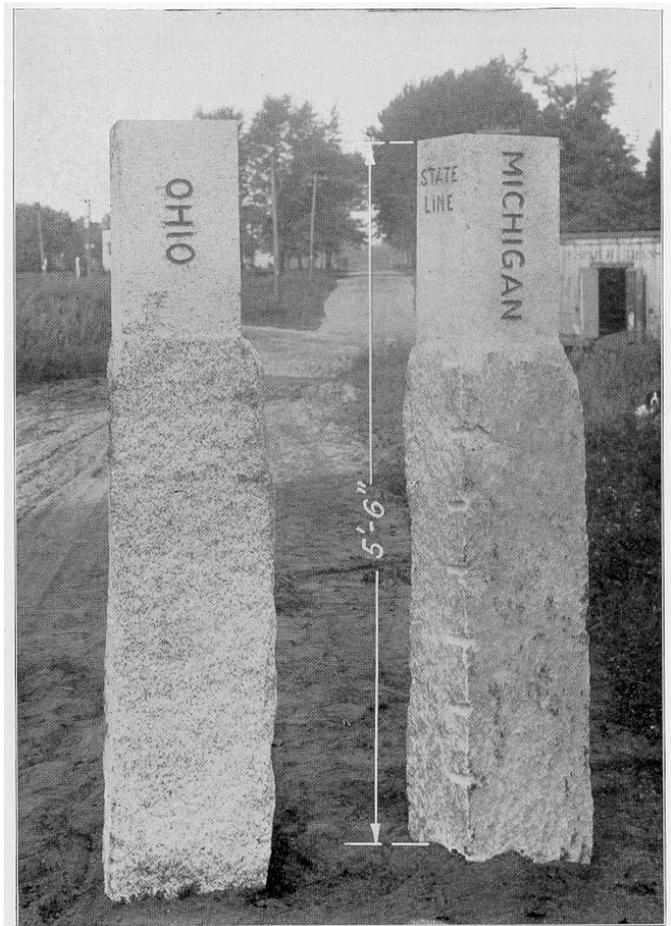
We beg to state that the entire work has been completed at as little expense as consistent with durability. The entire length of line from the western terminal post to post 71 at Lake Erie is 369,182.35 feet as measured by the engineer, or 69.92 miles. The total expense of doing the work, exclusive of putting reports through press, was \$7,197.98, as exhibited in the table on a following page. This is a cost of \$102.94 per mile, which we believe to be one of the least expensive boundary relocations ever made, considering the high quality of the results obtained.



Views of Post 70 near Eastern Terminus



Governor Ferris Nov. 24, 1915 Governor Willis



Intermediate Monuments

While comparisons with other boundary surveys can not be readily made, on account of varying topographic and other conditions, it is interesting to note that the relocation and monumenting of the Ohio-Pennsylvania boundary, 92.72 miles from Lake Erie to Ohio River, was begun in November, 1878, and the last post was not set until August, 1882. About twenty per cent of the original monuments set on this line by Andrew Ellicott in 1786 were found. The cost of doing the work is not stated definitely in the report of the Ohio Commissioners published in 1883, but is known to exceed per mile that of the present work, and the monuments set are not so substantial as those on the Ohio-Michigan boundary.

Similarly the work of relocating and monumenting the Pennsylvania-Maryland boundary ("Mason and Dixon line") extended over a number of years. The field work began in September, 1900, and the last stone was not set until August, 1903. The report was completed in 1907 and published in 1909. While the length of this line is about 198 miles, only about 66 miles were virtually new work. About 80 per cent of the original monuments were recovered, many being found in the original positions in which they had been set by Charles Mason and Jeremiah Dixon during the years 1763 to 1767.

To complete the work, it remains only for the legislatures of both states to accept the survey and adopt this report by passage of the following or a similar joint resolution:

*Whereas*, the 81st General Assembly of Ohio in House Bill 701 passed May 27, 1915, and the 48th Legislature of Michigan by Act 84 of Public Acts of 1915, provided for a joint relocation and permanent monumenting of the line between Ohio and Michigan, and

*Whereas*, this work has been duly executed by the proper officers of both states as evidenced by their report dated July 1, 1916, to the governing authorities of both states, therefore be it

*Resolved*, that the said boundary line as relocated and monumented under authority of the acts above cited be adopted as the true boundary, and that the work of the commissioners and their above mentioned report be adopted as final.

All of which is respectfully submitted for your approval and transmission to the respective legislatures.

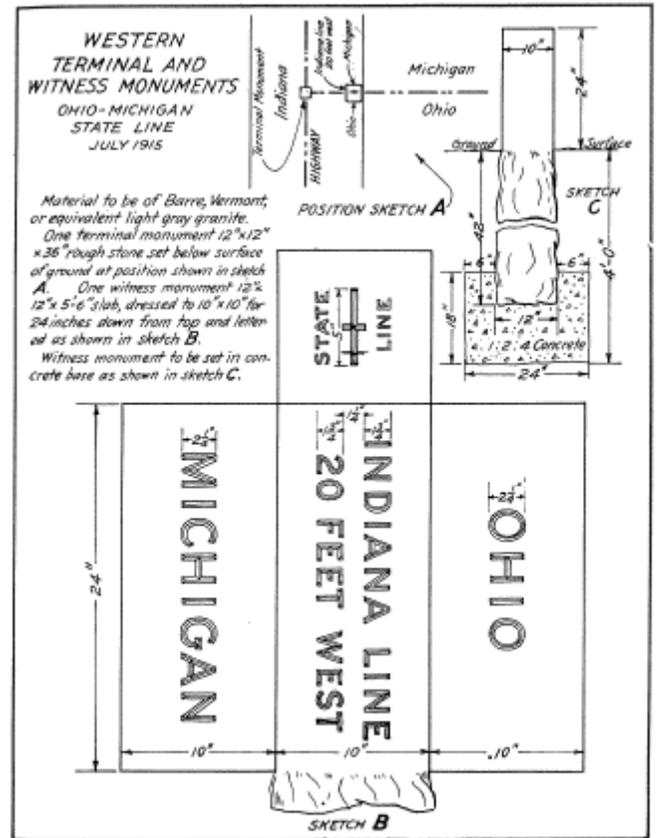
Very respectfully,

*C. E. Sherman*

Inspector,  
Ohio Topographic Survey.

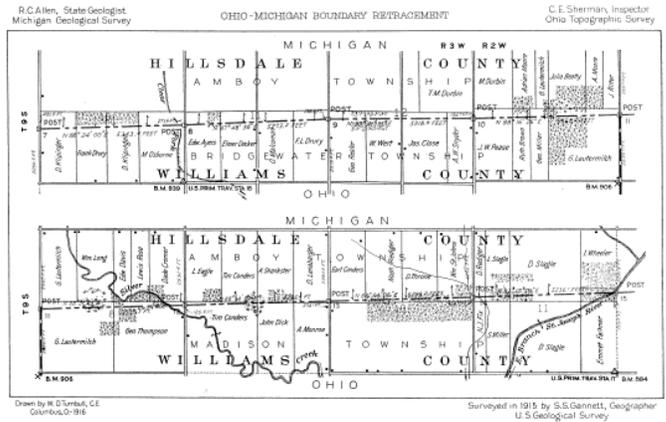
*R. C. Allen*

Director,  
Michigan Geological Survey,  
Commissioners.

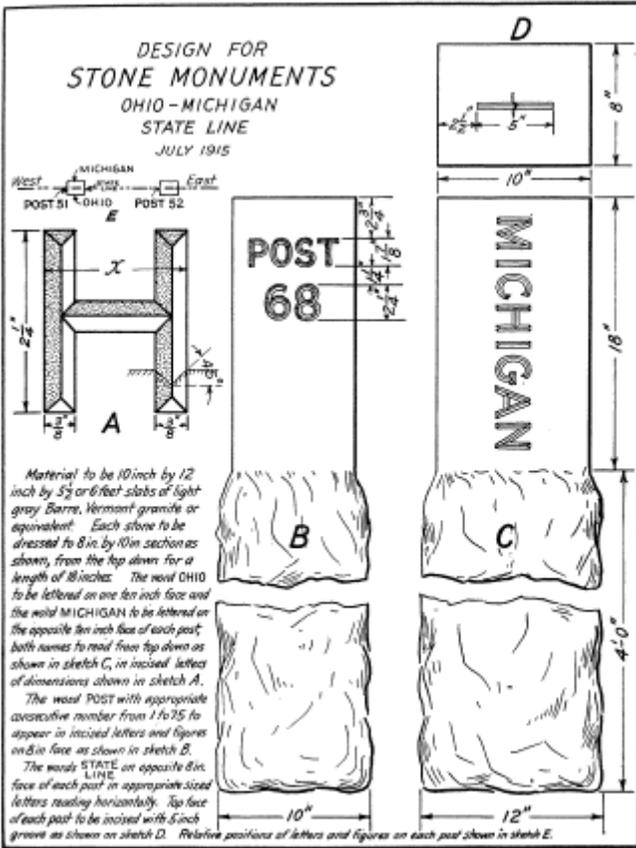


**SPECIFICATION FOR WESTERN TERMINAL MONUMENT**

Map No. 2

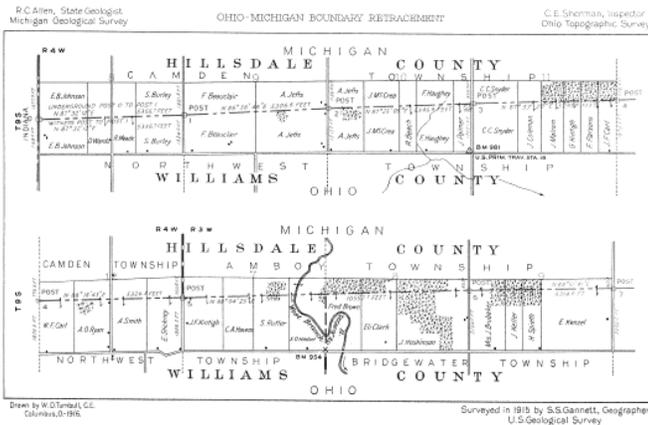


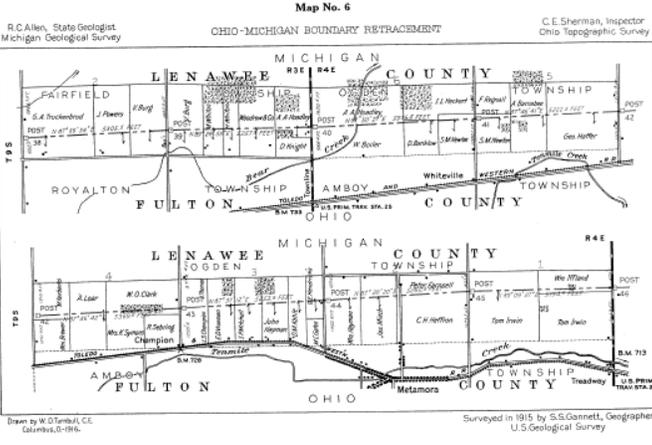
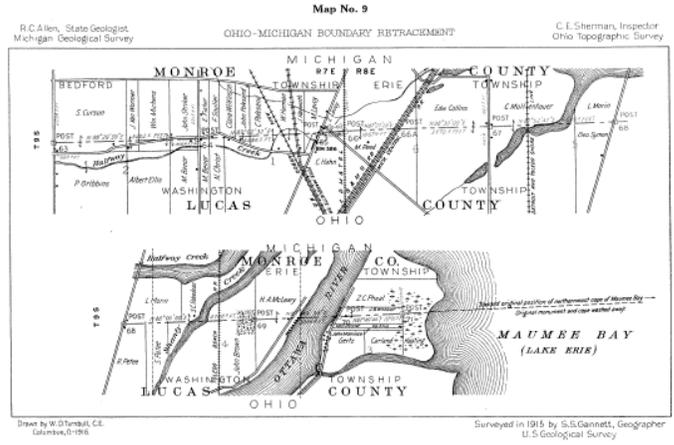
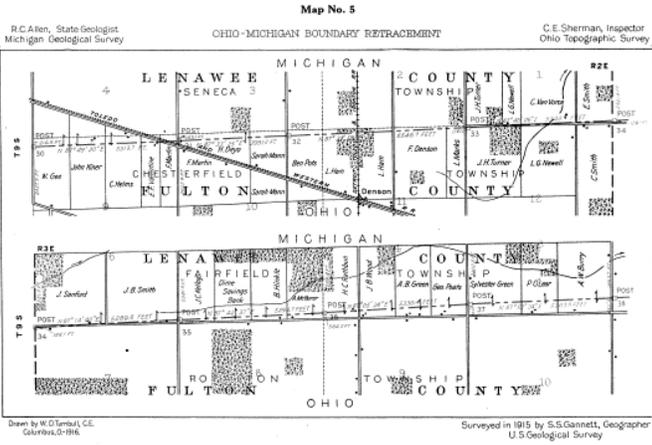
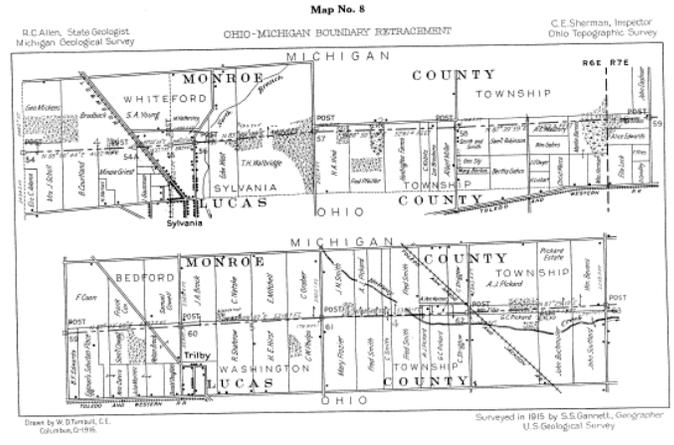
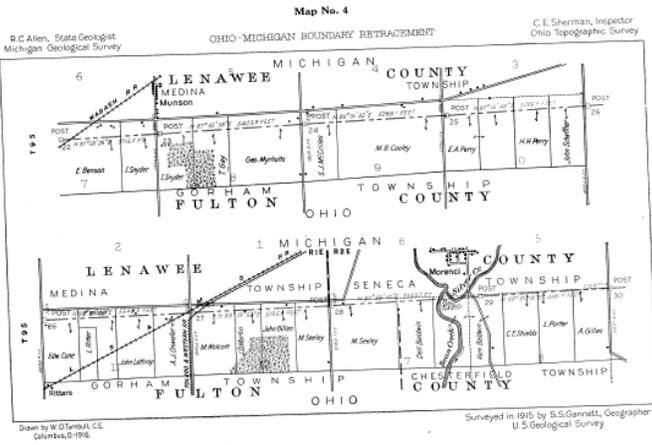
Map No. 3



**SPECIFICATION FOR INTERMEDIATE POSTS**

Map No. 1



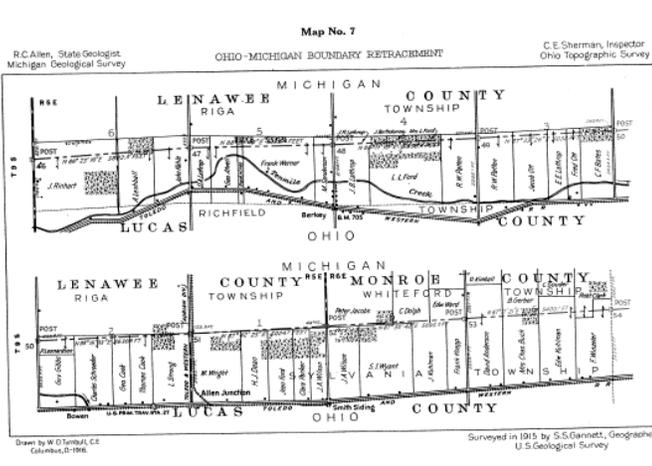


**STATEMENT OF EXPENDITURES MICHIGAN-OHIO JOINT BOUNDARY LINE RESURVEY.**  
July 1, 1915-June 30, 1916.

Michigan Appropriation.

Payee.	Total.	Salary.	Substance.	Travel.	Assistance.	Property permanent.	Office incidental.	Miscellaneous.
Allen, R. C.	879 67		825 50	54 17				
Robbin, Duff	23 50							
Campbell, C. Alfred	191 50	191 00	91 50		84 50	81 00		
Olney, C. A.	282 50				262 50			
Gannett, Samuel S.	1,588 54	1,325 00	216 00	59 85		57 22	830 47	
Jackson, R. B.	135 00	80 00	75 00					
Linton, L. L.	241 00	150 00	91 00					
Lloyd Brothers	450 00							
Sherman, C. E.	200 00	200 00				7450 00		
Sherman, R. B.	134 50	70 00	64 50					
Sorenson, P. G.	112 25	88 33	54 00					
Terry Operating Co.	108 49							
Turnbull, W. D.	50 25	50 25				105 99		
<b>Total</b>	<b>81,508 28</b>	<b>81,933 58</b>	<b>8616 50</b>	<b>8376 52</b>	<b>824 50</b>	<b>8614 21</b>	<b>830 47</b>	
Appropriation Balance	\$1,600 00							
	1 72							
	<b>\$1,600 00</b>	<b>\$1,600 00</b>						

\*Granite monuments.



Ohio Appropriation.

Payee.	Total.	Salary.	Substance.	Travel.	Assistance.	Property permanent.	Office incidental.	Miscellaneous.
Campbell, C. Alfred	\$412 50	\$292 50	\$120 00					
Dietz, C.	118 65				118 65			
Olney, C. A.	927 38	678 33	84 00					\$165 05
Jackson, R. B.	81 67	31 87	30 00					
Linton, L. L.	399 00		277 50					
Lloyd Brothers	1,073 30					481,073 30		
McDonald, A. M.	150 00	150 00						
Sherman, C. E.	90 38		11 50	45 00	830 71			\$14 77
Sherman, R. B.	61 67	31 67	30 00					
Sorenson, P. G.	61 67	31 67	30 00					
Stanhams, A.	150 00			150 00				
Turnbull, W. D.	88 88	88 88						
<b>Total</b>	<b>\$3,590 70</b>	<b>\$1,582 22</b>	<b>\$427 00</b>	<b>\$306 65</b>	<b>\$30 71</b>	<b>\$1,073 30</b>	<b>\$14 77</b>	<b>\$165 05</b>
Appropriation Balance	30							
	<b>\$3,600 00</b>	<b>\$3,600 00</b>						

\*Granite monuments.

**PART II. REPORT OF ENGINEER.**

## OHIO.

Toledo, Ohio, November 30th, 1915.

Mr. R. C. Allen,  
Director Michigan Geological Survey,  
Lansing, Michigan.

Professor C. E. Sherman,  
Inspector Ohio Topographic Survey,  
Columbus, Ohio.

Dear Sirs:—

I have the honor to submit the following report of operations in surveying and monumenting the Michigan-Ohio boundary line during 1915.

A preliminary reconnaissance of the line made early in July, partly in company with Mr. R. C. Allen, Director of the Michigan Geological Survey, disclosed the fact that none of the original marks or posts set by Wm. Harris in 1817, or by Andrew Porter in his resurvey of 1837 of that part of the line through T. 9, S., R. 7 E. to T. 9 S., R. 4 W.; or by John Mullett in his resurvey of 1842 of that part of the line through T. 9 S., R. 8 E., were in existence.

The western terminus of the line, the northwest corner of Ohio, was identified by a boulder or "niggerhead" buried about 2 feet below the surface of road bed, pointed out by residents of that locality as being an undisputed point. The eastern terminus of the line, originally the most northerly cape of Maumee Bay, has been washed away for many years and did not furnish a definite starting point; neither were there other permanent or semi-permanent marks near the eastern terminus, as well defined as the western terminus.

It was therefore evident that the survey of 1915 could best begin at the northwest corner of Ohio. The party was organized at Pioneer, Ohio, July 12th as follows:

- S. S. Gannett, Geographer U. S. Geological Survey,—in charge.
- L. L. Linton, of Michigan, Recorder.
- C. Alfred Campbell, of Ohio, Rear Chainman.
- F. G. Sorensen, of Ohio, Head Chainman.
- R. B. Jackson, of Michigan, Rear Rodman.
- R. B. Sherman, of Ohio, Head Rodman.

The field work of survey began on July 13th and the last monument was set October 26th, 1915. An automobile sufficiently large to transport members of the party with the necessary instruments, was engaged and was used throughout the season. The transportation problem was thus solved in a satisfactory manner and comparatively little time was lost in going to and from work excepting when roads were muddy. Headquarters for field work were made at Pioneer, Ohio; Morenci, Michigan; and Sylvania, Ohio. The office work was done at Toledo, Ohio.

Ohio was the first state formed from the original Territory Northwest of the River Ohio. It was admitted as a state on November 29, 1802, with limits given in the enabling act as follows:

Bounded on the east by the Pennsylvania line, on the south by the Ohio River to the mouth of the Great Miami River, on the west by the line drawn due north from the Great Miami aforesaid, and on the north by an east and west line drawn through the southerly extreme of Lake Michigan, running east after intersecting the due north line aforesaid, from the mouth of the Great Miami until it shall intersect Lake Erie or the Territorial line, and thence with the same through Lake Erie to the Pennsylvania line aforesaid; Provided, That Congress shall be at liberty at any time hereafter either to attach all the territory lying east of the line to be drawn due north from the mouth of the Miami aforesaid to the Territorial line, and north of an east and west line drawn through the southerly extreme of Lake Michigan, running east as aforesaid to Lake Erie, to the aforesaid state, or dispose of it otherwise, in conformity to the fifth article of compact between the original states and the people and states to be formed in the territory northwest of the river Ohio. (Seventh Congress, first session.)

In the constitution of Ohio of 1802, Article 7, the boundaries are defined as follows:

Bounded on the east by the Pennsylvania line, on the south by the Ohio river to the mouth of the Great Miami River, on the west by the line drawn due north from the mouth of the Great Miami aforesaid, and on the north by an east and west line drawn through the southerly extreme of Lake Michigan, running east after intersecting the due north line aforesaid from the mouth of the Great Miami until it shall intersect Lake Erie or the Territorial line and thence with the same through Lake Erie to the Pennsylvania line aforesaid; provided always and it is hereby fully understood and declared by this convention, that if the southerly bend or extreme of Lake Michigan should extend so far south that a line drawn due east from it should not intersect Lake Erie, or if it should intersect the said Lake Erie east of the mouth of the Miami River of the Lake, then and in that case, with the assent of the Congress of the United States, the northern boundary of this state shall be established by, and extending to, a direct line running from the southern extremity of Lake Michigan to the most northerly cape of the Miami Bay, after intersecting the due north line from the mouth of the Great Miami River as aforesaid; thence northeast to the Territorial line, and by the said Territorial line to the Pennsylvania line.

In accordance with the provisions in the enabling act and in the first constitution of the State, the northern boundary of the State was changed so that, instead of running on a parallel drawn from the southern extremity of Lake Michigan, it followed the arc of a great circle drawn from the southern extremity of Lake Michigan to the most northern cape of Maumee ("Miami") Bay. Following are the texts of the acts providing for the examination of the northern boundary and making the change in the boundary:

AN ACT to provide for the taking of certain observations preparatory to the adjustment of the northern boundary line of the State of Ohio.

That the President of the United States cause to be ascertained by accurate observation, the latitude and longitude of the southerly extreme of Lake Michigan; and that he cause to be ascertained by like observation, the point on the Miami of the lake which is due east therefrom, and also the latitude and longitude of the most northerly cape of the Miami Bay; also that he cause to be ascertained with all practicable accuracy, the latitude and longitude of the most southerly point in the northern boundary line of the United States in Lake Erie, and also the points at which a direct line drawn from the southerly extreme of Lake Michigan to the most southerly point in said northern boundary line of the United States will intersect the Miami River and Bay; and also that he cause to be ascertained by like observation, the point in the Mississippi which is due west from the southerly extreme of Lake Michigan; and that the said observations be made and the result thereof returned to the proper Department within the current year. (Twenty-second Congress, first session, 1832.)

AN ACT to establish the northern boundary line of the State of Ohio, and to provide for the admission of the State of Michigan into the Union.

The northern boundary line of the State of Ohio shall be established at and shall be a direct line drawn from the southern extremity of Lake Michigan to the most northerly cape of the Maumee (Miami) Bay after that line, so drawn, shall intersect the eastern boundary line of the State of Indiana; and from the said north cape of the said bay northeast to the boundary line between the United States and the province of Upper Canada, in Lake Erie, and thence, with the said last mention line, to its intersection with the western line of the State of Pennsylvania. (Twenty-fourth Congress, first session, 1836.)

The northern boundary was originally surveyed in 1817 by Wm. Harris. The western boundary was surveyed in the same year from old Fort Recovery to the northwestern corner. South of Fort Recovery this boundary was surveyed as the first principal meridian of the General Land Office.

#### MICHIGAN.

Michigan was organized as a territory June 30, 1805, from the northern part of Indiana Territory.

The following clause from the act dividing Indiana Territory defines its limits:

From and after the thirtieth day of June next all that part of the Indiana Territory which lies north of a line drawn east from the southerly bend or extreme of Lake Michigan, until it shall intersect Lake Erie, and east of a line drawn from the said southerly bend through the middle of said lake to its northern extremity, and thence due north to the northern boundary of the United States, shall, for the purpose of temporary government, constitute a separate territory, and be called Michigan. (Eighth Congress, second session.)

The latter line was run and marked in 1827.

Reduced to its present limits, as described in the following clause from its enabling act, Michigan was admitted to the Union January 26, 1837.

AN ACT to provide for the admission of the State of Michigan into the Union.

Beginning at a point where the above described northern boundary of the State of Ohio intersects the eastern boundary

of the State of Indiana, and running thence with the said boundary line of Ohio, as described in the first section of this act, until it intersects the boundary line between the United States and Canada in Lake Erie; thence with the said boundary line between the United States and Canada, through the Detroit River, Lake Huron, and Lake Superior, to a point where the said line last touches Lake Superior; thence in a direct line through Lake Superior to the mouth of the Montreal River; thence through the middle of the main channel of the said river Montreal to the middle of the Lake of the Desert; thence in a direct line to the nearest headwater of the Menominee River; thence through the middle of that fork of the said river first touched by the said line to the main channel of the said Menominee River; thence down the center of the main channel of the same to the center of the most usual ship channel of the Green Bay of Lake Michigan; thence through the middle of Lake Michigan to the northern boundary of the State of Indiana, as that line was established by the act of Congress of the nineteenth of April, eighteen hundred and sixteen; thence due east with the north boundary line of the said State of Indiana to the northeast corner thereof; and thence south with the east boundary line of Indiana to the place of beginning. (Twenty-fourth Congress, first session.)

The above boundaries remain unchanged.

#### ORIGINAL SURVEY.

The boundary line between Michigan and Ohio was originally surveyed in July and August, 1817, by Wm. Harris. The record of this survey is contained in manuscript form in the surveying division of the General Land Office, Washington, D. C., presumably written by Harris. The beginning of the record is as follows:

Variation 3° 32'

Commenced at the North Cape of the Miami Bay made a willow corner 11 inches diamr. and marked MT on the north side and O on the south from which corner a point of land bears S. 57° E. 6 or 7 miles and a point off an Island bears S. 60° E. 6 or 7 miles and the north point of the same island bears S. 75° E. 6 or 7 miles. From thence—

Courses & distance.	Miles.	
S. 87° 42' W.		Between the State of Ohio and Michigan Territory.
	Chains	
	25.00	Along the shore.
		1 Corner in the Bay.
		Continued
S. 87° 42' W.		Between the State of Ohio and Michigan Territory
	41.00	passed the bay and enter a prairie.
		2 Set post from which a Locust 24 inches diam. bears N. 39° W. 2.00 lks. Prairie wet and covered with high grass.
		Continued
S. 87° 42' W.		Between the State of Ohio and Michigan Territory
	5.00	passed the prairie.
	25.00	to an arm of the bay formed by a creek
	45.51	passed it

3	Set post from which a Hickory 9 inches diameter bears S. 31° W. 22 lks. and an Elm 24 inches diameter bears N. 40° E. 18 lks. Land level. Oak, elm, hickory—good farming land.	40.50 66.00 72.50 79.80	leave prairie and enter a field. enter the right edge of Prairie. pass it Intersect line between Secs. 1 & 2. Set Post in cross roads from which an elm 6 inches diam. bears N. 26½° E. 70 lks. dist. (No other bearing trees.)
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The western terminus of the Ohio-Michigan line is described by Harris as follows:

S. 87° 42' W.	Between the State of Ohio and Michigan Territory	N. 1¼° W. 11.75 40.00 46.00 79.21	between Secs. 1 & 2. passed W. oak 36 in. dia. passed qr. sec. post. State line at a post. Sec. Cor. Land ¾ improved S. E. qr. barren prairie. The Monroe and Perrysburg Turnpike passes diagonally through this section. June 1, 1837.
Chains 33.92	To the N. W. corner of the State of Ohio, the corner a pile of stones from which a beech 14 inches diameter bears N. 37° W. 44 lks. and a sugar 5 inches diameter bears N. 31° E. 15 lks. and a sugar 9 inches diameter bears S. 8° W. 20 lks. Land rich and good for farming.		

Harris furnishes no record of how he measured the distance of more than a mile across the bay or one-fourth mile across Ottawa River. It was in the middle of the summer and he must have waded it, triangulated it or guessed the distance. In the resurvey made by John Mullett in February 1842 the bay and rivers were probably frozen and direct measurements across comparatively easy. The description of the mile posts set are also very meager, no statement is made of the size of posts or material from which they were made, excepting for the one at the initial point on North Cape. No map of the Harris line is on file in U. S. General Land Office.

The resurvey of 1842 by John Mullett, D. S., is described by him as follows:

	T. 9 S., R. 8. E. Mer. (Mich.)	
	Resurvey of State Line between Ohio and Michigan. Var. 2° 30' E. by satisfactory observation taken in Sec. 6. February 17th, 1842.	
	Set post at intersection of State Line with line between Ranges 7 and 8 E. from which a B. oak 20 in. dia. bears N. 13° E. 286 lks. dist. and a hickory 9 in. dia. bears S. 33° W. 140 lks. dist.	
Course N. 2° W. Chs. Lks. 6.00 30.00 31.75	between ranges 7 and 8.  a stream 100 lks. wide course E. Road to Maumee S. 22° W. Township corner. Land rolling, 2nd rate timber, Hickory, Oak, Elm, etc. From State Line measured on Range Line	
S. 2° E. 6.27 7.00 21.41 46.27	between Ranges 7 and 8. qr. Sec. post. Road to Manhattan, S. 50° E. post and Mound. Section corner. Land level, mostly prairie, 2nd rate.	

#### RESURVEYS OF 1837 AND 1842.

That part of the Michigan-Ohio boundary line which passes through T. 9 S., R. 7 E. to T. 9 S., R. 4 W., 66 miles in length, was resurveyed by Andrew Porter, Deputy Surveyor in June, 1837. Four miles in T. 9 S., R. 8 E. near the eastern end of the boundary line were re-surveyed by John Mullett, Deputy Surveyor, in February, 1842. During these resurveys 31 or less than half of the original 71 mile posts set by Harris were found. No map showing results of these resurveys is on file in the General Land Office at Washington D. C., excepting the individual township plats showing connections with section and quarter section corners adjacent to the line.

A sample of the notes prepared by Andrew Porter, D. S., follows:

	T. 9 S., R. 7 E. Mer. (Mich.)	
	Survey of the State Line between Ohio and Michigan. Var. 3° 36' E. through Sec. 1, on line between Ohio & Michigan.	
S. 88° W. Chains 12.10 27.50 36.50	pass a small branch, course S. E. enter a small wet prairie. pass a small creek, Course N. E.	N. 87° 42' E. 9.50 20.50
	T. 9 S., R. 8 E. Mer. (Mich.)	
	From post on State Line at intersection of line between Ranges 7 and 8 thence on State Line.	
	in Sec. 6. enter W. Wilkinson's fields and enter Prairie. leave W. Wilkinson's.	

51.11 Harris 5 mile post.  
 80.00 line between Secs. 5 and 6 set post at  
 intersec. from which Burr Oak 9 in. in dia.  
 bears S. ½° E. 4.35 lks. dist. and a  
 Hickory 6 in. in dia. bears S. 44½° E. 220  
 lks. dist.  
 Land rolling, second rate, W. ½ mile  
 scattering Oak, Aspen, Elm, etc. E. ½  
 mi. Prairie, 2nd rate.  
 N. 1° W. between Secs. 5 and 6.  
 28.00 Section corner on Town line.  
 Land level, 1st rate Prairie.  
 S. 1° E. between Secs. 5 and 6.  
 6.54 to qr. Sec. post and leave Prairie.  
 15.50 a stream course N. E.  
 46.54 Section corner.  
 Land rolling 2nd rate, timber W. and Burr  
 Oak, Hickory, Elm, etc.

#### DESCRIPTION OF OPERATIONS.

The usual method of retracing and resurveying a state boundary line is by identifying original marks on the ground, replacing them by permanent monuments and establishing other permanent monuments between these identified marks.

In this case practically all of the original marks having been destroyed, the following methods, adopted in resurveying the Michigan-Ohio boundary line were agreed to at a conference between R. C. Allen, Director Michigan Geological Survey, C. E. Sherman, Inspector Ohio Topographical Survey, W. H. Herron, Geographer in charge Central Division of Topography, U. S. G. S. and S. S. Gannett, Geographer U. S. G. S., held in Toledo, July 7th; and at another conference in Pioneer, Ohio, July 26th, 1915, those mentioned above being present except Mr. Herron.

- (1) As nearly as may be line to be relocated as originally staked out on the ground, and not necessarily run as a straight line from end to end.
- (2) Existing monuments, fences, highways or other marks, when agreed to by land owners on both sides as being on the State line, are to be so accepted.
- (3) Mr. S. S. Gannett to be in charge of the work as per letter of July 3rd, 1915, from Geo. Otis Smith, Director U. S. Geological Survey.
- (4) All expenses of doing the work to be paid on vouchers approved and countersigned by S. S. Gannett.
- (5) All July expenses to be forwarded to C. E. Sherman and paid by Ohio on regular U. S. Geological Survey vouchers, rubber stamped or marked "Joint Boundary Survey." Duplicates to be furnished Director Allen.

(6) All August and September expenses to be forwarded on Michigan vouchers to R. C. Allen and paid by Michigan, and duplicates furnished C. E. Sherman.

(7) Subsequent expenses to be apportioned by S. S. Gannett between the two States so that the total cost to the two States of completing the work shall be the same. Duplicates of all expense bills furnished each State.

(8) Field maps of the survey shall be on a scale of 400 feet per inch, showing preliminary line in red ink, and the location with reference thereto of existing monuments, buildings, highways, property lines, and other topographic features (except relief) in black ink.

(9) State line in black ink with distances north and south from adjacent section and one-fourth section lines given.

(10) From this atlas of field sheets (one mile shown on each sheet) and the field notes gathered on the preliminary survey, the points at which monuments shall be planted will be determined by joint conference between S. S. Gannett, R. C. Allen, and C. E. Sherman.

(11) Monuments will then be planted, and final report made by S. S. Gannett to R. C. Allen and C. E. Sherman.

(12) Not less than \$2,000.00 to be reserved for purchase and placing of monuments.

(13) Final position of monuments with true bearings and distances between.

(14) Latitude and Longitude of all monuments given to nearest hundredth of second.

#### MONUMENTS.

(15) In general, planted at each highway and railway crossing of the state line. In particular, for the first 17 miles as marked upon topographic map at Pioneer conference.

(16) Intermediate monuments planted 4 feet into the ground, bottom surrounded with concrete 12 inches deep, 2 feet square, half a sack of Portland cement to each.

(17) Western terminal monument as per attached drawing.

(18) Where State line lies in an east and west road no monuments to be placed, unless the line angles at some point in the road.

(19) Monuments to placed at all angles in state line.

In most cases the only feasible method was to accept the measurements given in the records of the General Land Office of connections made in 1837 and 1842, between the state line and the nearest section and quarter section corners, north and south. A certified copy of these notes was obtained from the Public Domain Commission of Michigan at Lansing and has been used as the official record upon which the survey of 1915 is based. These connections were compared with the values given on plats obtained from the General

Land Office, Washington D. C. and were found to be identical.

One difficulty was quickly encountered in adopting this method; for example according to record of the General Land Office, the surveyor starts at a given section corner in Ohio and measures north a certain distance and fixes a point for the Michigan-Ohio line; according to the same record of the General Land Office he starts from a section corner or quarter section corner in Michigan one mile or one-half mile north of first corner, as the case may be, and measures south the recorded distance and fixes a point for the state line which differs materially from the point fixed from the first measurement. The two measurements fall short or overlap by any amount from 1 foot to 200 feet. Accepting the measurement from the south would locate the line in quite a different place from that located by measuring from the north. After checking the new measurements to be sure they are correct the method usually adopted is to assume the chain used in the old survey was too long or too short and that the error in distance was thus uniformly distributed throughout the mile, then prorate this error or distribute it according to the fraction of a mile that the state line is north or south of the nearest corner.

Example.—T. 9 S., R. 1 E., Section 11, by General Land Office record from corner sections 10, 11, 14 and 15, it is 4,596.2 feet north to State line and from corner sections 2, 3, 10 and 11 it is 696.9 feet south to State line. The sum of these two measurements is 5,293.1 feet. By measurement of survey of 1915 this distance from corner to corner is 5,395.3 feet, or 102.2 feet longer than by record of General Land Office; 696.9 feet is 13.17% of 5,293.1 feet and should be corrected by 13.17% of 102.2 feet or by + 13.46 feet = 710.36 feet; 4,596.2 feet is 86.83% of 5,293.1 feet and should be corrected by 86.83% of 102.2 feet or by +88.74 feet = 4,684.94 feet; 4,684.94 feet + 710.36 feet = 5,395.3 feet as measured by 1915 survey. The Michigan-Ohio line is therefore 710.36 feet south of corner sections 2, 3, 10 and 11 and 4,684.94 feet north of corner sections 10, 11, 14 and 15.

#### INSTRUMENTS.

The following instruments loaned by the U.S. Geological Survey were used in making the survey of 1915. Transit No. 80 (new) with circle 6 inches in diameter graduated to 10 feet spaces and read by vernier to 30 inches; telescope furnished with stadia wires, ratio 1 to 100. Two 300 foot steel tapes graduated to feet throughout. One 100 foot steel tape, with necessary repair outfit. Two red and white iron transit rods 8 feet in length. One stadia rod 13 feet in length, plumb bobs, tally pins, etc., completing the usual equipment for running a transit line.

A double center fore and back sight transit line was run excepting where timber, houses or other obstructions necessitated the turning of deflection angles which were read twice, direct and reverse. This line may be designated by one of several names, trial, reference, random or base line and was kept as near to and as nearly parallel to the original State line as circumstances

would permit. This reference line was sometimes north and sometimes south of the boundary, according to the nature of the country and obstacles encountered.

#### TOPOGRAPHY.

The following topographic maps of the U. S. Geological Survey; Pioneer, Alvordton, Wauseon, Swanton, Toledo and Maumee Bay, included the area under survey and were of material assistance in planning and executing the work. Maps of the four first named quadrangles made in 1911, with a contour interval of 10 feet, showing timbered areas in addition to other natural and cadastral features, were found to be very accurate and were especially useful.

Toledo and Maumee Bay quadrangles mapped in 1899 with a contour interval of 20 feet, although they did not show timbered areas and were somewhat out of date from a cultural standpoint were likewise useful.

Near the eastern end of the line three good sized streams, Halfway Creek, Shanty Creek and Ottawa River, which could not be directly measured across with the 300 foot steel tape, were triangulated. Railroads were conveniently located for base measurement near Halfway Creek and Shanty Creek and the line was extended across Ottawa River, 0.3 mile wide, by means of a base measured along the stone road near the east bank of the river. Numerous bungalows and trees near this river added to the difficulty of crossing it.

Most of the country traversed was comparatively level, sloping gradually from the west towards the east; the roughest part being near the western end. The extremes in elevation ranging from 573 feet above sea level at Maumee Bay to 1,050 feet near the northwest corner of Ohio.

At first timber and brush retarded the work; later in the summer cornstalks 10 to 14 feet in height formed the principal obstacle. Care was taken to do as little damage as possible to growing crops; the farmers were interested in having the line permanently established and offered little or no objection to trespassing on private property, tramping down corn, oats and wheat and climbing barbed wire fences. The unusually wet summer caused the members of the party to walk many hours through rain, mud and swamps annoyed by hungry mosquitoes, but comparatively little time was lost.

#### DISTANCES.

Distances were measured to nearest 1-100 foot with one of the 300 foot steel tapes held horizontally. Distances to nearest foot were carefully checked by stadia readings.

#### ASTRONOMICAL OBSERVATIONS.

Astronomical observations for azimuth were obtained with the transit by observing Polaris near sundown. Six measurements of the angle between the star and mark were made with the telescope direct and reversed in three positions of the circle. Knowing the latitude of the place of observation and hour angle of Polaris the

vertical and horizontal circles on the transit were set and the star easily pointed to long before dark. No artificial light was therefore needed to illuminate the mark or cross hairs. The mark was one of the transit rods held over a station hub tack one-fourth to one-half mile distant east or west. Time was obtained from the master clock of the Western Union Telegraph Co. in Toledo and from the railroads; a mean time Howard watch was compared with standard time as sent daily by telegraph from the U. S. Naval Observatory at Washington. Proper reduction was made for difference in longitude.

Azimuth observations were made at eleven stations along the boundary line 70 miles in length. Tables prepared by the General Land Office were used in reducing the observations. The line being nearly east-west the convergence of meridians is considerable, amounting to 46 inches per mile.

I desire to say in conclusion that the boundary line as laid out and marked in 1915 conforms as nearly as it is possible to make it to the original line, and as located least disturbs the titles of citizens residing along it, and that with very rare exceptions the citizens of both states are satisfied.

The fact that the survey was completed and the final line permanently marked in one season, without using all the funds appropriated is due in no small degree to the zeal and energy of the assistants employed on the work, Messrs. L. L. Linton, C. A. Campbell, F. G. Sorensen, R. B. Jackson and R. B. Sherman. Acknowledgment is also due local surveyors and engineers for maps furnished and favors extended.

To you commissioners representing Ohio and Michigan under whose direct supervision the work was done, I am indebted for many valuable suggestions and instructions and for having accounts settled promptly.

Descriptions of the granite posts together with their geographic positions with true bearings and distances between posts will be found appended herewith.

Yours very truly,  
S. S. GANNETT.

#### APPENDIX. GRANITE POSTS.

In marking the line a material has been used which it is believed will last for many years, or even for centuries. Granite monuments 5½ feet in length, 1 foot square, with upper 18 inches dressed 8 by 10 inches, were obtained from a quarry at Mt. Airy, North Carolina and cost \$18.00 each delivered. The material is very hard, light gray in color and should "weather" well in this climate. Each post weighs about 700 pounds but including the bed of concrete, the total weight of each in place exceeds 1,400 pounds. Each post is set 4 feet in the ground so that 18 inches projects above the surface.

The posts are lettered as follows: On north side "Michigan;" on south side "Ohio;" on east side "State Line;" on west side "Post" with appropriate number.

#### GEOGRAPHIC POSITIONS.

The geographic position of the northwest corner of Ohio had already been determined by the primary traverse work of the U. S. Geological Survey and the value given on page 52, Bulletin 552 U. S. Geological Survey; namely

Latitude 41° 41' 46.2" Longitude 84° 48' 21.1" was adopted as the best available for the western terminal or initial post. With this value, using distances and azimuths between posts, determined by the survey of 1915, the geographic positions of posts numbered 1 to 71 inclusive were computed and the results given in the following table. These positions are based upon the same datum as the engraved topographical maps of the U. S. Geological Survey covering northwestern Ohio and southeastern Michigan and agree with those maps.

#### DESCRIPTION OF GRANITE POSTS.

*Western Terminal or Initial Post.* At northwest corner of Ohio. This point falling in a public road, it was not practicable to erect a monument projecting above the surface. An underground mark was therefore left as follows: A block of granite 12 by 12 by 40 inches, relacing a boulder or "nigger head" buried two feet deep, on east edge of north-south road. Top of granite block is 12 inches below surface of road, the base is set in a bed of concrete 24 by 24 by 18 inches. This granite block is not marked except by a hole one-half inch diameter drilled three inches deep in center of top. It is 1,169 feet north of center of road east, approximate corner of sections 7, 8, 17 and 18, and 1,477 feet south of fence east, the north property line of E. B. Johnson and quarter corner section 8.

The history of the "nigger head" noted above marking the northwest corner of Ohio was obtained by Professor C. E. Sherman on December 29th, 1914 from Mrs. W. A. Saunders, Montpelier, Ohio, as follows:

The southwest quarter section 8, T. 9 S., R. 4 W., lying partly in Michigan and partly in Ohio, was patented by the United States to Hiram Russell, who sold it to Betsy Johnson (Mrs. Saunders' grandmother) from whom it passed to Aldis Johnson (in two parcels?), who died in 1897 at the age of 77. Aldis Johnson moved on the property in 1841 when Mrs. Harriett Johnson (now living at the age of 80 with her daughter Mrs. W. A. Saunders at Montpelier) was 7 years old.

When the farm just east of Aldis Johnson had surveys made in 1869 they dug up the old rotted stake (about 4 inches of it) from the center of the road and all agreeing that it was the original monument, Aldis Johnson planted a "niggerhead" on top of it, which Mrs. Saunders says was there in the middle of the road in 1881 the last time she was there.

It was well known at that time because young folks used to go there to stand in three states, said Mrs. Saunders. (C. E. SHERMAN.)

Copy made April 22, 1915.

(Latitude 41° 41' 46.20" Longitude 84° 48' 21.10")  
To Post 1, true bearing N. 87° 32' 12" E. Distance 5,355.7 feet.

#### WITNESS POST.

A granite post 5½ feet long, 12 inches square with top dressed 10 inches square for 24 inches down from top. Post is lettered as follows; on north side "Michigan;" on south side "Ohio;" on west side "Indiana Line 20 Feet West;" on top "State Line." The post is set in a bed of concrete 2 feet square and 2 feet deep and is in line with an old rail fence east and is 2 feet west of north-south fence on east side of road and 20 feet N. 87° 32' 12" E. from underground western terminal post. Top of post projects 24 inches above ground. Adjoining property east owned by E. B. Johnson.

(Latitude 41° 41' 46.20" Longitude 84° 48' 20.84")  
To Post 1, true bearing N. 87° 32' 12" E. Distance 5,335.7 feet.

#### POST 1.

On east side of north-south road between Secs. 8 and 9, T. 9 S., R. 4 W. Post of light gray granite 69 inches long 12 inches square with top dressed 8 by 10 inches square for 18 inches down from top. Lettered on north side "Michigan," on south side "Ohio," on east side "State Line," on west side "Post 1." Base of post embedded in concrete top projects 18 inches above ground. Post is 1,324.0 feet north of stone corner of Secs. 8, 9, 16 and 17, and 1,321.3 feet south of quarter corner Secs. 8 and 9. Adjoining property east owned by F. Beauclair. Adjoining property west owned by S. Burley.

(Latitude 41° 41' 48.47" Longitude 84° 47' 10.57")  
To Post 2, true bearing, N. 86° 56' 46" E. Distance 5,306.6 feet.

#### POST 2.

On east side of north-south road between sections 9 and 10 T. 9 S., R. 4 W. 1,135.86 feet south of stone, quarter corner between sections 9 and 10, and 1,510.6 feet north of center of east-west road. Adjoining property east and west owned by A. Jeffs.

(Latitude 41° 41' 51.26" Longitude 84° 46' 0.72")  
To Post 3, true bearing N. 87° 25' 05" E. Distance 5,345.6 feet.

#### POST 3.

On east side of north-south road between sections 10 and 11, T. 9 S., R. 4 W., 959.9 feet south of fence east-west, approximate quarter corner sections 10 and 11; 1,702.1 feet north of center of crossroads, approximate corner sections 10, 11, 14 and 15. Adjoining property east owned by C. C. Snyder. Adjoining property west owned by J. Palmer.

(Latitude 41° 41' 53.63" Longitude 84° 44' 50.33")  
To Post 4, true bearing N. 87° 53' 20" E. Distance 5,293.6 feet.

#### POST 4.

On north-south fence line between sections 11 and 12, T. 9 S., R. 4 W., on property of J. F. Carl; 776.5 feet south of east-west fence, approximate quarter corner sections 11 and 12; and 1879.5 feet north of center of east-west road approximate corner sections 11, 12, 13 and 14. Adjoining property east owned by W. F. Carl.

(Latitude 41° 41' 55.55" Longitude 84° 43' 40.60")  
To Post 5, true bearing N. 88° 18' 43" E. Distance 5,326.5 feet.

#### POST 5.

On east side of north-south road between section 7, T. 9 S., R. 3 W., and section 12 R. 4 W., 2 feet west of north-south fence; 750.8 feet south of stone, quarter corner west side section 7; 1,888.2 feet north of approximate southwest corner section 7. Adjoining property east owned by J. F. Kintigh and adjoining property west owned by Mrs. Edw. Stickney.

(Latitude 41° 41' 57.09" Longitude 84° 42' 30.42")  
To Post 6, true bearing N. 88° 04' 25" E. Distance 10,557.7 feet.

#### POST 6.

On east side of north-south road between sections 8 and 9 T. 9 S., R. 3 W., 4 feet west of north-south fence; 463.0 feet south of quarter corner between sections 8 and 9, fence east-west; 2,194.0 feet north of corner sections 8, 9, 16 and 17. Adjoining property east owned by Mrs. John Brubaker and adjoining property west owned by J. W. Hoskinson.

(Latitude 41° 42' 0.57" Longitude 84° 40' 11.33")  
To Post 7, true bearing N. 88° 51' 41" E. Distance 5,314.0 feet.

#### POST 7.

On east side of north-south road between sections 9 and 10 T. 9 S., R. 3 W., on north south fence line if extended (no fence 1915); 401.5 feet south of quarter corner between sections 9 and 10, fence east-west; 2,250.5 feet north of stone, corner of sections 9, 10, 15 and 16. Property east owned by D. Klipinger and property west owned by E. Kenzel.

(Latitude 41° 42' 01.61" Longitude 84° 39' 01.29")  
To Post 8, true bearing N. 88° 24' 00" E. Distance 5,343.4 feet.

#### POST 8.

On east side of north-south road between sections 10 and 11, T. 9 S., R. 3 W., 2 feet west of north-south fence; 28.5 feet north of center of small creek; 271.57 feet south of quarter corner between sections 10 and 11, fence east-west; 2,373.42 feet north of center of crossroads, corner sections 10, 11, 14, and 15. Property east owned by Edward Ayres. Property west owned by M. Osborn.

(Latitude 41° 42' 03.08" Longitude 84° 37' 50.88")  
To Post 9, true bearing N. 87° 48' 36" E. Distance 5,273.15 feet.

#### POST 9.

On east side of north-south road between sections 11 and 12 T. 9 S., R. 3 W., 2.3 feet west of north-south wire fence; 138.8 feet south of quarter corner between sections 11 and 12, fence east; 2,519.2 feet north of center of crossroads, corner of sections 11, 12, 13 and 14. Property east owned by Geo. Resler. Property west owned by F. L. Drury.

(Latitude 41° 42' 05.07" Longitude 84° 36' 41.42")  
To Post 10, true bearing N. 89° 41' 35" E. Distance 5,318.9 feet.

#### POST 10.

On east side of north-south road, between section 7 T 9 S., R. 2 W., and section 12 R. 3 W.; 2.5 feet west of north-south wire

fence; 152.7 feet south of quarter corner west side section 7, fence east; 2,489.3 feet north of center of road east, southwest corner of section 7. Property east owned by J. W. Pease. Property west owned by A. W. Snyder.

(Latitude 41° 42' 05.35" Longitude 84°-35' 31.30")  
To Post 11, true bearing N. 88° 16' 26" E. Distance 5,368.2 feet.

#### POST 11.

On east side of north-south road between sections 7 and 8, T. 9 S., R. 2 W.; 1.5 feet west of north-south fence line; 2,630.0 feet north of corner sections 7, 8, 17 and 18, center of crossroads; 2,667.0 feet south of corner sections 5, 6, 7 and 8, center of crossroads. Property east and west owned by G. Lautermilch.

(Latitude 41° 42' 06.94" Longitude 84° 34' 20.57")  
To Post 12, true bearing N. 88° 27' 45" E. Distance 5,322.3 feet.

#### POST 12.

On embankment on east side of north-south road between sections 8 and 9, T. 9 S., R. 2 W.; 1 foot east of north-south wire fence; 126.0 feet north of wire fence east; on line with end of stone road; 1.5 miles north of Pioneer, Ohio. Post is 125.56 feet north of stake and stones, quarter corner between sections 8 and 9; 2,532.44 feet south of corner sections 4, 5, 8 and 9, crossroads. Property east owned by L. Eagle. Property west owned by Dade Cromer.

(Latitude 41° 42' 08.34" Longitude 84° 33' 10.43")  
To Post 13, true bearing N. 88° 14' 02" E. Distance 5,295.4 feet.

#### POST 13.

On east side of north-south road between sections 9 and 10, T. 9 S., R. 2 W.; 1.5 feet west of north-south wire fence; 77.0 feet north of center of small wooden bridge over drain ditch; 274.14 feet north of fence, quarter corner between sections 9 and 10; 2,390.86 feet south of crossroads, corner of sections 3, 4, 9 and 10. Property east owned by Earl Conders. Property west owned by D. Lenabarger.

(Latitude 41° 42' 09.95" Longitude 84° 32' 00.65")  
To Post 14, true bearing N. 88° 04' 06" E. Distance 5,299.2 feet.

#### POST 14.

On east side of north-south road between sections 10 and 11, T. 9 S., R. 2 W.; 2 feet west of north-south rail fence; 303 feet north of center of small bridge; 396.7 feet north of east-west fence, quarter corner between sections 10 and 11; 2,252.3 feet south of crossroads, corner sections 2, 3, 10 and 11. Property east owned by D. Rediger. Property west owned by Wm. St. Johns.

(Latitude 41° 42' 01.71" Longitude 84° 30' 50.83")  
To Post 15, true bearing N. 87° 57' 59" E. Distance 5,236.1 feet.

#### POST 15.

On northwest embankment of east branch St. Joseph River on line between sections 11 and 12, T. 9 S., R. 2 W.; 39 feet north of old rail fence west; 556.2 feet north of fence east, quarter corner between sections 11 and 12; 2,091.8 feet south of crossroads corner of sections 1, 2, 11 and 12. Property east owned by E. Falkner. Property west owned by I. Wheeler.

(Latitude 41° 42' 13.54" Longitude 84° 29' 41.85")  
To Post 16, true bearing N. 89° 43' 20" E. Distance 5,331.4 feet.

#### POST 16.

On east side of north-south road between section 12 T. 9 S., R. 2 W., and section 7 R. 1 W.; 5 feet north of fence east; 2 feet west of north-south fence; 667.4 feet north of fence east, quarter corner west side section 7; 1,980.6 feet south of stone in center of road east, northwest corner of section 7. Property east owned by Joel Marzolf. Property west owned by S. Kurtz.

(Latitude 41° 42' 13.79" Longitude 84° 28' 31.57")  
To Post 17, true bearing N. 88° 15' 06" E. Distance 5,208.0 feet.

#### POST 17.

On east side of north-south road between sections 7 and 8 T. 9 S., R. 1 W., 2 feet west of north-south fence. Post is in line with north part of A. E. Myers barn. It is 802.1 feet north of east-west fence, quarter corner between sections 7 and 8; 1,847.9 feet south of stone in center of road, corner sections 5, 6, 7 and 8. Property east owned by A. E. Myers. Property west owned by C. Walkup.

(Latitude 41° 42' 15.35" Longitude 84° 27' 22.95")  
To Post 18, true bearing N. 87° 35' 17" E. Distance 5,096.0 feet.

#### POST 18.

On line of center of territorial road extended west; 90.7 feet west of center of road north and rail fence running south which marks line between sections 8 and 9, T. 9 S., R. 1 W. It is on south side of road which runs W. N. W. and is 2 feet north; of east-west wire fence. Adjoining property owned by A. E. Bernath.

(Latitude 41° 42' 17.46" Longitude 84° 26' 15.83")  
To Post 19, true bearing N. 88° 13' 07" E. Distance 11,397.3 feet.

Note regarding adoption of state line through sections 9 and 10, R. 1 W.

The center of the road through these sections was adopted as state line for the following reasons: (1) By certified copy of notes of 1837, survey by Andrew Porter, D. S., his line follows Indiana road for 11 Chains in west part of section 11 and for whole distance through sections 10 and 9 a total of 170.48 chains = 10,251.68 feet, (2) All property owners on each side of road pay taxes for property on north side to Michigan and on south side to Ohio. (3) See statement Claude P. Stevens of Waldron, Michigan herewith.

Waldron, Michigan, July 31st, 1915.

S. S. Gannett,  
Morenci, Michigan.

Dear Sir:

Your letter to the County Clerk has been sent to me for a reply. In answer I would say that the center of the public road in sections 9 and 10, T. 9 S., R. 1 W., 1½ miles south of Waldron is considered the dividing line between Michigan and Ohio. The state of Michigan has repaired the road and built the bridges for more than thirty years but how much longer I cannot tell.

Yours truly,  
Claude P. Stevens,  
Supervisor.

Original copy of above letter filed, in field note book No. 2.

The only thing that conflicts with the above is the fact that measurements of connections of state line with land corners north and south, make the state line 71 feet south of center of road at west side of section 9 and approximately 116 feet south of center of road at east side of section 10.

#### POST 19.

On line with center of territorial road extended east; 51 feet northeast of northeast corner of log house of Geo. Winsler; 47 feet south of center of road running northeast; 26.5 feet south of wire fence east; 2 feet west of north-south garden fence; on land belonging to Geo. Winsler.

(Latitude 41° 42' 20.94" Longitude 84° 23' 45.65")  
To Post 20, true bearing N. 88° 34' 26" E. Distance 4,472.6 feet.

#### POST 20.

On east side of north-south road between sections 11 and 12, T. 9 S., R. 1 W., and east of ditch; 2 feet north and 38.5 feet east from 10 inch hickory tree which is on west side of the road. Post is 1,250.48 feet south of stone, corner sections 1, 2, 11 and 12; 1,394.52 feet north of quarter corner between sections 11 and 12. Adjoining property east owned by H. L. Bender. Adjoining property west owned by Mrs. M. Rosa.

(Latitude 41° 42' 22.04" Longitude 84° 22' 46.71")  
To Post 21, true bearing N. 88° 30' 35" E. Distance 5,400.6 feet.

#### POST 21.

On east side of road which follows Michigan Meridian, Ranges 1 E. and 1 W. Post is 2.2 feet west of north-south wire fence. The distance measured 3 times along west side of section 7, R. 1 E. showed the excessive error of 144.4 feet in 1 mile and 114.3 feet in the half mile from quarter corner west side of section 7 to corner sections 6 and 7. The land office distance being short. Using the adopted method of prorating this error, Post 21 was set 1,055.22 feet south of stone, corner sections 6 and 7; and 1,600.08 feet north of quarter corner west side section 7. Adjoining property both east and west owned by T. W. Vanarsdalen.

(Latitude 41° 42' 23.42" Longitude 84° 21' 35.54")  
To Post 22, true bearing N. 87° 58' 06" E. Distance 5,010.4 feet.

#### POST 22.

In section 7 T. 9 S., R. 1 E.; 57 feet south of wooden state line sign board on Wabash R. R. and 1 foot south, southeast of fence separating property of the railroad from that of E. Benson.

(Latitude 41° 42' 25.17" Longitude 84° 20' 29.53")  
To Post 23, true bearing N. 87° 58' 26" E. Distance 3,715.2 feet.

#### POST 23.

On east side of north-south road between sections 7 and 8 T. 9 S., R. 1 E., 0.3 mile south of Munson, Michigan. Post is 6 feet west of 30 inch oak tree and 2.5 feet west of north-south wire fence. It is 889.7 feet south of center of east-west road, approximate corner of sections 5, 6, 7 and 8 and 1,777.3 feet north of fence west, quarter corner sections 7 and 8. Property east and west owned by I. Snyder.

(Latitude 41° 42' 26.47" Longitude 84° 19' 40.58")  
To Post 24, true bearing N. 87° 55' 58" E. Distance 5,423.8 feet.

#### POST 24.

On east side of north-south road between sections 8 and 9 T. 9 S., R. 1 E.; 1.5 feet west of north-south wire fence. Post is 834.2 feet south of center of crossroads, corner sections 4, 5, 8 and 9; 1,806.8 feet north of quarter corner between sections 8 and 9. Property east owned by S. J. McCrilles. Property west owned by Geo. Myrholzt.

(Latitude 41° 42' 28.40" Longitude 84° 18' 29.12")  
To Post 25, true bearing N. 88° 01' 32" E. Distance 5,269.1 feet.

#### POST 25.

On east side of north-south road between sections 9 and 10, T. 9 S., R. 1 E.; 1.8 feet west of wire fence; 888.9 feet south of fence east, accepted for 50 years as section line between sections 3 and 10; 1,779.1 feet north of east-west fence, quarter corner between sections 9 and 10. Property east owned by E. A. Perry. Property west owned by M. B. Cooley.

(Latitude 41° 42' 30.19" Longitude 84° 17' 19.69")  
To Post 26, true bearing N. 87° 15' 48" E. Distance 5,288.6 feet.

#### POST 26.

On east side of north-south road between sections 10 and 11, T. 9 S., R. 1 E.; 2.3 feet west of north-south wire fence; 26.0 feet north of wire fence west; 710.36 feet south of stone in road opposite fence west, corner sections 2, 3, 10 and 11; 4,684.94 feet north of iron washer above stone in crossroads, corner sections 10, 11, 14 and 15. No evidence of any stone, fence or other mark for quarter corner between sections 10 and 11 and point on state line was determined from the two section corners noted above. Property east owned by Edw. Cone. Property west owned by John Schaffner.

(Latitude 41° 42' 32.68" Longitude 84° 16' 10.04")  
To Post 27, true bearing N. 88° 21' 40" E. Distance 5,545.2 feet.

#### POST 27.

On east side of north-south road between sections 11 and 12, T. 9 S., R. 1 E.; 1.2 feet west of north-south wire fence. Post is 108.5 feet south of center line of track Toledo & Western R. R.; 88.7 feet south and 46.0 feet east of vitrified sewer pipe in which corner fence on west side of road marks limit of right of way Toledo & Western R. R.; 371.0 feet south of center line of track L. S. & M. S. R. R.; 588.3 feet south of iron pin center of road, corner sections 1, 2, 11 and 12. From iron pin, 8 inches below surface of road, it is 33.0 feet southwest to corner fence. Post 27 is 2,054.3 feet north of east-west fence, quarter corner between sections 11 and 12. Property east owned by Miles L. Wolcott. Property west owned by A. J. Onweller.

(Latitude 41° 42' 34.24" Longitude 84° 14' 56.96")  
To Post 28, true bearing N. 88° 19' 53" E. Distance 5,195.3 feet.

#### POST 28.

On east side of north-south road, between section 7, T. 9 S., R. 2 E., and section 12 R. 1 E.; 1.5 feet west of north-south wire fence; 463.0 feet south of stone at west corner sections 6 and 7, R. 2 E. The section corner stone was found 2½ feet below surface of road, vertically over it was placed a cement

sewer pipe 18 inches diameter and 2 feet long, with an iron pin 2 inches square and 30 inches long directly over the stone. From stone at section corner it is 57.0 feet N. 64° 30' E. to soft maple 2 feet in diameter, and 55.4 feet S. 27° E. to soft maple 3 feet in diameter. Post is 2,182.7 feet north of quarter corner west side of section 7; 0.7 mile southwest of Morenci Michigan. Property east and west is owned by M. Seeley.

(Latitude 41° 42' 35.73" Longitude 84° 13' 48.49")

To Post 29, true bearing N. 87° 59' 10". Distance 5,553.7 feet.

#### POST 29.

On east side of road in northwest quarter of section 8, T. 9 S., R. 1 E.; 0.5 mile south of Morenci, Michigan. Post is 267.1 feet south and 361.5 feet east of iron hub in tile, corner of sections 5, 6, 7 and 8; from iron hub in tile 3.8 feet northeast to blaze on buckeye tree and 19.9 feet west to blaze on butternut tree. Property owned by V. Baldwin.

(Latitude 41° 42' 37.65" Longitude 84° 12' 35.32")

To Post 30, true bearing N. 88° 01' 18" E. Distance 4,881.0 feet.

#### POST 30.

On east side of north-south road between sections 8 and 9, T. 9 S., R. 2 E. Post is 36.7 feet east and 15.0 feet north of 2 foot hickory tree which is on west side of road. Post is 210.85 feet south of corner of sections 4, 5, 8 and 9, section corner, marked by wood stake and bricks below surface of road, in line with fences east and west. Post is 2,437.85 feet north of quarter between sections 8 and 9. Property east owned by W. Gee. Property west owned by A. Gilles.

(Latitude 41° 42' 39.31" Longitude 84° 11' 31.01")

To Post 31, true bearing N. 87° 49' 20" E. Distance 5,313.7 feet.

#### POST 31.

On east side of north-south road between sections 9 and 10, T. 9 S., R. 2 E.; 217.0 feet north of center line of track of Toledo & Western R. R.; 143.1 feet south of fence west and row of trees east in line with corner sections 3, 4, 9 and 10. No corner stone found after digging up road. Post is 2,502.9 feet north of fence east-west, quarter corner between sections 9 and 10. Property east owned by H. Deyo. Property west owned by F. Martin.

(Latitude 41° 42' 41.30" Longitude 84° 10' 21.00")

To Post 32, true bearing N. 87° 33' 25" E. Distance 3,991.2 feet.

#### POST 32.

On east side of north-south road in section 10, T. 9 S., R. 2 E.; 0.25 mile west of north-south line between sections 10 and 11; 99.8 feet south of fence east. Property east owned by Ben Pots. Property west owned by Sarah Mann.

(Latitude 41° 42' 42.98" Longitude 84° 09' 28.43")

To Post 33, true bearing N. 87° 31' 58" E. Distance 6,546.7 feet.

#### POST 33.

On north side of "T" road east; 34.3 feet east and 17.8 feet north of corner sections 1, 2, 11 and 12, T. 9 S., R. 2 E. Section corner is marked by brick 1 foot below surface of road, in line with fence west. From section corner to center of oak stump (30 inches diameter) 43 feet S. 45° E. Property east owned by J. H. Turner. Property west owned by A. Metcalf.

(Latitude 41° 42' 45.76" Longitude 84° 08' 02.20")  
To Post 34, true bearing N. 87° 40' 06" E. Distance 5,344.7 feet.

#### POST 34.

On north-south wire fence line between section 6, T. 9 S., R. 3 E., and section 1, T. 9 S., R. 2 E.; 126.07 feet north of stone at west corner sections 6 and 7, R. 3 E. Stone is in center of east-west road 1 foot below surface and is in line with fences north and south. Post 34 is 2,521.3 feet south of quarter corner west side section 6. Property east owned by J. Sanford. Property west owned by E. Smith.

(Latitude 41° 42' 47.90" Longitude 84° 06' 51.79")

To Post 35, true bearing N, 87° 14' 00" E. Distance 5,289.8 feet.

#### POST 35.

On east side of north-south road between sections 5 and 6, T. 9 S., R. 3 E.; 266.1 feet north of stone near center of crossroads corner sections 5, 6, 7 and 8; 2,381.3 feet south of quarter corner between sections 5 and 6. Post is 1.5 feet west of north-south wire fence and 11.9 feet north of 12 inch burr oak tree. Property east owned by J. C. Kellogg. Property west by J. B. Smith.

(Latitude 41° 42' 50.42" Longitude 84° 05' 42.13")

To Post 36, true bearing N. 87° 42' 37" E. Distance 5,293.7 feet.

#### POST 36.

On north-south wire fence, line between sections 4 and 5, T. 9 S., R. 3 E.; on line between property of A. McGurer west and H. C. Rathbun east. Post is 384.2 feet north of the corner of sections 4, 5, 8 and 9 which was marked by old wood stake in center of three stones 1.5 feet below surface of east-west road and in line with north-south fence. Replaced wood stake with an iron pin 1 inch square and 1 foot long. Post is 2,259.8 feet south of quarter corner between sections 4 and 5.

(Latitude 41° 42' 52.50" Longitude 84° 04' 32.39")

To Post 37, true bearing N. 87° 05' 24" E. Distance 5,330.4 feet.

#### POST 37.

On east side of north-south road between sections 3 and 4, T. 9 S., R. 3 E.; 1 foot west of north-south wire fence. Post is 541.5 feet north of center road, approximate corner of sections 3, 4, 9 and 10 and 2,102.5 feet south of quarter corner between sections 3 and 4. Property east owned by Sylvester Green. Property west owned by Geo. Poats.

Note: Dug hole 3 feet deep and 10 feet in diameter but could not find stone or other mark for corner of sections 3, 4, 9 and 10.

(Latitude 41° 42' 55.17" Longitude 84° 03' 22.20")

To Post 38, true bearing N. 87° 52' 24" E. Distance 5,303.5 feet.

#### POST 38.

On east side of north-south road between sections 2 and 3, T. 9 S., R. 3 E.; 1.5 feet west of north-south wire fence; 652\*3 feet north of center of crossroads, approximate corner of sections 2, 3, 10 and 11. Dug hole 2 feet deep and 8 feet diameter for section corner mark but could not find any; 1,993.7 feet south of fence east, quarter corner between

sections 2 and 3. Property east owned by G. A. Truckenbrod. Property west owned by A. W. Burry.

(Latitude 41° 42' 57.11" Longitude 84° 02' 12.32")  
To Post 39, true bearing N. 87° 55' 34" E. Distance 5,305.5 feet.

#### POST 39.

On east side of north-south road between sections 1 and 2, T. 9 S., R. 3 E.; 1.3 feet west of north-south wire fence; 748.1 feet north of approximate corner sections 1, 2, 11 and 12, center of road and bridge west. According to oldest inhabitants section corner stone has been lost as corner comes at intersection of Bear Creek with crossroads. Post 1,882.9 feet south of east-west rail fence, quarter corner sections 1 and 2. Property east and west owned by V. Burg.

(Latitude 41° 42' 59.00" Longitude 84° 01' 02.41")  
To Post 40, true bearing N. 89° 26' 55" E. Distance 5,257.9 feet.

#### POST 40.

On east side of north-south road; 1.5 feet west of north-south wire fence. Post is directly east of south wing of Geo. Hoadley's residence and is 968.4 feet north of fence east and center of road west, approximate corner of sections 6 and 7. This section corner is in low wet ground near Bear Creek and mark could not be found. Post is 1,620.6 feet south of quarter corner west side section 6 T. 9 S., R. 4 E. Property east and west owned by A. A. Hoadley.

(Latitude 41° 42' 59.49" Longitude 83° 49' 43.09")  
To Post 41, true bearing N. 87° 50' 27" E. Distance 5,976.5 feet.

#### POST 41.

On east side of north-south road between sections 5 and 6, T. 9 S., R. 4 E.; 3 feet west of north-south rail fence; 1,080.1 feet north of east-west fence stated by L. J. Newton, a resident of many years, as having been accepted as line between sections 6 and 7 and sections 5 and 8. No stone found by digging at corner. Post 1,495.9 feet south of fence west, quarter corner between sections 5 and 6. Property east and west owned by S. M. Newton.

(Latitude 41° 43' 01.71" Longitude 83° 58' 34.34")  
To Post 42, true bearing N. 87° 45' 41" E. Distance 5,222.5 feet.

#### POST 42.

On east side of north-south road between sections 4 and 5, T. 9 S., R. 4 E.; 1.8 feet west of north-south wire fence; 4.3 feet north of an opposite fence running N. 85° E.; 1,201.6 feet north of stone in road corner sections 4, 5, 8 and 9, T. 9 S., R. 4 E.; 1,310.4 feet south of fence west, quarter corner between sections 4 and 5. Property east owned by M. Fairbanks. Property west owned by Geo. Haffer.

(Latitude 41° 43' 03.72" Longitude 83° 57' 25.53")  
To Post 43, true bearing N. 87° 46' 42". Distance 5,369.0 feet.

#### POST 43.

On east side of north-south road between sections 3 and 4, T. 9 S., R. 4 E.; 2 feet west of north-south wire fence; 61.5 feet south of 36 inch elm tree which stands on west side of road; 1,295.2 feet north of fence west, corner sections 3, 4, 9 and 10; 3,778.4 feet south of stone in road, corner of sections 3, 4, 33 and 34. From section corner stone 18.4 feet southwest to

hole cut in top of south wing of concrete culvert and 18.5 feet northwest to hole cut in north wing of same culvert. Property east owned by J. Thomas. Property west owned by W. O. Clark. Dug hole 10 feet diameter and 3 feet deep for quarter corner between sections 3 and 4 but no evidence of stone or other mark found. Connection was therefore made with stone at corner of sections 3, 4, 33 and 34 as noted above.

(Latitude 41° 43' 05.77" Longitude 83° 56' 14.79")  
To Post 44, true bearing N. 87° 37' 12" E. Distance 5,253.6 feet.

#### POST 44.

On east side of north-south road between sections 2 and 3, T. 9 S., R. 4 E.; 0.5 mile northwest of Metamora and 1.5 feet east of north-south wire fence. Post is 1,492.8 feet north of stone in road corner sections 2, 3, 10 and 11. Boulder 6 inches below road surface 95.7 feet northeast of northeast corner M. C. Gates house; 45.7 feet northeast of maple tree (four trunks); 76 feet north northeast of 2 foot wild cherry. Post 1,074.5 feet south of stone in road, quarter corner between sections 2 and 3 which is 1 foot below surface of road 2 feet north of wire fence and opposite center line of bridge north; 19.5 feet southwest of mark on top of east wing of bridge and 19.5 feet southeast of mark on top of west wing of bridge. Placed 1½ inch gas pipe and bricks above boulder. Property east owned by Wm. Hayman. Property west owned by O. E. Hendricks.

(Latitude 41° 43' 07.92" Longitude 83° 55' 05.58")  
To Post 45, true bearing N. 87° 20' 20" E. Distance 5,260.5 feet.

#### POST 45.

On east side of north-south road between sections 1 and 2, T. 9 S., R. 4 E.; 1 foot west of north-south wire fence; 0.5 mile northeast of Metamora. Post 1,673.72 feet north of stone in road corner sections 1, 2, 11 and 12. Stone close to surface of road; 20 feet west of anchor post of fence east; S, 85° E. 34 feet to 20 inch elm. Post 897.78 feet south of 2 inch iron pipe, quarter corner between sections 1 and 2. Pipe belled at end, set in bricks, 17.5 feet northeast of center of top of north wing concrete culvert and 35.9 feet west of anchor post of fence east. Property east owned by Tom Irwin. Property west owned by Peter Farnsel.

(Latitude 41° 43' 10.33" Longitude 83° 53' 56.29")  
To Post 46, true bearing N. 89° 09' 27" E. Distance 5,194.6 feet.

#### POST 46.

On west side of north-south road between sections 1, R. 4 E. and 6, R. 5 E., T. 9 S., on north-south fence line; 0.5 mile north of Treadway. Post is 1,744.9 feet north of stone in road, west corner sections 6 and 7. Stone 10 inches below surface in center of road, in line with fence east and west; 26.6 feet east of anchor post of fence west. Post is 829.1 feet south of quarter corner west side of section 6, stone in center of road, 10 inches below surface. In line with fence west; 38.8 feet east of anchor post fence west. Property east owned by J. Rinhart. Property west owned by Tom Irwin. Note.—The fence west, property line between W. Iffland north and Tom Irwin south, and pointed out by them as being approximately on the state line is 65 feet north of state line as determined from the General Land Office record of 1837. Residents (J. Rinhart and Wm. Iffland) agree that said fence is comparatively new and has been moved at least 10 feet north within the last eight years by Tom Irwin in the absence of Wm. Iffland. The General Land Office measurements with error prorated was

adopted, as the stone, corner of sections 1 and 6, and stone, quarter corner between sections 1 and 2, were both found. J. H. Rinhart states he has paid taxes on all his buildings in Michigan for 14 years. His house now comes in Ohio, but accepting the fence between Irwin and Iffland referred to above, would locate most of his barn in Ohio also.

(Latitude 41° 43' 11.08" Longitude 83° 52' 47.80")  
To Post 47, true bearing N. 86° 23' 10" E. Distance 5,822.5 feet.

#### POST 47.

On east side of north-south road between sections 5 and 6, T. 9 S., R. 5 E.; 1 foot west of north-south rail fence. Post 633.6 feet south of stone in road, quarter corner between sections 5 and 6. Stone 1 foot below road surface; 25.5 feet east of anchor post of fence west and 29.0 feet from anchor post of fence east. No evidence of corner of sections 5, 6, 7 and 8 found or fence east and west and post was set from quarter corner only. Post 1,385.6 feet north of center line Toledo & Western R. R. tracks; 1,116.6 feet north of center line of bridge over Tenmile Creek. Property east owned by D. A. Lathrop. Property west owned by John Kahle.

(Latitude 41° 43' 14.70" Longitude 83° 51' 31.18")  
To Post 48, true bearing N. 88° 31' 49" E. Distance 5,232.6 feet.

#### POST 48.

On west side of north-south road between sections 4 and 5, T. 9 S., R. 5 E.; opposite wire fence east; 0.5 mile north of Berkey. Post 2, 104.0 feet north of corner sections 4, 5, 8 and 9 in Berkey pointed out by six residents as accepted corner. Post 441.7 feet south of stone quarter corner between sections 4 and 5, stone 33.5 feet west from poplar tree on east side of road. On east the state line divides the property of J. B. Lathrop on the south from that of J. R. Lathrop on the north. Adjacent property west owned by M. B. Sanderson. Note.— The state line through section 4, T. 9 S., R. 5 E. has been in dispute for many years. The several landowners on both sides of the line have had numerous law suits and various surveys made to locate a line acceptable to all. About 1907 a fence was built from the west side of section 4 eastward for three-fourths of a mile and adopted as a compromise state line, and has since been accepted by those most interested, viz., J. R. Lathrop, J. B. Lathrop, L. L. Ford and Jean Ford. This fence through section 4 has been adopted by the survey of 1915 as the final line because it is less liable to cause disputes in the future than a line established either north or south of it. It is about 67 feet north of a point on state line on west side of section 4 as determined from General Land Office records and 75 feet north of a point on state line on east side of section 4 determined from the same record.

(Latitude 41° 43' 16.02" Longitude 83° 50' 22.21")  
To Post 49, true bearing N. 88° 11' 10" E. Distance 5,338.8 feet.

#### POST 49.

On east side of north-south road between sections 3 and 4, T. 9 S., R. 5 E.; 1.5 feet west of north-south wire fence. Post 307.6 feet south of stone, quarter corner between sections 3 and 4. Stone at surface of road, 24 feet west of anchor post of fence east and 26.5 feet east of anchor post of fence west. Post 2,295.1 feet north of east-west fence corner sections 3, 4, 9 and 10. Property east and west owned by R. W. Patten.

(Latitude 41° 43' 17.68" Longitude 83° 49' 11.85")  
To Post 50, true bearing N. 87° 33' 26" E. Distance 5,032.3 feet.

#### POST 50.

On east side of north-south road between sections 2 and 3, T. 9 S., R. 5 E. Post 260.82 feet south of stone opposite fence west quarter corner between sections 2 and 3. Post 2,434.3 feet north of approximate corner sections 2, 3, 10 and 11. Dug hole 8 feet by 10 feet, 2 feet deep but found no trace of corner sections 2, 3, 10 and 11. Post 1,831.3 feet north of center line of bridge over Tenmile Creek. Property east owned by Perry Leonardson. Property west owned by C. F. Bates.

(Latitude 41° 43' 19.79" Longitude 83° 48' 05.55")  
To Post 51, true bearing N. 88° 15' 03" E. Distance 5,630.8 feet.

#### POST 51.

On east side of north-south road between sections 1 and 2, T. 9 S., R. 5 E.; 12.7 feet west of west rail Toledo & Western R. R., Adrian branch; 0.5 mile north of Allen Junction. Post is 123.45 feet south of stone, quarter corner between sections 1 and 2; 2,482.05 feet north of approximate corner sections 1, 2, 11 and 12. Property east owned by W. Wright. Property west owned by L. Strong.

(Latitude 41° 43' 21.48" Longitude 83° 46' 51.33")  
To Post 52, true bearing N. 87° 42' 25" E. Distance 5,024.7 feet.

#### POST 52.

On east side of north-south road between section 1, R. 5 E. and section 6, R. 6 E., T. 9 S.; 0.5 mile north of Smith Siding. Post 44.0 feet south and 22.0 feet east of stone, quarter corner west side of section 6. Adjacent property east and west owned by J. A. Wilson.

(Latitude 41° 43' 23.46" Longitude 83° 45' 45.12")  
To Post 53, true bearing N. 87° 50' 42" E. Distance 5,095.2 feet.

#### POST 53.

On west side of north-south road between sections 5 and 6, T. 9 S., R. 6 E. Opposite old stake found in center of road, stated by Edw. Ward to mark line between his farm and that of F. Knapp; 30.2 feet east of 2 foot elm tree on property line, stated by Frank Knapp and Edw. Ward to have been accepted for 40 years or more as on state line. South 2,558.0 feet to center of crossroads, approximate corner of sections 5, 6, 7 and 8. North 2,567.0 feet to center of crossroads approximate corner sections 5, 6, 31 and 32. State line west divides the property of Edw. Ward on the north and Frank Knapp on the south. Adjacent property east owned by David Anderson.

(Latitude 41° 43' 25.35" Longitude 83° 44' 37.98")  
To Post 54, true bearing N. 87° 17' 21" E. Distance 5,400.1 feet.

#### POST 54.

Two feet west of north-south wire fence on line between sections 4 and 5, T. 9 S., R. 6 E.; 4.5 feet northwest of 20 inch elm. One mile west by 0.5 mile north of Sylvania. Post 2,482.7 feet south of stone, corner sections 4, 5, 32 and 33. Stone 1.8 feet north of center line east-west road on line with north-south fence. Post 2,434.2 feet north of stone, corner sections 4, 5, 8 and 9. Stone 6 inches below surface of road set over another stone and is S. 6° (approximate) W. 47.0 feet

from 18 inch hickory and directly south 63 feet from another 18 inch hickory. Post on property of Frank Winzeler. Property east owned by Mrs. J. Scholl.

To Post 54A, true bearing N. 88° 00' 44" E. Distance 4,122.9 feet.

#### POST 54A.

A concrete post of the Lake Shore & Michigan Southern R. R. on west line of railroad right of way in section 4 T. 9 S., R. 6 E. on north line of Sylvania corporation. The post is triangular in shape and projects about 8 feet above ground. Marked "Mich." on north and "Ohio" on south. This post replaces a wooden post set by the same railroad which had been accepted for many years as the state line and as it agreed closely with the line as surveyed in 1915, it has been adopted as a mark on the final line.

(Latitude 41° 43' 29.28" Longitude 83° 42' 32.51")  
To Post 55, true bearing N. 87° 22' 25" E. Distance 1,337.7 feet.

#### POST 55.

On north-south fence line between sections 3 and 4, T. 9 S., R. 6 E.; 0.5 mile north of Sylvania on north boundary of corporation; 435.5 feet South of iron pin in east-west road marking quarter corner between sections 3 and 4. Post 2,210.1 feet north of iron pin, corner sections 3, 4, 9 and 10. Pin 6 inches below surface of east-west road in Sylvania; 37.0 feet east of catch basin; 49.3 feet north of northwest corner M. Crumm's house and 41.6 feet south of south brick wall of K. J. Canfield's house. Property west owned by E. L. Fowler. Property east owned by Mary Hattersley.

(Latitude 41° 43' 29.89" Longitude 83° 42' 14.89")  
To Post 56, true bearing N. 85° 27' 54" E. Distance 887.9 feet.

#### POST 56.

On east side of road running north northeast and south southwest through section 3, T. 9 S., R. 6 E.; 2 feet west of north-south wire fence. Post is on north boundary of Sylvania corporation. Property both east and west owned by Mary Hattersley.

(Latitude 41° 43' 30.58" Longitude 83° 42' 03.22")  
To Post 57, true bearing N. 85° 29' 09" E. Distance 4,416.4 feet,

#### POST 57.

On east side of north-south road between sections 2 and 3, T. 9 S., R. 6 E.; 2 feet west of north-south wire fence and 38.6 feet south of anchor post of fence east. Post is 129.87 feet south of stone, quarter corner sections 2 and 3. Stone in center line north-south road, 31 feet north of north fence of road east. Post is 2,421.93 feet north of stone corner sections 2, 3, 10 and 11. Stone in center line road opposite center line lane east from stone 75.6 feet southeast to 24 inch oak tree and 39.2 feet northeast to 8 inch apple tree. Property east of post 57 owned by H. A. Hine. Property west owned by T. H. Walbridge.

(Latitude 41° 43' 34.01" Longitude 83° 41' 05.16")  
To Post 58, true bearing N. 88° 50' 18" E. Distance 5,261.4 feet.

#### POST 58.

On east side of north-south road between sections 1 and 2, T. 9 S., R. 6 E.; 46.6 feet northwest of northwest corner of A.

Shabnow's house; 104.5 feet south of stone, quarter corner between sections 1 and 2. Post 2,509.2 feet north of iron pipe, center line north-south road, opposite fence west, marking corner sections 1, 2, 11 and 12. Post on lot of A. Shabnow. Property west owned by Albert Miller.

(Latitude 41° 43' 35.06" Longitude 83° 39' 55.79")  
To Post 59, true bearing N. 87° 39' 59" E. Distance 7,103.3 feet.

#### POST 59.

On west side of north-south road through section 6, T. 9 S., R. 7 E.; 0.3 mile east of range line, opposite stone in center line of road and fences east-west. Stone in road pointed out by residents as having been accepted for many years as being on state line. Fence east divides property of F. Coon on the north from B. F. Edwards on the south. Line west divides property of John Dashner on the north from Winnifred Nicholass on the south.

(Latitude 41° 43' 37.91" Longitude 83° 38' 22.19")  
To Post 60, true bearing N. 87° 23' 00" E. Distance 4,277.7 feet.

#### POST 60.

On east side of north-south road between sections 5 and 6, T. 9 S., R. 7 E.; 0.5 mile north of Trilby; in line with south side of J. A. Brock's house; 62.7 feet west of west side of same house; 5.6 feet south of 10 inch elm; 55.9 feet north of stone, quarter corner sections 5 and 6, on west side of stone road on edge of ditch opposite large oak tree. Post 2,369.8 feet south of center of crossroads approximate corner sections 5, 6, 31 and 32. Post on property of J. A. Brock. Property west owned by Sam'l Cowell.

(Latitude 41° 43' 39.84" Longitude 83° 37' 25.84")  
To Post 61, true bearing N. 87° 09' 07" E. Distance 5,218.7 feet.

#### POST 61.

On east side of north-south road between sections 4 and 5, T. 9 S., R. 7 E.; 2 feet west of north-south board fence; 179.9 feet north of fence west pointed out by Will Frazier as being on the one-half section line; 2,303.1 feet south of center of crossroads, opposite center line of bridge east, approximate corner sections 4, 5, 32 and 33. Property east owned by J. N. Smith. Property west owned by C. Graber.

(Latitude 41° 43' 42.40" Longitude 83° 36' 17.10")  
To Post 62, true bearing N. 88° 46' 50" E. Distance 5,389.1 feet.

#### POST 62.

On west side of north-south road between sections 3 and 4, T. 9 S., R. 7 E.; 14.5 feet south of south rail of Toledo, Ann Arbor & Jackson R. R.; 15.0 feet east of north-south wire fence and 12.5 feet west of center line of paved roadway. Post 289.78 feet north of east-west fence pointed out as being on one-half section line; 2,345.42 feet south of north corner of sections 3 and 4. Corner marked by wooden stake above stone 2 feet below surface of road. Stake 42.5 feet northwest of telephone pole; 33.7 feet west of 1 foot brace pole; 8.1 feet south east of mail box post; 21.7 feet south of east-west wire fence. Property east owned by Wm. Ellis. Property west, owned by C. Striggow.

(Latitude 41° 43' 43.53" Longitude 83° 35' 06.05")  
To Post 63, true bearing N. 87° 29' 10" E. Distance 5,132.2 feet.

POST 63.

On east side of north-south road between sections 2 and 3, T. 9 S., R. 7 E.; 1.2 feet east of north-south wire fence; 397.70 feet north of west fence pointed out by S. Curson as on the one-half section line; 2,258.30 feet south of center of crossroads pointed out by S. M. Koch as the corner of sections 2, 3, 34 and 35. Post on property of S. Curson. Property west owned by Wm. Bevens.

(Latitude 41° 43' 45.75" Longitude 83° 33' 58.43")  
To Post 64, true bearing N. 88° 29' 59" E. Distance 5,202.5 feet.

POST 64.

At southwest corner of crossing of north-south road between sections 1 and 2, T. 9 S., R. 7 E. and east-west road through center of sections 1 and 2; 3 feet east of north-south wire fence and 5 feet north of east-west wire fence; 400.6 feet north of stone quarter corner between sections 1 and 2, T. 9 S., R. 7 E. in center line of north-south road, opposite fence west. Stone and stake 20.5 feet east of north-south fence. Post 2,217.4 feet south of center of cross roads, approximate corner sections 1, 2, 35 and 36. Property east owned by C. Tye. Property west owned by John Striker.

(Latitude 41° 43' 47.09" Longitude 83° 32' 49.84")  
To Post 65, true bearing N. 87° 02' 32" E. Distance 4,484.5 feet.

POST 65.

On east side of Detroit Ave., in section 1 T. 9 S., R. 7 E.; opposite fence east along north side of church yard, pointed out by Moses Lavoy (resident for 45 years) as having been accepted for many years as state line. Post 2.5 feet west of anchor post of said fence east; 51.7 feet northwest of northwest corner of brick church. Line east divides property of L. Lavoy from church yard. Property west owned by M. Lavoy.

(Latitude 41° 43' 49.37" Longitude 83° 31' 50.78")  
To Post 66, true bearing N. 88° 05' 49" E. Distance 870.3 feet.

POST 66.

In section 6, T. 9 S., R. 8 E.; on Detroit, Monroe & Toledo Short Line R. R. right of way; 37.67 feet east of east rail of tracks; 1.5 feet west of north-south wire fence; on line with north fence of cemetery, which is on line with fence along north side of church yard (see Post 65), accepted for many years as state line. Post is 2,081.0 feet south of approximate corner of sections 6 and 31, R. 8 E. Line west divides the property of L. Lavoy from cemetery. Property east owned by M. Reed.

(Latitude 41° 43' 49.65" Longitude 83° 31' 39.31")  
To Post 66A, true bearing N. 87° 27' 23" E. Distance 1,867.9 feet.

POST 66A.

A concrete post of the Lake Shore & Michigan Southern R. R. on east side of railroad in section 6, T. 9 S., R. 8 E.; 5 miles northeast of Toledo. The post is triangular in shape, about 18 inches on each side and projects 8 feet above ground; marked "Mich." on north side and "Ohio" on south. This post like post 54A, set by the same railroad north of Sylvania, has been accepted for many years as on the state line and as it agreed closely with the line as surveyed in 1915, it has been adopted as a mark on the final line.

(Latitude 41° 43' 50.47" Longitude 83° 31' 14.70")  
To Post 67, true bearing N. 88° 30' 00" E. Distance 3,370.5 feet.

POST 67.

On east side of north-south road between sections 5 and 6, T. 9 S., R. 8 E.; opposite line of cherry trees east. Post 73.3 feet from southwest corner concrete porch, house of C. Mollenhauer; 440.4 feet north of quarter corner sections 5 and 6, fence east 1,885.6 feet south of north corner sections 5 and 6 fence east pointed out by Nicholas Spross as being on the section line. Property east owned by C. Mollenhauer. Property west owned by Edw. Collins.

(Latitude 41° 43' 51.34" Longitude 83° 30' 30.26")  
To Post 68, true bearing N. 87° 52' 47" E. Distance 4,559.0 feet.

POST 68.

On east side of Michigan Ave., in section 5, T. 9 S., R. 8 E.; 2 feet west of anchor post of fence east. Fence said by residents to have been accepted for many years as state line; 58.3 feet southwest of south-west corner L. Morin's house; 42.0 feet southwest of 30 inch oak tree. Line east divides property of L. Morin on the north from R. Petee on the south. Line west divides property of L. Morin on the north from Geo. Symon on the south.

(Latitude 41° 43' 53.00" Longitude 83° 29' 30.17")  
To Post 69, true bearing N. 88° 00' 00" E. Distance 4,748.0 feet.

POST 69.

In section 4, T. 9 S., R. 8 E.; 1.25 feet east of north-south wire fence east of timber; 6.3 feet northwest from 30 inch elm. Post replaced a stone 3 inches by 6 inches, 4 inches above ground, said by H. A. McLeary (old resident) to have been set on the state line about 40 years ago. Post on property of H. A. McLeary. Adjacent property west owned by John Brown.

(Latitude 41° 43' 54.63" Longitude 83° 28' 27.59")  
To Post 70, true bearing N. 87° 49' 34" E. Distance 3,086.8 feet.

POST 70.

A dressed granite monument, 48 inches by 30 inches by 18 inches, weighing about 2,500 pounds; lettered as follows: On north side—

MICHIGAN  
WOODBRIDGE N. FERRIS  
GOVERNOR ERECTED BY AUTHORITY OF  
THE 48TH LEGISLATURE  
ACT 84, PUBLIC ACTS OF 1915  
BY MICHIGAN GEOLOGICAL SURVEY  
R. C. ALLEN, DIRECTOR  
JOINTLY WITH THE STATE OF  
OHIO

On south side—

OHIO  
FRANK B. WILLIS  
GOVERNOR  
ERECTED BY AUTHORITY OF  
THE 81ST GENERAL ASSEMBLY  
ACT OF MAY 27, 1915  
BY OHIO TOPOGRAPHIC SURVEY  
C. E. SHERMAN, INSPECTOR

JOINTLY WITH THE STATE OF  
MICHIGAN

On east side—

POST  
70

On west side—

STATE  
LINE  
SURVEYED BY  
S. S. GANNETT  
GEOGRAPHER  
UNITED STATES  
GEOLOGICAL SURVEY  
1915

The lower part of the monument is embedded for 12 inches into a concrete foundation 36 by 48 by 48 inches, made of 10 sacks of cement and about 40 cubic feet of crushed stone. The foundation thus weighs more than three tons, and is set in sandy soil on property of J. B. Webber, a few feet east of and 20 feet south of northern terminus of stone road to Pt. Place. It is 50 feet east of east bank of Ottawa River and about 5 feet above surface of water. (See Post 71 for method used in locating post 70.)

(Latitude 41° 43' 55.78" Longitude 83° 27' 47.17")  
To Post 71, true bearing N. 87° 49' 44" E. Distance 2,291.2 feet.

POST 71.

Granite post 69 inches long, top dressed 6 by 8 inches square and 18 inches down from top; marked "OHIO" on south, "MICHIGAN" on north POST 71 on west, 1915 on east, "STATE LINE" on top. Post set on property of J. B. Webber, 2 feet west of north-south fence dividing property of J. B. Webber and Z. C. Pheatt; 656.6 feet north of fence west, property line of John Momimee and Mr. Garland; 41.6 feet north of fence east; 1,273.9 feet south of fence east-west, south line of section 34; 30.63 feet north of Station 421; 1,986.5 feet. It is in swampy ground, a little more than 900 feet west of shore of Maumee Bay and only a few feet higher than surface of water in the Bay. At the present rate that shore of Bay is being washed away this post should remain undisturbed several hundred years.

(Latitude 41° 43' 56.63" Longitude 83° 27' 16.97")

Note.—From hub at Sta. 421 plus 1,986.5 feet it is 626 feet south to east-west fence, pointed out by J. B. Webber as being line between properties of John Momimee and Mr. Garland; the east-west line passing through center of section 3. According to plat of General Land Office dated May 9th, 1843, T. 9 S., R. 8 E., state line passes 10 chains (660.0 feet) north of said east-west center line of section 3. By General Land Office certified notes and also by above plat it is 1,280.4 feet from south line of section 34 south to state line. The line located by the latter measurement comes 9.9 feet south of the location by former. Prorating this error makes location of line 1,273.87 feet south of south line of section 34 and 656.63 feet north of east-west center line of section 3. Accepting this point as the true eastern terminus of the Ohio-Michigan line, Post 71 was set here along the north-south fence crossing the swamp, line between the properties of J. B. Webber and Z. G. Pheatt.

The location for large monument No. 70 was determined by computation, being on the line between Post 71 and the stone pointed out by H. A. McLeary (replaced by Post 69). Monument 70 is 2,291.2 feet S. 87° 49' 44" W. from Post 71

and 3,066.8 feet N. 87° 49' 34" E. from Post 69. The true bearing of the line given by Harris in 1817 as well as that given by Mullett resurvey of 1842 is S. 87° 42' W. and N. 87° 42' E., agreeing closely with bearings between Posts 69, 70 and 71 given above.

### PART III. BASIS OF THE OHIO-MICHIGAN BOUNDARY DISPUTE.

ARTHUR MEIER SCHLESINGER.

There has always been an intimate relationship between map-makers and the makers of history. The former class has frequently been instrumental in changing the face of history; the latter has been even more largely responsible for changing the face of maps. An ill-conceived map nerved Christopher Columbus to set sail across the western ocean; the results of his voyage produced a revolution in cartography. It is the purpose of this paper to show to what extent a current misconception of geography made history in the form of the Ohio-Michigan boundary controversy.

Prior to the opening of the long war which made the British the masters of the Ohio valley instead of the French, the standard maps of the western country had been made by the great French cartographers, the De l'Isles, father and son; Jean Baptiste Bourguignon d'Anville; and Nicholas Bellin. These maps, based upon the accounts of the first explorers of that region, were necessarily impressionistic in many particulars.

A new era in map-making opened in 1755 when the British cartographers, stimulated by the ambitions of their government to possess the western country, turned their attention to this work. A flood of maps appeared in that year—as separate sheets, in atlases, and in the popular magazines.<sup>1</sup> Most of these maps plagiarized the work of the French cartographers; but, two of them stood forth as having a character and importance of their own.<sup>2</sup> These two maps influenced the labors of map-makers for the next half-century. The one, by Lewis Evans of Philadelphia, was hurried through the press in order to be of use in Braddock's ill-fated expedition.<sup>3</sup> This map represented chiefly the middle colonies and a part of the backcountry; a small inset showed the northwest region beyond Lake Erie.

The other map, by John Mitchell, played a leading part in the complications and misunderstandings which brought Ohio and Michigan to the verge of war eighty years later. John Mitchell, M. D., F. R. S., was a botanist who came to Virginia early in the eighteenth century. His large and elaborate map was undertaken at the request of the Lords of Trade, and was based on "Draughts, Charts and Actual Surveys of different parts of His Majesties Colonies and Plantations in America: Great part of which have been lately taken by their Lordships Orders, and transmitted to this Office by the Governors of the said Colonies."<sup>4</sup> This map treated the western country in great detail.

Mitchell's map was repeatedly reproduced, widely used and long deemed to be an authority. William Smith, the

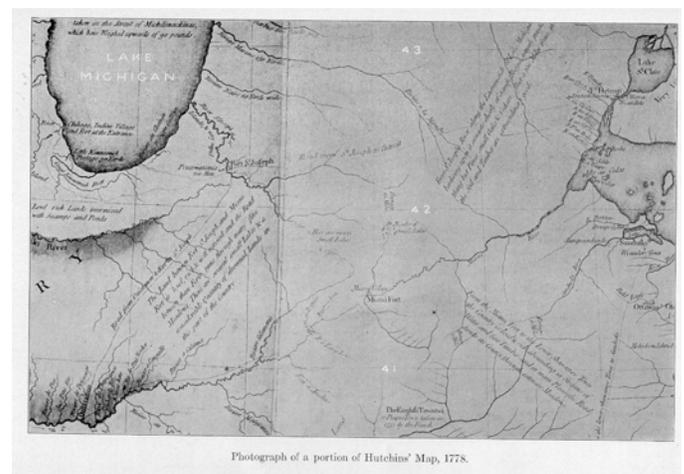
historian of provincial New York, said of this map: "Dr. Mitchell's is the only authentic one extant. None of the rest concerning America have passed under the examination or received the sanction of any public board, and they generally copy the French."<sup>5</sup> Its high repute was further evidenced by the fact that it formed the basis of the discussions leading up to the famous proclamation of 1763<sup>6</sup> and that when, almost twenty years later, the peace commissioners negotiated the treaty for the termination of the Revolutionary War, this map was the only one before them.<sup>7</sup> Such men as Thomas Kitchin, Eman, Bowen, Thomas Jefferys and William Faden—men whose names were known wherever maps were known in the latter part of the eighteenth century—were map publishers primarily; and they borrowed freely of the labors of the original map-makers, taking to themselves the credit of authorship as well as the profits of publication. Mitchell's map was most widely pirated and may be said to have produced a brood of bastard maps which helped to impress and perpetuate the cartographic errors, as well as excellences, of their progenitor.<sup>8</sup>

Mitchell and his contemporaries had no better conception of the relative positions of Lakes Erie and Michigan than did the earlier French cartographers. It was a misunderstanding of this point that caused all the trouble between Michigan and Ohio in later years. Correct modern maps show that a parallel of latitude (or due east and west line), drawn through the southernmost bend of Lake Michigan, passes about seven miles south of what was formerly the northernmost cape of Maumee Bay. Such a due east line intersects the southern shore of Lake Erie about one-third of a degree east of the mouth of the Maumee river. The French authors had displayed a wide divergence of opinion in this matter. According to Guillaume De "Isle, a parallel of latitude passing through the southern extremity of Lake Michigan would intersect the blunt end of Lake Erie about halfway between the mouths of the Maumee and the river Raisin.<sup>9</sup> D'Anville believed that such a parallel would entirely clear the lake to the south.<sup>10</sup> Bellin, through a happy fortune succeeded in drawing his maps so that such a parallel would sever the southern shore of Lake Erie east of the mouth of the Maumee.<sup>11</sup> Bellin had chanced upon a close approximation of the true relative position of the two lakes.

Had the British map-makers and publishers used Bellin as a model in this matter, the boundary controversy would never have occurred. Instead, the De l'Isle assumption was taken over in more or less exaggerated form by Mitchell, Evans and their school, though one of the standard atlases, with an excess of that quality which Matthew Arnold termed "sweet reasonableness," followed all three of the French models in as many different maps.<sup>12</sup>

On Lewis Evan's map a due east line drawn from the southernmost point of Lake Michigan would have intersected the western end of Lake Erie some distance

north of Maumee Bay. According to Mitchell, it would have crossed the Detroit river above its entrance into Lake Erie. The De l'Isle-Mitchell-Evans misconception dominated map-making to such an extent that the vast majority of maps produced from 1755 until the early decades of the nineteenth century were so constructed as to permit a parallel drawn through the southernmost bend of Lake Michigan to intersect Lake Erie at some point north of the mouth of the Maumee, or to pass the lake entirely on the north. Nor did maps drawn under the supervision of the United States government, and based on actual surveys, improve the situation perceptibly. The map made in 1778 by Thomas Hutchins, of New Jersey, who bore the title of "geographer general in the United States," was not as far wrong as many others, but the due east line in question would have struck Lake Erie near the northern cape of Maumee Bay.<sup>13</sup> The same was true of a map made in 1784 by William McMurray, "late assistant geographer to the United States."<sup>14</sup>



The De l'Isle-Mitchell-Evans misconception as to the relative position of the lakes was widespread as evidenced by its perpetuation on the following maps: de Vaugondy's *Partie de l'Amerique Septent qui comprend la Nouvelle France ou le Canada* (1755); Palaiet's *Carte des possessions Angloises & Francoises du continent de l'Amerique* (1759); *An accurate map of North America* \* \* \* by Eman. Bowen and John Gibson (1763); *A map of the British dominions in North America* \* \* \* by

Peter Bell (1772); *An accurate map of North America* \* \* \* by Bowen and Gibson (1772); Pownall's *A map of the middle British colonies in North America. First published by Lewis Evans, of Philadelphia, in 1755; and since corrected and improved* \* \* \* (1776); *The British colonies in North America*, engraved by William Faden (1777); *A new map of North America*, engraved for Carver's *Travels through the Interior Parts of North America* (1778); *A map of the United States of North America*, engraved by H. D. Pursell (1785); the same (1787); *A map of the United States of North America*, reproduced in Schopf's *Reise durch einige Mittlern und Sudlichen Vereinigten Nord Amerikanischen Staaten* (1788); the anonymous map, *Sketch of the western countries of Canada* (1791); Conder's *A map of the middle states of America* \* \* \* (1794); *A new map of North America, with the West Indies*, published by Laurie & Whittle (1794); Scott's *N. W. territory* (1795); Bradley's *Map of the northern part of the United States of America* (1797); *A new map of North America* \* \* \* engraved by Hill (1797); *Map of the United States, Canada, etc.*, engraved by Smith and Jones (1799); *Map of the southern, western and middle provinces of the United States*, engraved for Michaux's *Travels to the westward of Alleghany Mountains* (1805); *Map of the United States, including Louisiana*, engraved by Scoles (1810); *The upper territories of the United States*, engraved by Kneass and Delleker (1814); *Map of the United States of America*, published by John Melish (1815); *Map of the United States of America, from Mellishes, with additions and corrections*, engraved by Neele & Son (1818); Lewis's *A new and correct map of the United States of North America* \* \* \* (1819); and *United States*, engraved for Cobbett's *A Year's Residence in the United States of America* (1828).

Thus the misconception was wide-spread and long-enduring. The only exception during this time that the writer has been able to find was *A map of the northwest parts of the United States of America* by the inventor, John Fitch, wherein the relative position of the two lakes was given with approximate correctness. Although published in 1785, Fitch's map was not once referred to by either party in the later boundary controversy.

In view of the almost unanimous testimony of contemporary cartography, it cannot be doubted that in the later eighteenth century and the early years of the nineteenth it was an accepted fact in the best scientific circles, as well as among the people in general, that the southern extremity of Lake Michigan lay on a parallel of latitude north of Maumee Bay to a greater or less distance. Indeed, the Senate Committee on the Judiciary, which finally effected an adjustment of the difficulties between Ohio and Michigan in 1836, went so far as to say that Mitchell's map, "then considered every where as a map which, in reference to the Northwestern Territory, had no superior for accuracy," was "alleged to have been the very map relied on by Congress, and by the convention of Ohio, at the time of the admission of the State."<sup>15</sup> It is only fair to conclude therefore that when the Ordinance of 1787 described "an east and

west line drawn through the southerly bend of Lake Michigan" as a proper boundary between the upper and lower tier of the projected states, the framers had in mind a line that would intersect Lake Erie north of Maumee Bay; or, if Mitchell's map was relied on as authority, the Detroit river above its entrance into the lake.<sup>16</sup> Further, Congress must have intended the same division of territory when the Enabling Act for Ohio (1802) declared that a part of the northern boundary of Ohio should be a line running due east and west "through to the southerly extreme of Lake Michigan." The members of the Ohio constitutional convention were laboring under the same misapprehension, when, an old beaver-trapper appeared on the scene and informed them that the southern shore of Lake Michigan lay much farther south than the maps indicated. Under the circumstances the convention incorporated in the constitution the boundaries described in the Enabling Act, with the proviso that if the southern bend of Lake Michigan extended so far south that a parallel passing through it should not intersect Lake Erie or should pierce the lake east of the mouth of the Maumee, then, with the assent of Congress, the boundary should be "a direct line running from the southern extremity of Lake Michigan to the most northerly cape of the Miami [Maumee] bay."<sup>17</sup> In 1805, when the territory of Michigan was organized by Congress, the Ohio line remained as defined in the Ordinance of 1787 and in the Enabling Act for Ohio.

The merits of the subsequent controversy between Ohio and Michigan should now be clear. The Ohioans claimed the boundary which it had been the intent and purpose of Congress to give them in the light of the geographical knowledge of the times. The Michigan officials for the most part ignored this aspect of the question and insisted that the boundary defined by Congress should be established in accordance with the latest and most accurate surveys; in other words, that Maumee Bay and Toledo should properly be considered a part of Michigan instead of Ohio. The dispute was one phase of the eternal conflict between what law-makers actually said and what they intended to say.

The original question was magnified and complicated by certain considerations of national politics and by the pressure of commercial interests in both Ohio and Michigan.<sup>18</sup> By 1836 the situation had developed to a stage where it was no longer susceptible of adjustment on the basis of the merits of the question alone. The report of the Senate Committee on the Judiciary in that year did indeed cite eleven maps of the earlier period in order to prove that the Ohio contention was correct; and the supporters of Michigan failed to produce any maps that belied this evidence.<sup>19</sup> But, in view of the bitter feeling that had been engendered, and the imminence of an internecine border warfare, the controversy was ripe for a definitive settlement by congressional action on the ground of large public policy. Whatever may have been the immediate motives of Congress, it was an eminently wise compromise by which Ohio received the boundary she had claimed and the feelings of Michigan Territory

were soothed with the gift of statehood and the annexation of a large portion of the Upper Peninsula in which such rich mineral deposits have since been developed.

<sup>1</sup>Eleven different maps, apparently by as many different authors, may be found in the Library of Congress for the year 1755.

<sup>2</sup>Reed, S. M., "British Cartography of the Mississippi Valley in the Eighteenth Century." *Miss. Valley Historical Review*, vol. 2, pp. 217-222.

<sup>3</sup>*A general map of the middle British colonies, in America; viz. Virginia, Mariland., Delaware, Pennsylvania, New Jersey, New York, Connecticut and Rhode Island.* \* \* \* By Lewis Evans. Engraved by Jas. Turner.

<sup>4</sup>A map of the British and French dominions in North America with the roads, distances, limits and extent of the settlements. By Jno. Mitchell. Thomas Kitchin, sculp. An inscription, signed by Thomas Pownall, secretary of the Plantation Office conveyed the endorsement of the Lords of Trade.

<sup>5</sup>Winsor, Narrative and Critical History, vol. 5, p. 83, quoting from Smith, History of the province of New York (Albany, 1814), p. 218.

<sup>6</sup>Report on Canadian Archives, 1907, No. 18, p. 103n.

<sup>7</sup>John Adams' Works (C. F. Adams ed.), vol. 8, pp. 20, 210, 392, 398, 518, 519.

<sup>8</sup>Professor Reed gives a list of such reprints in her article in the *Miss. Valley Historical Review*, vol. 2, pp. 219-220. For a partial list of reprints of Evan's map, see Winsor, Narrative and Critical Period, vol. 5, pp. 84-85.

<sup>9</sup>*Carte du Canada ou de la Nouvelle France et des decouvertes qui y ont ete faites* \* \* \* Par Guillaume Del l'Isle, geographe de l'Academie Royale des Sciences. 1703.

<sup>10</sup>*Amerique Septentrionale.* \* \* \* Par le sr. d'Anville. 1746.

<sup>11</sup>*Carte des lacs du Canada.* \* \* \* Par N. Bellin, ingenieur et hydrographe de la marine. 1744.

<sup>12</sup>Jefferys, Thomas, *American Atlas* (London, 1776), nos. 2, 5, 7,

<sup>13</sup>*A new map of the western parts of Virginia, Pennsylvania, Maryland and North Carolina, comprehending the rivers Ohio, and all the rivers which fall into it; part of the river Mississippi* \* \* \* By Thomas Hutchins.

<sup>14</sup>*The United States. According to the definitive treaty of peace signed at Paris, September 3, 1788.* By William McMurray. R. Scot, sculp. Mr. P. Lee Phillips, Chief of the Division of Maps and Charts at the Library of Congress, has called this "the first official map of the United States;" *The Rare Map of the Northwest by John Fitch* (Washington, 1916), p. 27.

<sup>15</sup>Senate Doc. 211, 1st Sess., 24th Cong., p. 13. Cf. p. 47.

<sup>16</sup>Jacob Burnet in his Notes on the Early Settlement of the North Western Territory (Cincinnati, 1847), p. 360, says: "It is generally known, to those who have consulted the maps of the western country extant at the time the Ordinance" of 1787 was passed, that Lake Michigan was represented as being very far north of the position, which it has since been ascertained to occupy. On a map in the Department of State, which was before the committee of Congress, who formed the Ordinance, for the government of the Territory, the southern boundary of that Lake was laid down as being near the forty-second degree of north latitude; and there was a pencil line passing through the southern bend of the lake to the Canada line, which intersected the strait, between the river Raisin and the town of Detroit. That line was manifestly intended by the committee, and by Congress, to be the northern boundary of this State \* \* \*" The map here described was in all probability Mitchell's map.

<sup>17</sup>Congress admitted Ohio without assent to or rejection of the proviso.

<sup>18</sup>Mr. G. J. Miller emphasizes the economic and business considerations in his article, "The Establishment of Michigan's Boundaries," *Bulletin Am. Geog. Soc.*, vol. 43, pp. 339-351.

<sup>19</sup>*Senate Doc. 211, 1st Sess., 24th Cong.*, pp. 13-15, 32. Seven of these maps have been located in the Division of Maps and Charts in the Library of Congress, and photostat copies in the exact size of the originals have been deposited with the Ohio State Archaeological and Historical Society of Columbus and the Michigan Historical Commission. They bear out the contention of the committee. Of the remaining four, a map of the United States by Lewis was located of the date 1819 instead of 1815 and it proved the point for which the Senate Committee contended; the map called "an ancient map of the Northwestern Territory, with a supplement to the map of Hudson's and Baffin's bays" was not described in sufficient detail to afford identification; "Vame's [Vance's?] map of the United States, published in 1818" could not be found; and the map of Ohio by Hough and Bourne (not "Bounce"), published in 1815, proved to be a detailed map of the state which had no proper bearing upon the question in point inasmuch as Lake Michigan was not shown and the boundary, drawn by partisans of the Ohio claim, bore the legend, "The Northern boundary line of this State has not been precisely ascertained."

## BIBLIOGRAPHY OF THE OHIO-MICHIGAN BOUNDARY DISPUTE.

COMPILED BY ARTHUR MEIR SCHLESINGER

### SOURCES MATERIAL.

*Federal documents:* The most extensive official sources are the Executive Documents and the Senate Documents for the twenty-third and the twenty-fourth Congresses. These volumes contain the correspondence between the two governors and the United States government, legislative reports, and almost all the important papers appertaining to the controversy. In connection therewith the *Journal of the House of Representatives*, the *Journal of the Senate*, the *Annals of Congress*, *Congressional Debates*, *Congressional Globe*, and the *United States Statutes at Large* are important at the appropriate periods. Miss Soule's footnotes give detailed references to these sources.

*State and Territorial Documents:* For the Michigan side, the most important sources are the *Journal of the Michigan Legislative Council, 1824-1834*, *Laws of the Territory of Michigan*, *Journal of the Proceedings of the Convention to form a Constitution for the State of Michigan*, and the *Senate and House Journals*. A large number of *Territorial Records* have been printed in the *Michigan Pioneer and Historical Society, Historical Collections*, vol. 36, pp. 100-620; vol. 37, pp. 17-31, 207-419. A collection of pamphlets, classified as *Early Michigan History*, may be consulted at the Michigan State Library. For Ohio, the *Acts of the General Assembly* and the *Journals*, particularly the *Journal of the extra session of the Assembly in June, 1835*, are important. In the State House at Columbus may be found the unpublished *Executive Documents* of the state, containing a large portion of the extensive correspondence of Governor Lucas in regard to the boundary. The constitutions of Michigan and Ohio are printed in Thorpe, F. N., *The Federal and State*

*Constitutions, Colonial Charters, and other Organic Laws of the United States*, Washington, 1909.

*Unofficial sources*: The chief source is quasi-official in character, being the "Letters of Lucius Lyon," who as Senator-elect went to Washington to labor for the admission of Michigan. These have been published in the *Michigan Pioneer and Historical Society, Historical Collections*, vol. 27, pp. 412-604. Of interest is the article entitled "How They Fought, Personal Recollections of the Contest with Ohio Fifty Years Ago," in the *Michigan Pioneer Society Collections*, vol. 7, pp. 69-73. Insight into the politics and opinion of the day is afforded by the contemporary issues of the *Ohio State Journal*, *Niles' Register*, *Detroit Journal*, and *Detroit Free Press*.

*Maps*: Practically all the maps bearing on the boundary dispute may be found in the Library of Congress. Phillips, P. L., *A List of Maps of America in the Library of Congress* (Washington, 1901), should be consulted. Photostat copies of some of the more important maps, in the exact size of the originals may be found at the Ohio State Archaeological and Historical Society, Columbus, Ohio, and in the Archives of the Michigan Historical Commission.

#### SECONDARY MATERIAL.

The boundary dispute has yielded a wide literature of varying merit. Miss Soule's monograph stands forth as the most scholarly treatment of the episode. The subject has also been treated in the histories of the two states and of the Northwest Territory. The following list represents the principal articles and books treating of the boundary dispute.

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Soule, A. M., "The Southern and Western Boundaries of Michigan" *Mich. Pion. and Hist. Soc., Hist. Colls.*, vol. 27, pp. 346-390; also *Mich. Pol. Sci. Assn. Pubs.*, vol. 2, pp. 29-81.

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Waggoner, Clark. *History of the City of Toledo and Lucas County*. New York, 1888.

Way, W. V., *The Facts and Historical Events of the Toledo War of 1835*. Toledo, 1869.

## APPENDIX I.

Below are listed the libraries, scientific and educational institutions to which the reports of the survey are delivered in the order in which they are issued. Those from which publications are received in exchange are indicated on the list by an asterisk.

#### MICHIGAN PUBLIC LIBRARIES, SCIENTIFIC AND EDUCATIONAL INSTITUTIONS.

Name.	Address.
Adrian College	Adrian, Michigan.
Albion College	Albion, Michigan.
Alma College	Alma, Michigan.
* University of Michigan Library	Ann Arbor, Michigan.
Benton Harbor College	Benton Harbor, Michigan.
Benzonia Academy	Benzonia, Michigan.
Ferris Institute	Big Rapids, Michigan.
Detroit College	Detroit, Michigan.
Detroit University School	Detroit, Michigan.
* Michigan Agricultural College	East Lansing, Michigan.
Hillsdale College	Hillsdale, Michigan.
Hope College	Holland, Michigan.
* College of Mines	Houghton, Michigan.
Western State Normal College	Kalamazoo, Michigan.
Northern State Normal College	Marquette, Michigan.

Central State Normal College	Mt. Pleasant, Michigan.	Public Library	Niles, Michigan.
* Olivet College	Olivet, Michigan.	Ladies Library	Northville, Michigan.
Cleary Business College	Ypsilanti, Michigan.	Otsego Public School Library	Otsego, Michigan.
State Normal College	Ypsilanti, Michigan.	Township Library	Otsego, Michigan.
Ypsilanti Public Library	Ypsilanti, Michigan.	Public Library	Petoskey, Michigan.
Adrian Public Library	Adrian, Michigan.	Port Huron Public Library	Port Huron, Michigan.
Albion Public Library	Albion, Michigan.	Quincy Free Public Library	Quincy, Michigan.
Township Library	Allegan, Michigan.	Romeo Public Library	Romeo, Michigan.
Public Library	Alpena, Michigan.	Dunbar School of Agriculture	Sault Ste. Marie, Michigan.
Ann Arbor Public Library	Ann Arbor, Michigan	Hoyt Library	Saginaw, Michigan.
Armada Free Public Library	Armada, Michigan.	Saginaw (E.S.) Public School Libr.	Saginaw, Michigan.
Battle Creek Public School Library	Battle Creek, Michigan.	Saranac Public School Library	Saranac, Michigan.
Bay City Public Library.	Bay City, Michigan.	Traverse City Public Library	Traverse City, Michigan.
The Phelps Free Library	Big Rapids, Michigan.	Tecumseh Public Library	Tecumseh, Michigan.
City Library	Benton Harbor, Michigan.	Three Rivers Free Library	Three River, Michigan.
Bessemer Public Library	Bessemer, Michigan.	Township Library	Union City, Michigan.
Cadillac Public Library	Cadillac, Michigan.	Schoolcraft Township Library	Vicksburg, Michigan.
Calumet and Hecla Company Library.	Calumet, Michigan.	* State Highway Department	Lansing, Michigan.
Free Public Library	Charlotte, Michigan.	Escanaba Public Library	Escanaba, Michigan.
McMillan High School Library	Detroit, Michigan.	Mt. Clemens Public Library	Mt. Clemens, Michigan.
Eastern High School	Detroit, Michigan.	Negaunee Public Library	Negaunee, Michigan
Public Library	Detroit, Michigan.	New Baltimore Public School Library	New Baltimore, Michigan.
A. J. Phillips Library	Fenton, Michigan.	Portland Public Library	Portland, Michigan.
Public School Library	Frankfort, Michigan.	Quimby Public School Library	Quimby, Michigan.
Grand Haven Public Library	Grand Haven, Michigan.	Northport Public School	Northport.
Grand Ledge Public Library	Grand Ledge, Michigan.	Edwardsburg Public School	Edwardsburg.
Grand Rapids Public Library	Grand Rapids, Michigan.	Board of State Tax Commissioners	Lansing.
Central High School Library	Grand Rapids, Michigan.	Western Michigan Development Bureau	Traverse City.
Kent Scientific Museum	Grand Rapids, Michigan.		
Public School Library	Hancock, Michigan.		
Harbor Springs Public Library	Harbor Springs, Michigan.		
Houghton Public Library	Houghton, Michigan.		
Howell Carnegie Library	Howell, Michigan.		
Hudson Public Library	Hudson, Michigan.		
Carnegie Library	Iron Mountain, Michigan		
Baxter Laundry Library	Grand Rapids, Michigan		
Carnegie Library	Ironwood, Michigan.		
Jackson Public Library	Jackson, Michigan.		
Ladies Library	Jonesville, Michigan.		
Public Library	Kalamazoo, Michigan.		
Kalamazoo College Library	Kalamazoo, Michigan.		
* Lansing Public Library	Lansing, Michigan.		
Ludington Public Library	Ludington, Michigan.		
Marine City Public School Library	Marine City, Michigan.		
Peter White Public Library	Marquette, Michigan.		
Mendon Free Public Library	Mendon, Michigan.		
Mt. Pleasant Public Library	Mt. Pleasant, Michigan.		
Spies Public Library	Menominee, Michigan.		
Hackley Public Library	Muskegon, Michigan.		

FOREIGN COLLEGES, LIBRARIES, SCIENTIFIC AND EDUCATIONAL INSTITUTIONS.			
	Name.	Address.	
	University of Arizona Library	Tucson, Arizona.	
	McGill University Library	Montreal, Canada.	
	Manitoba University Library	Winnipeg, Canada.	
	* Colorado School of Mines Library	Golden, Colorado.	
	Department of Geology, Trinity College	Hartford, Connecticut.	
	Sheffield Scientific School, Dept. of Geology	New Haven, Connecticut.	
	* University of Chicago	Chicago, Illinois.	
	* Field Museum of Natural History	Chicago, Illinois.	
	John Crerar Library	Chicago, Illinois.	
	* University of Illinois Library	Urbana, Illinois.	
	* Purdue University Library	LaFayette, Indiana.	
	Howard Memorial Library	New Orleans, Louisiana.	
	Amherst College Library	Amherst, Massachusetts.	
	Mass. Institute of Technology	Boston, Massachusetts.	
	Williams College Library	Williamston, Massachusetts.	

University of Minn., Winchell Library of Geology	Minneapolis, Minnesota.	* State Bureau of Mines	Corvallis, Oregon.
* Minnesota Historical Society	St. Paul, Minnesota.	Wyoming Hist. and Geological Society	Wilkes-Barre, Pennsylvania.
University of Missouri Library	Columbia, Missouri.	American Mining Congress	Washington, D. C.
* University of Missouri, (School of Mines and Metallurgy)	Rolla, Missouri.	* Bureau of Mines	Washington, D. C.
St. Louis Public Library	St. Louis, Missouri.	* Department of Agriculture	Washington, D. C.
Rutgers College Library	New Brunswick, New Jersey.	* Director of the Census	Washington, D. C.
Princeton University Library	Princeton, New Jersey.	Hygienic Laboratory	Washington, D. C.
Grosvenor Public Library	Buffalo, New York.	* Library of Congress	Washington, D. C.
Cornell University Library	Ithaca, New York.	* Office of Public Roads, U. S. Dept. of Agriculture	Washington, D. C.
American Society of Civil Engineers	New York City, New York.	Smithsonian Institution	Washington, D. C.
American Geographical Soc. of N. Y.	New York City, New York.	* United States Geological Survey	Washington, D. C.
* American Museum of Natural History	New York City, New York.	* University of Wisconsin	Madison, Wisconsin.
New York Public Library	New York City, New York.	Peabody Museum, Yale University	New Haven, Connecticut.
New York Univ., Dept. of Geology	New York City, New York.	Northwestern University	Evanston, Illinois.
Public Library of Cincinnati	Cincinnati, Ohio.	Louisiana State Library	Baton Rouge, Louisiana.
Adelbert College Library	Cleveland, Ohio.	Smith College Library	Northampton, Massachusetts.
Cleveland Public Library	Cleveland, Ohio.	Washington University	St. Louis, Missouri.
Ohio State University Library	Columbus, Ohio.	Columbia University	New York City, New York.
Oberlin College Library	Oberlin, Ohio.	State Normal College	Bowling Green, Ohio.
* State University of Oklahoma, Dept. of Geology	Norman, Oklahoma.	University of Oregon	Eugene, Oregon.
Muhlenberg College	Allentown, Pennsylvania.	Commercial Museum	Philadelphia, Pennsylvania.
Bryn Mawr College Library	Bryn Mawr, Pennsylvania.	Lincoln Memorial University	Cumberland Gap, Tennessee.
Pennsylvania State Museum	Harrisburg, Pennsylvania.	University of Kansas	Lawrence, Kansas.
Academy of Natural Sciences	Philadelphia, Pennsylvania.	University of Tennessee	Knoxville, Tennessee.
American Philosophical Society	Philadelphia, Pennsylvania.	University of Washington	Seattle, Washington.
University of Pennsylvania	Philadelphia, Pennsylvania.	* Australian Museum	Sydney, Australia.
Free Library of Philadelphia	Philadelphia, Pennsylvania.	* Mines Department	Melbourne, Victoria, Australia.
* Carnegie Library	Pittsburgh, Pennsylvania.	* Queensland Museum	Brisbane, Australia.
Lehigh University, Dept. of Geology.	South Bethlehem, Pennsylvania.	* Abhandlungen Der. K. K. Geologischen Reichsanstalt	Wien, Vienna, Austria.
Fisk University, Geological Library	Nashville, Tennessee.	* Bureau of Mines	Toronto, Canada.
Seattle Public Library	Seattle, Washington.	* Department of Mines	Ottawa, Canada.
Milwaukee Public Library	Milwaukee, Wisconsin.	* Geological Survey Library	Ottawa, Canada.
Milwaukee Public Museum	Milwaukee, Wisconsin.	Liverpool Geological Society	Liverpool, England.
* Chicago Academy of Science	Chicago, Illinois.	Geological Survey of Eng. and Wales	London, England.
* Davenport Academy of Science	Davenport, Iowa.	Patent office Library	London, W. C., England.
* Colorado College	Colorado Springs, Colorado.	* Mysore Geological Survey	Mysore, India.
* Kansas Academy of Science	Topeka, Kansas.	* Tahaku Imperial University	Sendai, Japan.
* Portland Society of Natural History	Portland, Maine.	* Imperial Geological Survey	Tokyo, Japan.
Boston Society of Natural History.	Boston, Massachusetts.	* Instituto Geologico de Mexico.	Mexico City, Mexico.
* Geological Museum	Cambridge, Massachusetts.	* New Zealand Geological Survey	Wellington, New Zealand.
* University of Minnesota	Minneapolis, Minnesota.	Da Escola de Minas de Ouro Preto	Ouro Preto, Brazil, S. A.
Academy of Science	St. Louis, Missouri.	Institute de Geologia Y Perforaciones	Montevideo, Uruguay, S. A.
* Missouri Botanical Garden	St. Louis, Missouri.	University of Upsala	Upsala, Sweden.
* State Engineer and Surveyor	Albany, New York.	* Geological Survey of W. A.	Perth, Western Australia.
American Institute of Mining Engineers.	New York City, New York.	Dulau & Co.	London, England.

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Name.	Address.
* Geological Survey	University, Alabama.
Geological Survey	Tucson, Arizona.
* Geological Survey	Fayetteville, Arkansas.
* State Mineralogist	San Francisco, California.
* Geological Survey	Boulder, Colorado.
* Geological Survey	Middletown, Connecticut.
* Geological Survey	Tallahassee, Florida.
* Geological Survey	Atlanta, Georgia.
* Geological Survey	Urbana, Illinois.
* Geological Survey	Indianapolis, Indiana.
* Geological Survey	Iowa City, Iowa.
* Geological Survey	Lawrence, Kansas.
* Geological Survey	Lexington, Kentucky.
* Geological Survey	Baton Rouge, Louisiana.
State Survey Commission	Augusta, Maine.
* Geological Survey	Baltimore, Maryland.
* Geological Survey	Jackson, Mississippi.
* Geological Survey	Rolla, Missouri.
* Geological Survey	Lincoln, Nebraska.
* Geological Survey	Trenton, New Jersey.
* Geological Survey	Albany, New York.
* Geological Survey	Chapel Hill, North Carolina.
* Geological Survey	Grand Forks, North Dakota.
* Geological Survey	Columbus, Ohio.
* Geological Survey	Norman, Oklahoma.
* Topographic & Geologic Sur. Com	Beaver, Pennsylvania.
* Geological Survey	Charleston, South Carolina.
* Geological Survey	Vermilion, South Dakota.
* Geological Survey	Nashville, Tennessee.
Bureau of Economic Geology and Technology	Austin, Texas.
* Geological Survey	Burlington, Vermont.
* Geological Survey	Charlottesville, Virginia.
* Geological Survey	Seattle, Washington.
* Geological Survey	Morgantown, West Virginia.
* Geological Survey	Madison, Wisconsin.
* Geological Survey	Cheyenne, Wyoming.



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