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Correspondence re: Kansas Geological Society's 6th Annual Field Conference - central US cross-section. 1931

Thwaites, F. T. (Fredrik Turville), 1883-1961

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Final Notice

Sixth Annual Field Conference

Kansas Geological Society

Kansas - Missouri - Nebraska

August 28 September 3, 1932

The Kansas Geological Society invites you to attend its Sixth Annual Field Conference. The primary purpose of the Conference is to allow geologists to study under competent leadership the very interesting stratigraphy and structure of the Permo-Pennsylvanian rocks of the Northern Midcontinent region. Very excellent opportunity will also be given to examine the structural and stratigraphic features of the northwest flank of the Ozark Uplift in western Missouri, involving rocks of Mississippian to Ordovician age.

The Conference will convene at the Allis Hotel, Wichita, Kansas, Saturday evening, August 27th, and will terminate in Lincoln, Nebraska, Saturday evening, September 3rd. A large number of participants will enjoy a pre-Conference trip to a salt mine at Lyons, Kansas, Saturday morning and afternoon, August 27th.

REGISTRATION

It is *imperative* that those planning to start with the Conference Sunday morning arrive in Wichita the afternoon of Saturday, August 27th, in order to register for the Conference. Headquarters and registration booth will be established in the lobby of the Allis Hotel Saturday afternoon. The party will leave Sunday morning at 7:00 A. M.

Attention is called to the meeting in Wichita Saturday evening, at which time a general outline of the Conference will be given by the Director, Dr. R. C. Moore. At this same time participants will enjoy the paper of Hugh D. Miser.

PRE-CONFERENCE TRIP

Many of the participants have indicated their desire to attend the pre-conference trip to the mine of the American Salt Company at Lyons, Kansas, about 90 miles northwest of Wichita on excellent highways. This trip will be under the direction of Mr. W. A. Ainsworth, consulting geologist, who has had many years experience with this mine. The Lyons mine is believed to be the largest salt mine in the world. The return trip will bring the party through many of the recently developed oil fields of McPherson and Harvey counties.

Those wishing to attend this trip should indicate their desire on the enclosed personal reply blank. They should be in Wichita Saturday morning ready to start at 8:00 A. M. The party will leave from the Allis Hotel.

LEADERSHIP

Leadership for this conference is as follows:

DIRECTOR

RAYMOND C. MOORE—*State Geologist of Kansas.*

ASSOCIATE DIRECTORS

H. A. BUEHLER—*State Geologist of Missouri.*

G. E. CONDRA—*State Geologist of Nebraska.*

ADVISORY LEADERS

C. E. BUSBY—*Nebraska Geological Survey.*

C. O. DUNBAR—*Professor of Paleontology, Yale.*

F. C. GREENE—*Consulting Geologist.*

G. F. KAY—*State Geologist of Iowa.*

K. K. LANDES—*Assistant State Geologist of Kansas.*

H. S. MCQUEEN—*Assistant State Geologist of Missouri.*

H. D. MISER—*United States Geological Survey.*

J. L. RICH—*Consulting Geologist.*

J. E. UPP—*Nebraska Geological Survey.*

J. M. WELLER—*Illinois Geological Survey.*

F. B. PLUMMER—*Texas Bureau of Economic Geology.*

PROGRAM FOR EVENING MEETINGS

Evening meetings will be held at 8:00 P. M. each night of the Conference except Monday. Most of these meetings will be held in a hall of the headquarters hotel. Participants are urged to attend all evening meetings and to pay close attention to directions given at such times.

SATURDAY, AUGUST 27TH—Allis Hotel, Wichita.

Outline of Important Points to be Covered on the Conference
—R. C. MOORE.

The Relationship of the Ouachita Mountains to the Geology of the Northern Midcontinent—H. D. MISER.

SUNDAY, AUGUST 28TH—Kelley Hotel, Iola.

A Reclassification of the Pennsylvanian System in the Northern Midcontinent—R. C. MOORE.

TUESDAY, AUGUST 30TH—President Hotel, Kansas City, Mo.

Geophysical Studies in the Ozark Region—H. A. BUEHLER.

Mississippian Rocks of the Ozark Region—R. C. MOORE.

WEDNESDAY, AUGUST 31ST—Topeka.

The Pennsylvanian System in the Eastern Interior Basin

—J. MARVIN WELLER.

THURSDAY, SEPTEMBER 1ST—Marysville.

Oil and Gas Possibilities of Northeastern Kansas—J. V. HOWELL.

Des Moines Group in Western Missouri.—F. C. GREENE.

FRIDAY, SEPTEMBER 2ND—Weaver Hotel, Falls City, Neb.

Outstanding Features of the Nebraska Sections—G. E. CONDRA.

SATURDAY, SEPTEMBER 3RD—Hotel Cornhusker, Lincoln, Neb.

Program incomplete at this time.

REGISTRATION FEE

A registration fee of \$10.00 is charged each participant of the Conference, whether he attends all of it or not. It is hoped that a majority will enclose a check for this amount with their reply blanks. If this is not convenient the registration fee may be paid at time of registration. Please make all checks payable to the Kansas Geological Society. Each participant will receive a copy of the Guide Book, described more fully below, upon registering for the Conference. Receipts will be furnished upon request.

HOTEL RESERVATIONS

All hotel reservations with the *exception* of Saturday, August 27th, (Wichita) and Saturday, September 3rd, (Lincoln) will be made for you. An Advance Agent will arrange adequate and comfortable hotel reservations for each participant of the Conference. In keeping with the spirit of the times, attempts have been made this year to secure reasonable rates at the hotels and eating places which this Conference will patronize and we are pleased to announce that we have secured the co-operation of a number of such places. We believe that such expenses this year will be approximately 25% less than heretofore.

If two men wish to occupy hotel rooms jointly throughout the Conference, arrangements will be made accordingly by the Advance Agent. Please answer all questions on the Personal Reply Blank thoughtfully.

TELEGRAMS AND MAIL

Arrangements have been made with the Western Union Telegraph Company so that telegrams may be delivered each noon and night provided they are properly addressed. Mail should be addressed to the headquarters hotel at each night stop; telegrams may be addressed likewise, or to the eating place at noon stops. *All mail and telegrams should be sent care of the Kansas Geological Society Field Conference.*

ADVANCE AGENT—BAGGAGE

All baggage is carried in a baggage truck supplied by the Society. The Advance Agent completes registration for each participant and places his baggage in his hotel room. Before the town in which the night stop is made is reached by the caravan, the Advance Agent hands out cards showing the room number of each participant. Upon arrival at the hotel, each participant finds his registration has been made for

him; his baggage placed in his room; he need only ask for the key to his room from the Room Clerk.

LADIES

An increasing number of feminine geologists attend our conferences each year. Such ladies are welcome. However it is not possible to provide for ladies that do not come under the above classification. Participants are urged to remember we are in the field for work and study; not on a sight-seeing excursion.

GUIDE BOOK

A leatheroid-bound Guide Book is given to each participant upon registration. Others who wish to secure copies of this book may also have them upon payment of ten dollars. This Guide Book will include the road log of the conference, descriptions of all geologic phenomenon seen en route, oil fields, correlation tables, and items of historical and geologic interest.

Two new features will be incorporated into the road log in this year's Guide Book. One of these will be the inclusion of graphic measured sections of the rocks exposed at each stop. Another will be large scale strip maps of the route traveled by the Conference, showing the areal geology and other points of interest.

An areal geologic map, of eastern Kansas, western Missouri, and southeastern Nebraska, on a scale of 1:500,000 will be included in the Guide Book. This is the only map showing the detailed geology of this area and will contain some valuable recent information.

"A Reclassification of the Pennsylvanian System" is the title of a paper by Raymond C. Moore, which will be appreciated by all who purchase a Guide Book. In this paper, Dr. Moore will discuss his new classification of the Pennsylvanian of the Midcontinent region, which has provoked so much discussion within the past year. This paper should be in the hands of all students of the Pennsylvanian in any part of the United States. This Conference is calling together many such workers from all parts of the country.

Those who do not believe that commercial geologists are interested in and can do accurate scientific work by means of well logs and well samples will get a surprise when they see the detailed results embodied in "A Detailed Cross Section from Osceola, Mo., to Gove County, Kansas," by Miss Betty Kellett. In this section Miss Kellett has traced many of the smaller units of the Pennsylvanian as well as the larger units of all ages from the Tertiary to the Pre-Cambrian underground from their outcrops. The section is about 400 miles long and includes over 130 wells.

Inasmuch as the Cross Section is quite bulky and troublesome in a car, it is suggested that many participants would prefer to have it sent to their office or home rather than receive it at time of registration. A large scale colored reproduction of the Cross Section will be on display at all evening meetings.

Three other features of the Guide Book help to make it one of the best yet published by this Society. The "Map of the Forest City Basin," by F. G. Holl, and "A Pre-Mississippian Sub-Areal Map of Eastern Kansas and Adjacent States," by J. V. Howell are two maps that will find considerable use in the files of both commercial and academic men. "An Index to the Stratigraphy of Eastern Kansas and Adjoining Areas," by Dr. W. A. Ver Wiebe will give in convenient form all pertinent information on the many subdivisions of the Permian and Pennsylvanian of the northern Midcontinent region.

Persons wishing to assure themselves that they will receive a copy of the Guide Book should send in their check with the enclosed Order Blank, properly filled out (unless they have previously done so). Orders for the Guide Book will be filled in the order they are received. No more Guide Books will be published after the present supply is exhausted.

TRANSPORTATION

Good railroad, bus, or air line service is available into Wichita from all directions. The highways leading to Wichita are also in good condition. The Committee urges all participants to arrive Friday evening if you intend to take the Salt Mine Trip; otherwise arrive Saturday afternoon in order to have time to register and attend the evening meeting.

Travel by automobile in cars of two to five passenger capacity has been found highly satisfactory on past field conferences and will be used this year. If you can bring a five passenger car, please do so. The Committee will attempt to secure transportation for those who do not bring their cars.

In order to promote broader acquaintanceship, passengers will be placed in different cars each day. This has been found to be a very satisfactory arrangement.

Every possible step is taken to promote safety during the Conference. During parts of the Conference police escorts will be provided. Drivers may assist by watching the road log for road directions and warnings. No serious accident has ever marred the pleasure of a Conference of the Kansas Geological Society. Let us keep this record.

OUTLINE OF THE CONFERENCE

SUNDAY, AUGUST 28TH—We will drive eastward from Wichita through many oil fields in the vicinity of Augusta and El Dorado and across the Flint Hills to Iola, studying en route the beds in the lower part of the Permian and in the Pennsylvanian down to the Iola limestone. We will see many excellent exposures of the Virgil series at its type locality.

MONDAY, AUGUST 29TH—From Iola we continue eastward through the Missouri series (redefined) and the Des Moines series. In western Missouri we will see Mississippian, Devonian, and Ordovician sections, as well as some interesting examples of overlap of the Cherokee shale on older beds. The night will be spent at Sedalia.

TUESDAY, AUGUST 30TH—The Des Moines series will be studied en route from Sedalia to Kansas City, including the type section of the Warrensburg channel sandstone, correlated by some with the Bartlesville sand of the oil fields. The afternoon will be devoted to a study of the Bronson and Kansas City (redefined) groups in their classic exposures at Kansas City.

WEDNESDAY, AUGUST 31ST—We will travel up the beautiful "Kaw" River Valley through Lawrence to Topeka, studying excellent new exposures of the Lansing (redefined), Pedee, Douglas (redefined), and Shawnee (redefined) groups.

THURSDAY, SEPTEMBER 1ST—We continue westward through Manhattan, Fort Riley, and Junction City, thence turn north to Marysville for the night stop. Excellent exposures of the members of the Waubesa group will be seen east of Manhattan and the members of the Chase Group near Fort Riley will be seen to good advantage.

FRIDAY, SEPTEMBER 2ND—West of Marysville, the Herington to Winfield portion of the Permian will be studied near Hanover. Northeastward from that town the route will take us down the section to the base of the Permian. In the afternoon we will study the faulted and folded area in the vicinity of DuBois, Table Rock, Humboldt, and Falls City, involving beds down to the Topeka limestone. The night stop is at Falls City, Nebraska.

SATURDAY, SEPTEMBER 3RD—The very interesting Weepingwater section will be studied in the morning and the afternoon will be devoted to a study of the Platte section, involving beds from the Oread to the base of the Bronson group. In this locality they will be of somewhat different character than that found farther south in Kansas. The Conference will have its terminus at Lincoln.

Final Notice

Sixth Annual Field Conference

Kansas Geological Society

Kansas - Missouri - Nebraska

August 28 September 3, 1932

Be sure and return the enclosed reply blanks promptly *whether or not you plan to attend*. It is very important that we know if you will be on this Conference. If you will participate, *answer all questions on each blank*.

Further information can be secured from the Committee on Arrangements.

EDWARD A. KOESTER,
RAYMOND A. WHORTAN,
E. C. MONCRIEF.

You are cordially invited
to attend



The
Sixth Annual Field Conference
of the
Kansas Geological Society

August 28 -- September 3, 1932

The Kansas Geological Society extends to all geologists a hearty welcome to its Sixth Annual Field Conference to be held this coming summer in eastern Kansas and adjacent parts of neighboring states. The primary purpose of the Conference is to study the Permo-Carboniferous of the Western Interior of the United States.

In its previous five annual conferences, this Society has attempted to provide careful study under competent leadership of the major stratigraphic and structural problems of pre-Pennsylvanian rocks in the central part of the United States. On these conferences we have visited the Mississippi River Valley in Iowa and Illinois, the Black Hills of South Dakota, the Rocky Mountains in Wyoming, Colorado, and New Mexico, the Ozarks and Ouachitas of Missouri and Arkansas, and the Wichitas and Arbuckles of Oklahoma. This, year at the request of a large number of past participants, the conference will be held on the fertile prairies of Kansas, Nebraska, and Missouri, where excellent exposures of the Interior Permo-Pennsylvanian are to be found.

LEADERSHIP

Most capable leadership has been sought for this Conference, and we are pleased to announce that the Director will be Dr. R. C. Moore, State Geologist of Kansas. He will be assisted by Dr. G. E. Condra, State Geologist of Nebraska, and Dr. H. A. Buehler, State Geologist of Missouri. They will be further aided by a worthy corp of workers on the stratigraphy and paleontology of the Permian and Pennsylvanian.

THE CONFERENCE

The Conference will convene at Wichita, Kansas, Saturday evening, August 27, and will proceed by automobile the following morning across the Flint Hills eastward, studying the geology en route. The Conference will conclude Saturday evening, September 3 at Omaha, Nebraska.

EVENING MEETINGS

A splendid program of evening meetings is being arranged. The evening meeting has been an outstanding feature of Kansas Geological Society Field Conferences. This year inter-regional correlation of the Pennsylvanian will be the main theme of the program. The high lights of the following days' trip will also be discussed.

OUTLINE OF THE ROUTE

Sunday, August 28—We will drive eastward from Wichita through many oil fields in the vicinity of Augusta and El Dorado and across the Flint Hills to Iola, studying many good exposures of the lower Permian and the Virgil series of the Pennsylvanian at its type locality.

Monday, August 29—From Iola the route continues eastward, covering the Missouri series (redefined) and the Des Moines series, into Missouri, where we will study the Mississippian section in the vicinity of Osceola and Warsaw. The night will be spent in Sedalia.

Tuesday, August 30—The Des Moines series will be studied en route from Sedalia to Kansas City, including the type section of the Warrensburg sandstone, correlated by some with the Bartlesville sand of the oil fields. The afternoon will be devoted to the classic exposures of the Kansas City group (redefined) at the type locality.

Wednesday, August 31—We will travel up the beautiful "Kaw" River Valley through Lawrence to Topeka, studying excellent exposures of the Missouri and Virgil series. These beds are to be seen in somewhat different character than that found in southern Kansas.

Thursday, September 1—We continue up the Kansas River through Manhattan and Fort Riley to Junction City, where we ascend the Smokey Hill River to Abilene. The northern Flint Hills section of the upper Pennsylvanian and lower Permian are studied, several members of the latter at their type locality. The night stop is Abilene.

Friday, September 2—Most of the day will be devoted to the Permian of northern Kansas and southern Nebraska where the minor subdivisions have been worked out in considerable detail. The route runs northward through Clay Center and Washington, Kansas, to the stopping place for the night, Lincoln, Nebraska.

Saturday, September 3—The last day of the Conference will allow a fine opportunity to study the stratigraphy of the Pennsylvanian of eastern Nebraska. Several fine sections will be seen along the Platte and Weepingwater rivers. Some interesting structural problems will also be studied. The Conference will be concluded at Omaha.

PRE-CONFERENCE TRIP

A pre-Conference trip to the largest salt mine in the world is planned for Saturday morning, August 27. This will be to the plant of the American Salt Company at Lyons, Kansas, and will be under the direction of Mr. W. A. Ainsworth, who has been familiar with this mine for over twenty years. The return trip will bring the party through the Ritz-Canton oil field, largest in area in Kansas. We assure you that this feature will be interesting and instructive to all. Those wishing to take this trip will indicate their wish on the enclosed reply blank.

GUIDE BOOK

A bound guide book is prepared for each participant of this Conference. It contains a detailed road log, giving road directions, descriptions of all geologic phenomena seen en route, oil fields, columnar sections, correlation tables, and items of historical and scientific interest. An innovation in the Guide Book for the Sixth Conference will be the inclusion of graphic measured sections of the beds studied at each stop.

An areal geologic map of eastern Kansas, and parts of adjacent states, on a scale of 1:500,000 will be included in the Guide Book. This is the only map showing the detailed geology of this area.

Another feature of the Guide Book will be a preliminary paper by Raymond C. Moore entitled "A Reclassification of the Pennsylvanian System."

Other Features of the Guide Book are:

"A Detailed Cross Section from Osceola, Missouri to Gove County, Kansas," by Miss Betty Kellett.

"The Subdivisions of the Mississippian System in Kansas," by J. I. Daniels and H. S. McQueen.

"Index to the Stratigraphy of Eastern Kansas and Adjoining Areas," by W. A. Ver Wiebe.

"Map of the Forest City Basin, Showing Isopachs of the Des Moines Series," by F. G. Holl.

"Pre-Mississippian Sub-Areal Geologic Map of Eastern Kansas and Adjacent States," by J. V. Howell.

A limited number of extra copies of the Guide Book will be available to those who do not attend. If you wish to make sure you will have the information contained in it, fill out and return the enclosed order blank.

ACCOMODATIONS

Every effort is made by the Field Conference Committee to provide for the convenience and safety of participants during the Conference. All hotel reservations are arranged in advance. A baggage truck is provided for the use of participants.

Travel is by automobile and those not driving their own car are allotted places in the cars of others. Passengers are moved about each day, thus allowing broader acquaintanceship. There is no charge for transportation.

REGISTRATION FEE

A registration fee of \$10.00 is charged each participant of the Conference. Each registrant receives a copy of the Guide Book upon registering. Extra copies of the Guide Book may be secured for the same amount.

FURTHER NOTICES

If you are interested in receiving further announcements of this Conference, please fill out and return to the proper address the enclosed reply blank. Otherwise your name will not be included on the second mailing list.

We will be glad to furnish any special information to any persons writing for same. We will also appreciate receiving the names of any geologists whom you think would care for an announcement of this Conference.

Edward A. Koester,
Raymond A. Whortan,
E. C. Moncrief.

Field Conference Committee

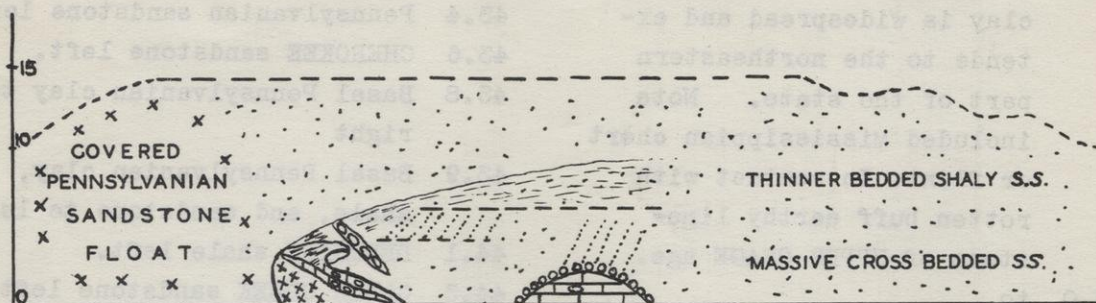
You are cordially invited
to attend



The
Sixth Annual Field Conference
of the
Kansas Geological Society

August 28 -- September 3, 1932

NW $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 11 - T. 37 N. R. 26 W.
ST. CLAIR COUNTY MO.



APPROXIMATE VERTICAL SCALE 1 INCH = 10'

APPROXIMATE HORIZONTAL SCALE 1 INCH = 25'

LEGEND

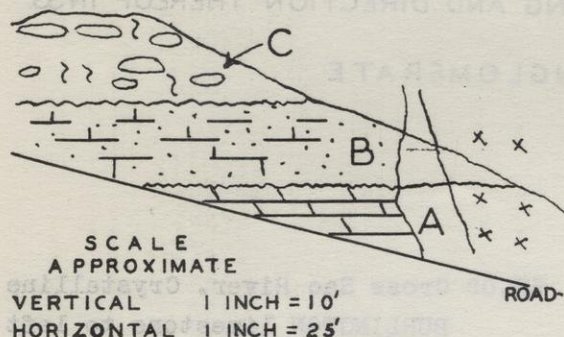
-  CHERTY MISSISSIPPIAN (OSAGE) LIMESTONE
-  SANDSTONE (CLEAR CREEK) CHEROKEE
-  INDICATES THIN SHALE TONGUES IN SANDSTONE
-  INDICATES CROSS BEDDING AND DIRECTION THEREOF IN SS.
-  CHERT OR FLINT CONGLOMERATE
-  COVERED AREAS

Mississippian residual chert and basal Pennsylvanian sandstone
55.45 Mississippian residual chert.
55.8 Basal Pennsylvanian sandstone to left. Note outcrop near top of hill to left.
55.85 Approximate Pennsylvanian-Mississippian contact.
56.45 STOP. NW $\frac{1}{4}$ SW $\frac{1}{4}$ Sec. 11, T. 37N., R. 26W. CLEAR CREEK sandstone in contact with SEDALIA limestone.

58.05 Cross Sac River. Crystalline BURLINGTON limestone to left and right. The SEDALIA contact is about 12 feet below bridge level.
58.3 BURLINGTON limestone.
58.45 Contact of Pennsylvanian on Mississippian; just below the hilltop BURLINGTON limestone is exposed.
58.55 Basal Pennsylvanian clay and sandstone exposed to left.
58.65 BURLINGTON limestone to right
59.35 Pennsylvanian-Mississippian contact up hill.

- 40.7 Basal CHEROKEE green, sandy, shale, weathering to plastic clay in ditch to right. This clay is widespread and extends to the northeastern part of the state. Note included Mississippian chert or flint. In contact with rotten buff earthy limestone of UPPER OSAGE age.
- 42.0 to
- 42.5 Basal CHEROKEE shale and sandstone.
- 42.6 Eldorado Springs Golf Club.
- 42.8 Residual Mississippian chert.
- 43.0 STOP. Examine the following section:

NW SEC. 1 - T36 N. R. 28 W.
ST. CLAIR COUNTY MO.



Reed Springs ?

C. Residual dark bluish
chert and red clay 5'

Sedalia

B. Siltstone, earthy,
buff, calcareous 5' 4"

Sedalia or Choteau

A. Limestone, buff,
slightly earthy,
magnesian 5' 2"

- 43.1 Cross south fork Clear Creek.
- 43.3 Note red residual clay from SEDALIA limestone on right.
- 43.4 Pennsylvanian sandstone left.
- 43.6 CHEROKEE sandstone left.
- 43.8 Basal Pennsylvanian clay to right
- 43.9 Basal Pennsylvanian clay, shale, and sandstone to left.
- 44.1 DEDERICK shale left.
- 44.3 CLEAR CREEK sandstone left.
- 45.3 DEDERICK-CLEAR CREEK contact on right.
- 45.5 DEDERICK-CLEAR CREEK contact on right.
- 45.6 Tiffin. Elevation 868 feet.
- 48.05 Basal CHEROKEE shale and sandstone left.
- 48.45 Thin bedded CLEAR CREEK ? sandstone right.
- 48.6 Massive bedded CLEAR CREEK ? sandstone right.
- 49.05 Sandstone to left.
- 49.2 Oyer.
- 49.85 Knob to right probably capped by CLEAR CREEK.
- 50.85 Lower CLEAR CREEK.
- 51.55 Basal CLEAR CREEK to right.
- 51.65 Residual Mississippian chert to left.
- 51.8 Fairly massive sandstone.
- 53.15 Roscoe. Note cross bedding in CLEAR CREEK sandstone at town marker in right ditch.
- 53.35 Mississippian residual chert and calcareous siltstone to left; probably No. 2 of last stop. Chert is No. 3 of that section.
- 54.05 Mississippian residual chert to right.
- 54.15 Basal Pennsylvanian sandstone to right.
- 54.75 Overlooking Sac River Valley
- 55.25 Approximate contact of Miss-

BOARD OF MANAGERS

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H. A. BUEHLER
STATE GEOLOGIST

STATE OF MISSOURI

BUREAU OF GEOLOGY AND MINES

ROLLA, MO.

December 22, 1931.

Dr. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin.

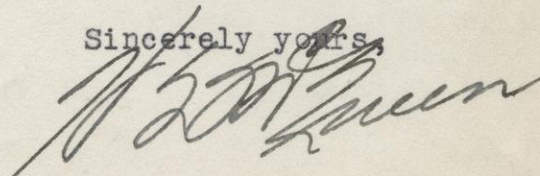
Dear Dr. Thwaites:

I have been in the field the greater part of this month and have your letter of December 12, upon my return.

I believe you will find that the Silurian and Upper and lower Ordovician rocks can be worked out satisfactorily by studying residues made from the original samples. At the present time, I am working on the formations from the base of the St. Peter sandstone to the top of the Mississippian and hope to publish the results during the coming year. At some later date, I would like to exchange with you one of our Missouri wells that penetrates a considerable portion of the Paleozoic section for one of your Wisconsin wells which drills approximately the same section. Perhaps by doing so, we could obtain some information relative to the formations in both states.

I am sorry that you will not be able to visit either Tulsa or Rolla this winter. I plan to leave the latter part of this week for Tulsa and, of course, I will be particularly interested in the sub-surface symposium which is scheduled for presentation during the G. S. A. Meeting.

Sincerely yours,



McQ/DS

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H. A. BUEHLER
STATE GEOLOGIST

STATE OF MISSOURI

BUREAU OF GEOLOGY AND MINES

ROLLA, MO.

November 14, 1931.

Dr. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin.

Dear Dr. Thwaites:

In view of the fact that the Lower Paleozoic sections of Wisconsin and Missouri are similar, I believe I can assure you that any systematic insoluble residue studies in your State will be a success. I must confess that I cannot place every single sample in its exact position within a formation. In general, we are able to designate a sample as coming from a certain formation and as our work progresses, we have recognized zones of considerable distribution within formations which, in some cases, do not have a great total thickness.

One of the most interesting features that has been brought out as a result of our studies has been the thickening and thinning and, in some instances, the total absence of certain formations that were formerly thought to have a wide spread distribution and constant thickness. The study has also enabled us to obtain information regarding unconformities and a number of significant features pertaining thereto.

I have recently been engaged in a study of diamond drill cores from the Southeast Missouri lead belt. Although the drilling covered a relatively small area, it is interesting to note that one of our Upper Cambrian formations, the Bonnetterre dolomite, can be zoned very sharply. These zones have also been recognized in drilling other areas in Southeast Missouri. This particular formation is somewhat variable in its thickness and it has never been fully understood just where these variations occurred in the section. The study mentioned is very encouraging in this respect. The overlying Davis formation of some 200 feet in thickness can now be easily separated into three distinct portions and all of them are persistent.

You will recall that I wrote you, during the past summer, regarding the occurrence of sponge spicules in the well

samples from Grinnell and Dubuque, Iowa and Frankford, Missouri. In subsequent work, sponge spicules have been obtained in Upper-Cambrian beds giving similar residues in or near our Upper Cambrian type locality in Southeast Missouri. These have also been obtained from hand samples in the Arbuckle region of Oklahoma and the Llano-Burnett region of Central Texas. I am hopeful that these forms and the accompanying residues will add to our knowledge of the Upper Cambrian.

As you probably know, it is a function of the Missouri Survey to supervise the drilling of wells for public water supplies. In this work, we have found the insoluble residues to be particularly helpful. They have enabled us to predict the depth to certain water bearing horizons; to determine where certain lenticular sands are absent; and to understand the occurrence of considerable quantities of water at certain persistent horizons within our thick dolomite section. We now know that such occurrences are, in the main, at unconformable contacts and, as a result, we are often advising deeper drilling in order that these productive horizons may be reached.

You will probably find, as we do in Missouri, that many relatively thin zones will be defined in residue studies. In our work, some of these are important in the determination of certain intervals below a particular zone; also in furnishing information regarding structure prior to the drilling of a major contact.

Many stratigraphic problems have confronted geologists in this state. Many of them are now being understood as the result of the correlation of surface and subsurface work. Regarding others, we are very hopeful. I believe you will find that the method will likewise assist you in similar problems in Wisconsin. I know that you have a wealth of material to work with and I am confident that any studies you may undertake will not result in any discredit. The work is intensely interesting because it adds daily to the knowledge of our section, and to the problems of regional stratigraphy.

I understand that Workman, of the Illinois Survey, is having considerable success with this method. It would be fine if those of us in the Mississippi Valley could do our subsurface work on the same basis and, I believe, the results would be most interesting.

In the event that you plan to attend the meeting of the Geological Society in Tulsa, I cordially invite you to visit Rolla and go over the work that we are doing. I had hoped to attend the field session of the Kansas Society but was unable to make the trip. Perhaps we can get together at Tulsa and I hope you can arrange to come here.

Cordially yours,



McQ/DS

Dec. 12, 1931

Dr. H. S. McQueen,
Bureau of Geology and Mines,
Rolla, Missouri

Dear Dr. McQueen:

I am afraid that I have been a long time in thanking you for your letter of November 14 which made clear the situation with regard to the study of insoluble residues. Of course, I had for a long time made use of such tests to pick up certain critical horizons like the top of the Mazomanie. I had even trained some of the drillers to do this and they found that it was a reliable test. On the other hand, such an impression seemed to exist around here that a new and marvelous method had been discovered which I knew nothing about that I felt reluctant to say that I had really been doing the same thing. The main difference is that I never saved any of the residues after examination. I hope to get some small bottles in which to save these for comparison.

My feeling is that the method if followed up more systematically may result in zoning the Niagara, Galena-Black River, and Lower Magnesian dolomites. It can do little now in the Cambrian since that is all sandstone with few minor exceptions. It might possibly result in criteria for the separation of the confusingly like Trempealeau and basal Mazomanie dolomites an error which caused Ulrich a lot of trouble. This error made him think that the Trempealeau rested directly on the Dresbach and this mistake is now in the literature although privately admitted to me in 1920. Since there is little dolomite in the Wisconsin Eau Claire the method will not help much there, I fear. But if it will enable me to distinguish between the Shakopee and Oneota dolomites I will be satisfied. So far I have been unable to do this. We may be able to use it to correlate the Prairie du Chien dolomite of the Chicago district. Some think that this is Mendota (that is Trempealeau according to everyone except Ulrich). By the way, the Dresbach of the Chicago wells has now been correlated by means of heavy minerals with that of the outcrop.

I am sorry to say that I will not be able to get to either Tulsa or Rolla this winter. One visit to that part of the country is all that I feel able to make in view of the threatened salary cuts and increase in income taxes. Besides I am revising my glacial geology text and that takes up a lot of time. Otherwise, I would be very glad to take advantage of your invitation particularly as the Ozarks are a place that I have never visited. Had to return through them at night last summer.

Thanking you again,

Very truly yours,

Lecturer in Geology, Geologist in charge of
well records

Box 1144.
Wichita-Kansas.
November 24, 1931.

Mr. Fred T. Thwaites,
University of Wisconsin,
Madison - Wisconsin.

Dear Thwaites;

Yesterday, in cleaning up the contents of my desk, I found to my astonishment and regret that I have inadvertently left unanswered your good letter of October 21st. Accept my profound apologies.

We do not have any extra surveying equipment described in your letter, and I have been unable to find a company which does. However I have no doubt that there are many for sale if one only knew where. I suggest that you write to J.P.D. Hall, care of the A.A.P.G., Box 1852, Tulsa. It is possible that he may be able to put you in touch with proper parties.

I presume by this time you have received your copy of the Cross Section. I should like to know how it was received by the Wisconsin men. We certainly hope that you will urge your geological friends to purchase a copy. The supply of Guide Books is practically exhausted. The section is for sale however at \$5.00 per copy. This past conference cost the Society a very large amount, and it is only through the sale of a great number of these sections, at \$5.00 each, that we will ever come out. No orders have been received from Michigan, and I hope you can get the Michigan men to order copies. Also can we not get an order from Dr. Leith and Bean and Twenhofel?. Do what you can for us.

In your letter dated August 17th, on the second page, you state that the best work ever published on the Minnesota-Wisconsin Cambrian was by Owen over 75 years ago. Will you be kind enough to supply me with this reference. Also have you a personal copy of this paper which I could borrow for a short time, or, would it be unawfull for your library to lend me a copy for two or three weeks?. I am anxious to digest its contents.

Also can you tell me if Minnesota has published an areal geological map of their state. If not, is there a partial areal map included in any of their reports. If so I would like to send to the Minnesota Survey for a copy if it is still available.

I trust that you had an enjoyable time on the Conference and that you will plan to participate with us next year. At present the area of the Conference is undecided but I feel sure that we will have a conference.

With kindest personal regards, and, don't forget to do all you can to help the Society advertise the sale of its Cross Section. In the future we might be willing to undertake similar projects, but only if the sale of the present section justifies the expense involved.

Very cordially yours,

Anthony Folger
Anthony Folger

AF/DK.

Dec. 11, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Folger:

In reply to yours of Nov. 24 I tried to interest others of the faculty in the Cross Section but not only with coldness. "An awful thing to show to students" and "very misleading" were among the comments. I tried to explain why such a scale had to be used but those used only to pre-Cambrian simply could not see it. I had the University order a copy and hope that we get it. Everyone here is hard up for the threats of high income taxes plus a cut in state pay makes them hang onto what little they have left. Next time I write to Illinois and Michigan I will try to interest them. Illinois is the only place where they have anything.

Had a very insulting letter from Sardeson in re my paper on the buried pre-Cambrian of Wisconsin! Seems that I am to blame for the abolition (really reduction) of the Wisconsin Survey! He reiterates Keyes' charge that I am in the pay of the University of Chicago. What its all about I do not know and don't care much, anyway. If they start pulling too many of these stunts, I may have to remind them about the postal laws but I do not want to have to reply at all. Wait till he sees the Cross Section, however; I mean to say wait until either one sees it. You would get a lot of advertising via the Pan-American Geologist if Keyes had a copy. I may try that when I get out the new Outline of Glacial Geology.

The report of Owen to which I referred is : Owen, D. D., Report of a geological survey of Wisconsin, Iowa, and Minnesota, etc., made under instructions from the U. S. Treasury Dept., Lippincott, Gambo and Co., Philadelphia, 1852. I do not have a copy but there is one in our library. The way to borrow it is to have the librarian at your University Library write to ours. Owen's section of the Cambrian can easily be interpreted in the light of our present one. He did not know anything about unconformities or the relation to the pre-Cambrian but his descriptions are wonderful and his search for fossils was thorough. Wooster, Irving, and Chamberlin did not come anywhere near to him in results. Mr. Raasch endorses this view, also.

I secured a second hand alidade from the Indian Territory Illuminating Oil Co. and bought Twenhofels personal outfit besides. Hope to be able to get more but we will now have five outfits which ought to hold us during the present well known condition.

I certainly enjoyed the Field Conference and would like to go on another unless hard times prevent. It was wonderfully managed; the only suggestion I would make is to collect in advance for some of the meals and pay in lump sum to save time and making change for everyone. I hope you get up courage to attack some more cross sections. All students seemed to like the Section but the faculty didn't! I hope soon to draw some sections of Wisconsin 1 inch to four or five miles horizontal and 1 inch to 1000 feet vertical. But thin formations will be only solid lines then, I fear,

Sincerely,

THE MUNICIPAL
UNIVERSITY OF WICHITA
WICHITA, KANSAS

Nov. 29, 1931.

Dear Friend Thwaites:-

Your fine letter of the 16th has reached me. I also wish to thank you for sending me reprints of a number of your published papers. I have read these and find much in them that will be of value to me. The paper on the stratigraphy of northern Ills. has given me several stratigraphic sections which will make my distribution maps more valuable and complete. I wonder whether you could send me the stratigraphic record of the Clarinda well sometime? It would supply a much needed point for my maps of the Cambrian thickness and distribution. If you care to give me your interpretation of the Friend well drilled near Springfield Ohio by the Pure Oil Co., it would also help me greatly.

I am going to send you some reprints of my papers on Michigan glacial geology. You may find in them some ideas which have not appeared elsewhere.

Hoping that the approaching holiday season will bring you much needed relaxation, I am

Very cordially yours,

Walter H. Hille

Dec. 11, 1931

Dr. W. A. VerWiebe,
University of Wichita,
Wichita, Kansas

Dear Dr. Ver Wiebe:

In reply to yours of Nov. 29 I want first to thank you for the reprints which will be of great value to me.

In regard to the Clarinda and Friend tests I have no complete logs of either. I think that the Gypsy has a log of the former. Mr. Thoron Wasson, Chief Geologist of the Pure Oil Company, Chicago, has a log of the latter. My work was confined to the Cambrian section. Mrs. Wasson is publishing a paper in the Journal of Geology which will give the log of the Friend test and some other deep tests in Indiana and Ohio. However, I fear that this paper will not be out before next summer as they are crowded with stuff for publication. I suppose that during the present otherwise lamentable condition people have time to write! Folger has a copy of my Clarinda determinations which checked those of McQueen and others. The Friend test was not drilled by the Pure Oil but by a local outfit on the basis of some kind of witching. It was not well sampled. We had the Chic ago type of section down through the Dresbach but below that a series of arkosic sands and pyritic dolomites. The latter were misinterpreted at first and thought to be Grenville limestones. Later study showed that they may be Middle or Lower Cambrian of the Appalachian type. Mrs. Wasson made quite a thorough study of the relations and has some very interesting cross sections showing the relation of the sections to the pre-Cambrian high of the Cincinnati arch.

I am pretty well rushed on the new Outline of Glacial Geology and will have to devote the vacation to it. I haven't started the drafting of illustrations so far and part must be ready by early in February! I hope to get it done by Edwards Brothers if it does not cost too much. On this account, not to mention threats of a salary cut and immensely increased income taxes I will not be able to go to Tulsa.

Very truly yours,

THE KANSAS GEOLOGICAL SOCIETY

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November 19, 1931

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PERRY R. HANSON
WALTER W. LARSH
E. P. PHILBRICK
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E. A. WYMAN

Gentlemen:-

Five years ago, September 5, 1927, the first field conference of the Kansas Geological Society convened at Columbia, Missouri. During the following five days the 41 participants, under the leadership of Professor E.B. Branson and State Geologist George F. Kay, examined many of the pre-Mississippian formations of northeastern Missouri and eastern Iowa. Because of its success many entertained the hope that a conference would be incorporated as an annual program of the Society. Accordingly, a second conference was held in the Ozark Mountains of southern Missouri and northern Arkansas, a third in the Black Hills of South Dakota and the Rocky Mountain Front Range of southern Wyoming and northern Colorado, a fourth continued southward along the Front Range of southern Colorado and northern New Mexico, together with adjacent parts of eastcentral New Mexico and a fifth covered the Wichita, Arbuckle and Ouachita Mountains of Oklahoma and Arkansas.

The past five conferences have completely circled Kansas. On these trips the most interesting and important geological localities have been visited. The Society is now confronted with the problem of whether our program has been completed, or whether this conference feature should be continued. Some of our membership hold that the cycle is now complete. Others maintain that a desirable precedent has been established and that the program by all means should be continued.

Before definite action is taken relative to the continuance of these conferences it is thought of our membership that a selected list of participants of past conferences be circularized in an endeavor to obtain their reaction to this important matter, and at the same time ascertain their choice of areas to be covered should future conferences be held. At the request of the Society, our Board of Directors has met with the members of past field conference committees. We have been asked both to circularize the participants and to suggest a number of areas in which future conferences may be held should it be the wish of the past participants, and of our Society membership, that they be continued.

In fulfillment of this request this joint committee offers the following areas for your consideration, together with their reasons pertaining to their choice:-

First:- A Pennsylvanian and Lower Permian conference into northeastern Kansas, southeastern Nebraska, southwestern Iowa, and northwestern Missouri. Admittedly this area contains the type Pennsylvanian and Lower Permian sediments for the mid-continent area. Herein are practically all of its type localities. Its formations have been more finely subdivided than in other areas. A thorough study of its lithology and fauna should go far in solving many of the multitude of problems which originate when these deposits pass under cover. Moreover our micro-paleontologists and micro-lithologists are continually increasing in number and importance. Much of the future mid-continent exploitation will be characterized by tests penetrating a thick series of lower Permian and Pennsylvanian rocks, and

it is imperative that these specialists have an intimate knowledge of its type outcropping sediments. Furthermore the designated locality of this conference is closely adjacent to Oklahoma and Kansas which contains the majority of the commercial specialists on Pennsylvanian. In these trying times of our industry it would be convenient to hold a conference necessitating a minimum of expense both to the Society and to its participants.

Second:- A pre-Pennsylvanian conference into eastern Iowa, northern Illinois, southern Wisconsin and southeastern Minnesota:- Such a trip would be an expansion of our First Annual Conference. Many of our participants have expressed the hope that sometime our Society would again hold an Iowan conference, expanding into adjacent states which would concentrate on Siluro-Devonian, upper Ordovician and Cambrian formations. Five years ago marked approximately the beginning of our present intensive study of the pre-Mississippian deposits of Kansas and Nebraska. At that time our imperfect knowledge of the problem precluded a visit to localities which today are of the utmost importance. Thus Wisconsin, which contains the thickest Cambrian section with which we should be concerned, was not included in our first itinerary.

Third:- A Mesozoic and Upper Permian Conference into western Kansas, eastern Colorado and adjacent parts of New Mexico and the Oklahoma Panhandle. A study of the stratigraphy and structure of this area will benefit those following the western Kansas-eastern Colorado play resulting from the recent discovery of commercial production in the Greasewood Dome Area.

Our joint committee recommends these as three of the most important conference which might be taken. To all of you will occur other areas meriting the attention and consideration of this Society. We shall be appreciative of your suggestions.

Relative to the continuance of these conferences may we call your attention to the fact that in addition to their geological importance, they have served as a means to bring together annually a selected group of commercial and academic geologists who thus mingle for one week of field work under ideal conditions. The resultant contacts and friendships have been of inestimable value to all of us, and constitute, in some respects, the most important benefit of these five trips.

A reply blank is enclosed herewith on which you will have opportunity to express both your reaction towards further conferences and their location if held. May we emphasize that the Society will be guided largely by the enthusiasm and the number of these replies in its consideration of whether our annual conference program is worthy of continuation.

Respectfully submitted,

KANSAS GEOLOGICAL SOCIETY

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Past Field Conference Committees

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Anthony Folger.
Leo R. Fortier.
J. L. Garlough.
Perry R. Hanson.
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Edward Koester.
Walter W. Larsh.
Marvin Lee.
E. P. Philbrick.
Paul A. Whitney.
E. A. Wyman.

Nov. 16, 1931

Prof. W. A. Ver Wiebe,
University of Wichita,
Wichita, Kansas

Dear Prof. Ver Wiebe:

I wish to thank you for your letter of the 10th and enclosed check. We will be glad to fill any orders for photographs but prefer to get as many as possible printed at the same time as this lessens the clerical work.

Also sent a set to Mr. Henson but did this later and have not heard from them as yet. Had a letter from Mr. Borden. He is now at the University of Chicago. Wrote to Folger some time back but had no reply so far. The University ordered a guide book for their library.

With regard to photographs your questions are possibly best answered by the enclosed extract from my outline of field methods although rereading shows that although only four years old it is already sadly out of date. I made a few pencil corrections. Sharp focus on near and far objects at same time is result of stopping down. Last September I used $\frac{1}{2}$ second and f32 with the very strong "G" filter for distant landscapes. This was with the new Agfa plenachrome film. You can take snapshots with this film and same filter but comparison of some of the views taken both ways shows that the small stop and longer time are better. I hope to rewrite this outline in the spring.

I am sorry to say that orders for glacial outlines regardless of age came in so fast this fall that I am now entirely out. I have all but a few of the pages left and not sorted into order so I may be able to get out a few more although I hate to spend so much labor on something which will soon be rendered obsolete. So if you can wait until spring I will appreciate it. The new edition will, however, be either printed or mimeographed like the guide book. At least that is my hope if funds are available. They are using it for a text at Illinois now. And is has been or is being used at Rochester. If in better form I think I could sell many more. Thus far there has been no charge except for express or postage. If enough orders come in to compel the replacement of the missing pages I will send you an unbound set express collect.

I have the cross section up in the hall at the U. W. On the whole the students praise it and the faculty kicks about the vertical scale! On^odenied that it shoed any detailed stratigraphy. Wonder just what he means by stratigraphy!

Sincerely,

F. T. Thwaites, Lecturer in Geology

THE MUNICIPAL
UNIVERSITY OF WICHITA
WICHITA, KANSAS

Nov. 10, 1931.

Dear Dr. Thwaites:-

I want to report that I showed your pictures to the members of the society last Saturday by means of an opaque projection machine. Everybody was loud in ^{his} ~~their~~ praises and justly so because they are exceptionally fine. You seem to have the ability of getting the background as well as the foreground into sharp focus. How do you do it? Do you use filters ?

I am enclosing a check in the amount of \$4.35 to pay for these^e prints and want to assure you that I appreciate your courtesy and trouble very much. I have the pictures in books so that they may be inspected and I am sure that others of the society will ^{write} ~~wite~~ to you for some of them. I have told them that the cost is 7 cents.

Please let me know the price of an unbound copy of your GLACIAL OUTLINE. I am anxious to buy one for the department even ^{if} ~~it~~ it is unbound.

Very cordially yours,

W. A. VerWiebe

W.A.Ver Wiebe



THE UNIVERSITY OF CHICAGO

Rosenwald Hall.

November 8, 1931.

Prof. F. T. Shwaites,
University of Wisconsin.

Dear Professor Shwaites:

The pictures you so kindly sent me arrived a few days ago, - and I appreciate them very much. They are very good considering the mud and haze that day. The big cross section came just a couple days ago, - so now I have all the material connected with the trip.

Your account of the practical economics at Wisconsin sounds quite natural, - the library here too closes from 5 to 7 each evening, and then closes at 9, - when it always has been open from 8 A.M. to 10 P.M. But on the whole there is much less notice of the depression here on the campus than there was in Oklahoma and Kansas.

There are quite a few graduate students in geology here this year, - many like me, - out of a job so

getting more education. I am taking a course in physiography, under Mr. Butz, and right now am preparing a report on the Ozark-Quachita area. We have two provinces a quarter to work up and report on. I have already reported on New England.

I showed the cross sections to Mr. Chamberlin and he was quite enthusiastic about it, - said they would surely have to have a copy for the department.

I'm glad Mrs. Shwaites and the baby are doing nicely. And thank you again for the pictures. I'm glad we went on to the top of Mt. Scott.

Very truly yours,

Joseph L. Borden

Nov. 10, 1931

Mr. F. M. Howson,
912 Gladstone Boulevard,
Shreveport, Louisiana

Dear Mr. Howson:

I am afraid I have been a long time getting out the set of photos which you requested but as soon as I got back from the trip I went out in the field. I got back from that expedition just as school opened and since then field trips not to mention the new addition to the family at home have kept me busy.

These photos cost me \$4.34. Would have liked to have been able to present them to you but the trip as well as things at home have not left me very flush. Think this was the understanding, was it not?

The list of locations and descriptions is wrapped around the photos. I also sent a set to the Kansas Geological Society at Wichita.

The trip was a wonderful experience for me for it is rare that one can travel with such full explanations and with so many who understand what it is all about. Hope that I will be able to get down that way again when there is more chance to stop at other places than we had time for.

With best regards,

Sincerely,

F. T. Thwaites, Lecturer in Geology

Oct. 21, 1931

Mr. Anthony Folger,
Gypsy Oil Co.,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

I have secured an appropriation from the University to replace some of our obsolete surveying equipment. It has been suggested that as all the oil companies are reducing their field forces we could secure second hand alidades, plane tables, barometers, and hand levels. If you can put me in touch with anyone who has such instruments for sale which are in good condition the information will be much appreciated.

I have not as yet received my copy of the Cross Section of the Central U. S. Have been wondering what has happened to it. Everyone here is anxious to see it and I am almost sure that I can sell a copy of the guide book to our library when they have a chance to see the Section.

The trip with the Society was certainly most valuable to me. I enjoyed every moment of it and got a lot of fine photographs. At request of Prof. Ver Wille I am sending a set to the Society. The prints are numbered and a key to the numbers is enclosed. Those desiring copies can order them by number. Cost will be 7 cents a print.

Mr. Hewson who served as mechanic on the trip also ordered a set. Now the cost of these pictures is \$4.34 and I am wondering if I should charge him for them. After the events of the summer I do not feel very affluent.

School has started with reduced registration and threats of further "economies" the form of which I do not yet know. One has been to close the library evenings! My physiography class has fallen off to 12. We go on a two day field trip this week end.

I put in two weeks in the field after my return from the south although one of the students failed to go out with us. However, we got a lot done although some of the country was covered rather hastily.

Please remember me to the others in Wichita.

Very truly yours,

Lecturer in Geology

Oct. 21, 1931

Mr. J. L. Bordon,
Box 2007,
Tulsa, Oklahoma

Dear Mr. Borden:

Enclosed please find copies of the photographs taken when we went up Mount Scoot last August. They turned out very well considering the haze and the wind. Numbers on back are those of my collection. Guess you can identify all of them so will not send a key unless you desire. There is no charge for these as I will always appreciate your help in getting up the only mountain I ascended on the trip!

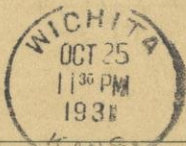
The trip was a wonderful experience for me and I enjoyed every minute of it. It will always be a great help to me in teaching.

I am sending a full set of my photographs to the Kansas Geological Society for others to order copies from if they desire. They also have the complete key to the numbers.

School is now on but with decreased number of students and actual as well as threatened "economies" like closing the library evenings! I have only 12 students in my physiography class this semester and only two writing theses with me. I worked two weeks in Wauashara County after my return.

Mrs. Thwaites and the baby are both feeling fine.

Sincerely,



THIS SIDE OF CARD IS FOR ADDRESS

Dr. F.T.Thwaites

Geology Dept. University of Wisconsin

MADISON

Wis.

Dear Friend Thwaites:-

— This is to acknowledge the fine set of pictures which you so kindly sent. Within a few days I shall write you more fully about them.

Very cordially yours,

Oct. 21, 1931

Prof. W. A. VerWiebe,
University of Wichita,
Wichita, Kansas

Dear Prof. VerWiebe:

In reply to yours of the 10th I am enclosing 62 prints of photographs taken of the Fifth Annual Field Conference of the Kansas Geological Society. Key to the numbers is enclosed. Anyone wishing duplicates can order them by number at cost of 7 cents each postpaid.

The cost of the set for the Society is \$4.34. I am sorry that I have to charge for these but as I already have a set of my own I cannot use them and the events of the summer have not left me very flush.

I certainly enjoyed the trip immensely and it was of the greatest value to me in my teaching. I now have funds promised for new instruments to use in mapping and have been trying to find some of the oil companies which are said to have second hand instruments for sale.

After I returned I had just one night at home and then left for two weeks with some of my students to work in Waushara County, Wisconsin. We had a good trip although the weather was very hot and rainy.

My physiography class has fallen off to only 12 but they seem like a reasonably good crowd. Saturday we go on a two day field trip up to the pre-Cambrian area.

Mrs. Thwaites and the baby are both very well.

If you notice missing numbers in the list reference to the list will show that they are duplicates. I thought I had spoiled some exposures but they turned out. I lost two through mishandling the shutter so that it stuck open. The roll taken at the diamond mines was poor, probably due to poor developing but on the whole I think the results were excellent.

With regard to reprints the glacial outline I promised will not be ready until spring. If you are in a hurry, however, can send you an unbound edition of 1927. I will send some of my other papers which I think will interest you just as soon as I can pick them out. The paper on the pre-Cambrian is not yet off the press.

Sincerely,

THE MUNICIPAL
UNIVERSITY OF WICHITA
WICHITA, KANSAS

Oct. 10, 1931.

Dear Friend Thwaites:-

At the next regular meeting of the Kansas Geological Society those of us who were on the trip are going to make a report to the others who could not go. In order to make it interesting we thought it would be nice to show some pictures. I remember that you were the most enthusiastic picture collector in the crowd and am hoping you can send us a few. I will promise to return them to you or better still promise that the society will pay for the prints and then we can keep them here for future records.

The meeting I have in mind comes the first Saturday in November.

I hope that you reached home safely and that you found Mrs. Twaites and the baby in the finest kind of health.

Very cordially yours,



P.S. Don't forget to send me the reprints you promised me. I am looking forward to reading them.

THE KANSAS GEOLOGICAL SOCIETY

FIELD CONFERENCE COMMITTEE

N. W. BASS, CHAIRMAN
919 CENTRAL BLDG.

J. L. GARLOUGH
612 BROWN BLDG.

E. A. WYMAN
614 ORPHEUM BLDG.

ADVISORY LEADER

CHAS. N. GOULD
NORMAN, OKLAHOMA

WICHITA, KANSAS

FIFTH ANNUAL FIELD CONFERENCE

August 4, 1931.

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E. A. WYMAN

FINAL NOTICE

The Fifth Annual Field Conference of the Kansas Geological Society, to be held August 30 to September 5, 1931, in the Wichita and Arbuckle Mountains of Oklahoma and the Ouachita Mountains of Oklahoma and Arkansas, will convene at Medicine Park, Oklahoma, Sunday morning August 30. One day (Sunday) will be spent in the Wichita Mountains, three days in Arbuckle Mountains and Criner Hills and three days in the Ouachita Mountains. The last day, Saturday, September 5, contains several unique features, in that a visit to the Arkansas diamond mines will be made, the entire stratigraphic section of the Ouachita Mountains will be crossed and a whetstone quarry will be visited, closing the day at Hot Springs, an interesting locality geologically and otherwise. A post-conference trip to Magnet Cove, Arkansas, will be made the following (Sunday) morning starting from Hot Springs. Arrangements have been made for excursions by plane over the Arbuckle Mountains and Criner Hills.

Time of arrival. Those expecting to start with the conference Sunday, August 30, should arrive in Medicine Park at least as early as 10:00 o'clock Sunday morning in order to register at Apache Inn and receive a copy of the guide book. Sunday's trip will start from Apache Inn at 12:00, noon. A special trip for paleontologists has been arranged for, leaving Apache Inn at 8:30, Sunday morning, joining the main group late in the afternoon.

Registration fee. A registration fee of \$10.00 will be charged each participant on the conference. It is hoped that the majority will inclose a check for this registration fee with their reply blanks, but if it is not convenient, the registration fee may be paid upon arrival at the conference. The full fee will be charged each participant irrespective of the length of time in attendance. Anyone inclosing a check for registration fee and not attending the conference will have the guarantee of the Kansas Geological Society that his check will be refunded in full after the conference. All checks should be made payable to the Kansas Geological Society. Receipts will be furnished upon request.

Como Hotel *Arlington* *Kingsway*
Hotel Reservations. All hotel reservations with the exception of Saturday night, Sept. 5, at Hot Springs will be arranged for you. It may be necessary for a certain number of the participants to occupy hotel rooms jointly. If you have any particular friend with whom you would like to occupy a room, list his name on the attendance blank in the space indicated.

Transportation. Previous conferences have been handled very successfully in automobiles of two to five passenger capacity. If you can arrange to bring a five passenger car, please do so. Participants will be placed in a different car each day for the promotion of better acquaintanceship.

Baggage. Arrangements have been made for a baggage truck in which all of the baggage of the participants will be transported direct to the night stop before arrival of the conference group. Please have your name on each piece of baggage.

Women. A number of women who are active geologists and paleontologists will participate on this trip. Although adequate hotel accommodations have been secured for them, it will be impossible to accommodate any women who do not fall under the above classifications.

Telegrams and mail. Arrangements have been made with the Western Union Telegraph Company for the delivery of telegrams to any participant each night. Send telegrams by Western Union in care of the Kansas Geological Society Field Conference. All mail should be addressed to the headquarters hotels in care of the Kansas Geological Society Field Conference.

Change in plans. Should you at the last minute find it impossible to attend the conference, please telegraph H. E. White, 412 Union National Bank Building, Wichita, Kansas, through Friday, August 28; thereafter, to N. W. Bass, Apache Inn, Medicine Park, Oklahoma.

LEADERSHIP OF CONFERENCE

Advisory Leader.

Chas. N. Gould - Director, Oklahoma Geological Survey, Norman, Oklahoma.

Leaders.

George C. Branner - State Geologist of Arkansas, Little Rock, Arkansas.

C. E. Decker - Professor of Paleontology, University of Oklahoma, Norman, Oklahoma.

John Fitts - Consulting Geologist, Ada, Oklahoma.

Frank Gouin - Consulting Geologist, Duncan, Oklahoma.

C. W. Honess - Geologist, Gypsy Oil Company, Tulsa, Oklahoma.

K. K. Landes - Assistant State Geologist of Kansas, Lawrence, Kansas.

Hugh D. Miser - Geologist in charge, Geology of Fuels, U. S. Geological Survey, Washington, D. C.

C. W. Tomlinson - Geologist, Schermerhorn-Ardmore Company, Ardmore, Oklahoma.

J. V. Howell - Consulting Geologist, Ponca City, Oklahoma.

Pre-conference trip

Sunday morning, August 30. Leader: J. V. Howell.

Opportunity will be given on Sunday morning to collect in the upper Arbuckle limestone (probably Cotter) where fossils are numerous and well preserved in SW 4-4N-12W, southwest of Apache, about 20 miles from Medicine Park. At the same locality the Arbuckle is traversed by numerous veins of calcite and of limonite pseudomorphic after pyrite. Considerable folding has taken place also, but the sequence of beds is not disturbed. Those who take this trip will start from Medicine Park at 8:30 A.M. Carry lunches. Will meet the main party in Blue Creek Canyon.

CONFERENCE PROGRAM

Sunday, August 30

Registration at Apache Inn, Medicine Park, Okla. The main conference group leave Apache Inn at 12:00, noon, for trip through the Wichita Mountains, lead by Frank Gouin. Study igneous rocks within the mountainous area and Paleozoic sediments exposed on the north flank. Paleontologists will join the main group late in the afternoon.

Evening program: Outline of the week's conference by Chas. N. Gould. Outline of trip for the following day by C. W. Tomlinson.

Monday, August 31

Day's trip: From Medicine Park through several oil fields to Pooleville locality at the west end of the Arbuckle Mountains, exposing the Permian-Pennsylvanian overlap on older Paleozoic rocks; thence to Ardmore. Leaders - Frank Gouin, C. W. Tomlinson, and C. E. Decker.

Evening program: Lecture, "Classification and correlation of the Pennsylvanian System", by Raymond C. Moore. Outline of trip for the following day, by C. E. Decker and C. W. Tomlinson.

Tuesday, September 1

Morning: Through the Criner Hills south of Ardmore. Leader, C. W. Tomlinson. Afternoon: North of Ardmore in the Arbuckle Mountains. Leaders, C. E. Decker and Chas. N. Gould. Return to Ardmore.

Evening program: Lecture, "Minerals and the future", by W. T. Thom, Jr. Outline of trip for the following day, C. E. Decker and John Fitts.

Wednesday, September 2

Morning: From Ardmore east over Cretaceous rocks to Tishomingo, thence north over granite core of the Arbuckles to Ada, stopping near Franks to study the Simpson formation. Leader, C. E. Decker. Afternoon: Ada to McAlester via Atoka, Stringtown and Limestone Gap. Leaders, C. E. Decker and John Fitts.

Evening program: Lecture, "The Oklahoma Mountains", by Sidney Powers. Outline of the following day's trip, Hugh D. Miser.

Thursday, September 3

Day's trip: From McAlester, east to Victor, thence southwest through the Ouachita Mountains, with a side trip to the Potato Hills, to Paris, Texas. Leader - Hugh D. Miser.

Evening program: Lecture, "The Ouachita Mountains of Oklahoma and Arkansas", by Hugh D. Miser. Outline of the following day's trip, C. W. Honess.

Friday, September 4

Day's trip: Paris, Texas to DeQueen, Arkansas, stopping at Arthur's Bluff on Red River, and spending all afternoon in the closely folded Paleozoic rocks a few miles north of Broken Bow, Okla. Leader - C. W. Honess.

Evening program: Lecture, "Some Unsolved Problems of the Ouachita Mountains", by C. W. Honess. Outline of the following day's trip, Geo. C. Branner.

Saturday, September 5

Day's trip: DeQueen, Arkansas to Hot Springs, Arkansas, via the diamond mines at Murfreesboro, Caddo Gap, crossing the entire Ouachita Mountains and stopping at a whetstone quarry near Hot Springs. Leaders - Geo. C. Branner and Hugh D. Miser.

Post-conference Trips

Magnet Cove, a famous mineralized locality near Hot Springs, will be visited Sunday morning, Sept. 6, under the leadership of K. K. Landes. The itinerary starts with a 12 mile drive east from Hot Springs to the rim of the Cove, at which point the detailed road log begins.

C. W. Honess has logged the route from Norman, Ark., via Bigfork, Mena, Page, Heavener, and Howe to Victor, Okla., for the use of those who wish to return to Tulsa and other cities in Oklahoma. It is a beautiful route past many very excellent rock exposures.

Special features

Airplane Trips Over Arbuckle Mountains. A 100-mile airplane trip has been planned which will cover the Arbuckle Mountains, the Ardmore Basin and the Criner Hills, lasting about an hour. The plane is an 8-place Travelair cabin model owned by Lloyd Noble, of the Noble Drilling Company, and piloted by Arther Oakley who had his first experience in the war and has since earned his living as a pilot. The famous round-the-world flyer, Wiley Post, took his first instructions from Oakley. The price of this trip will be \$8.00 per person for the full hour. If a shorter time is desired by some, arrangements will be made for a 30 minute trip for the price of \$4.00. This will probably not include the Criner Hills.

Opportunity for fishing and swimming is afforded at Medicine Park.

It is hoped arrangements may be completed for holding the Ardmore evening meetings at the Dornick Hills Country Club.

GUIDE BOOK

An illustrated lithoprinted guide book bound in imitation leather has been prepared. It will contain an accurate road log of the entire route, descriptive geologic data, geologic maps, correlation chart of the strata studied, and a bibliography covering the region visited. It will include also a geologic cross section of the central United States with descriptive material on each state, U. S. Geol. Survey, 808, and Okla. Geol. Survey Bull. 50. Perhaps no better description of this book can be given than is indicated by the table of contents, which is appended.

The entire conference route will be shown on a colored geologic base, which will be in each guide book issued to those attending the conference.

Owing to a limited supply, it will not be possible to include this feature in the books sold to non-attendants; in such books the route will be indicated on a highway map.

The geologic cross section of the central United States, described in our preliminary announcement May 21, 1931, has been prepared. It will be printed on a 4 by 8 foot sheet. The section will start in the Canadian Shield near Huron Mountain, Michigan; extend through Green Bay and the Baraboo Uplift, Wisconsin; Dubuque, Des Moines, and Clarinda, Iowa; northwestern Missouri; Topeka, Iola, and Elgin, Kansas; Cushing, Oklahoma City, and the Arbuckle Mountains, Oklahoma; Cooke, Jack, and Taylor Counties, the Big Lake oil field, the Fort Stockton High, the Marathon Mts. and the Solitario Uplift, Texas. An index map that extends from the Appalachian Mts. to the Rockies, showing major lines of folding in the central United States and the location of all wells used in the cross section is included.

HEADQUARTERS HOTELS AND LUNCH STOPS

This list is furnished for your convenience so that you may leave mail and telegraph addresses at your home office.

Sunday noon	August 30	Medicine Park, Okla.	Apache Inn
Sunday night	August 30	Medicine Park, Okla.	Apache Inn
Monday noon	August 31	In Field	
Monday night	August 31	Ardmore, Okla.	Ardmore Hotel
Tuesday noon	September 1	Ardmore, Okla.	Ardmore Hotel
Tuesday night	September 1	Ardmore, Okla.	Ardmore Hotel
Wednesday noon	September 2	Ada, Okla.	Aldridge Hotel
Wednesday night	September 2	McAlester, Okla.	Aldridge Hotel
Thursday noon	September 3	In Field	
Thursday night	September 3	Paris, Texas.	Gibraltar Hotel
Friday noon	September 4	In Field	
Friday night	September 4	DeQueen, Ark.	Barlow Hotel
Saturday noon	September 5	Glenwood, Ark.	Tom Alford and Broadway Cafes
Saturday night	September 5	Hot Springs, Ark.	Como Hotel

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ADVANCE BIBLIOGRAPHY

For those who desire to read a part of the literature on the region to be traversed by the conference, the following selected bibliography is cited.

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- Ver Wiebe, W. A., Oil fields in the United States: Chapt. VI, pp. 279-329, 1930.
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- Decker, Chas. E., Simpson group of Arbuckle and Wichita Mountains: Bull. Amer. Assoc. Petr. Geologists, Vol. 14, pp. 1493-1506, 1930.
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- Gould, Chas. N., Index to the stratigraphy of Oklahoma: Okla. Geol. Survey, Bull. 35, 1925.
- Honess, C. W.; Geology of the southern Ouachita Mountains, Oklahoma: Okla. Geol. Survey, Bull. 32, 1923.
- Miser, H. D. and Purdue, A. H.; Geology of the DeQueen and Caddo Gap quadrangles, Arkansas: U. S. Geol. Survey, Bull. 808, 1929.
- Ulrich, E. O.; Fossiliferous boulders in the Ouachita "Caney" shale and the age of the shale containing them: Okla. Geol. Survey, Bull. 45, 1927.

GUIDE BOOK

Following the custom established in previous years, a bound mimeographed guide book is being prepared. It will contain an accurate road log of the entire route, descriptive geologic data, geologic maps, a correlation chart of the strata studied, abstracts of papers, and a bibliography covering the region visited.

This year's road log will include much fuller descriptions of the rocks at the localities where stops are made than has been attempted heretofore. The book will contain stratigraphic sections, which was a feature of last year's book. Short papers, prepared by the leaders, describing the structural, stratigraphic and historical geology of the several parts of the region to be visited will be included; for instance, a comprehensive paper on the Ouachita Mts. with cross sections and maps, and a recently completed paper on the stratigraphy of the Simpson group of the Arbuckle Mts. with a detailed geologic areal map, will be in the book. There will be several pages of illustrations. The selected bibliography that is being prepared will include seventy-five or more references.

The entire conference route will be shown on a colored geologic base, which will be in each guide book issued to those attending the conference. Owing to a limited supply, it will not be possible to include this feature in the books sold to non-attendants; in such books the route will be indicated on a highway map.

The OUTSTANDING FEATURE of the guide book will be a geologic cross section traversing the region between northwestern Michigan and southwestern Texas, which will portray in one continuous section the regional structure and the major changes in lithology in the central United States. It will start in the Canadian Shield near Huron Mountain, Michigan; extend through Green Bay and the Baraboo Uplift, Wisconsin; Dubuque, Des Moines, and Clarinda, Iowa; northwestern Missouri; Topeka, Iola, and Elgin, Kansas; Cushing, Oklahoma City, and the Arbuckle Mountains, Oklahoma; Cooke, Jack, and Taylor Counties, the Big Lake oil field, the Fort Stockton High, the Marathon Mts. and the Solitario Uplift, Texas.

As many wells as possible on which sample information is at hand will be used. The section will be reproduced on a scale which will permit showing stratigraphic subdivisions of the Carboniferous rocks as small as the Cimarron, Sumner, Chase, Council Grove, and Wabaunsee groups in Iowa, Missouri, Kansas and a portion of Oklahoma, and the Cisco, Canyon, Strawn and Bend groups in Texas. The pre-Mississippian strata will be represented down to the pre-Cambrian contact in as much detail as consistent with present information. A written statement discussing the salient features of the stratigraphy and structure will be prepared by each contributor for his state and included in the guide book.

The cross section project is in charge of Anthony Folger, Geologist, Gypsy Oil Co., Wichita, Kansas. It is made possible by the cooperation of the following geologists, who will be responsible for the several parts of the section: For Wisconsin and Michigan--Fred T. Thwaites, University of Wisconsin; For Iowa--James H. Lees, Iowa Geological Survey; for Missouri--H. S. McQueen, Missouri Geological Survey; for Kansas--Roy H. Hall, Gypsy Oil Company; for Oklahoma--Fred A. Bush, Sinclair Oil and Gas Company; for Texas--N. G. Cheney, Anzac Oil Corporation.

The preparation and compilation of the guide book is the biggest task confronting the committee, the conference leaders and others who are so kindly lending their assistance. It is imperative that the committee know in advance approximately how many books will be required, as much of the material must be ordered many weeks before needed. For this reason you will find attached hereto an order blank. If you desire one or more books, please fill out the blank and return it to the indicated address. In past years the books have been in demand from others than the conference participants, due to the valuable data contained in them.

All those who attend the conference will receive a copy of the guide book at the time of registration and payment of fee. This will not be regarded as a separate order for such persons, unless more than one book is requested.

N. W. Bass
E. A. Wyman
J. L. Garlough

Field Conference Committee

THE KANSAS GEOLOGICAL SOCIETY

FIELD CONFERENCE COMMITTEE

N. W. BASS, CHAIRMAN
919 CENTRAL BLDG.

J. L. GARLOUGH
612 BROWN BLDG.

E. A. WYMAN
614 ORPHEUM BLDG.

ADVISORY LEADER

CHAS. N. GOULD
NORMAN, OKLAHOMA

WICHITA, KANSAS

FIFTH ANNUAL FIELD CONFERENCE

May 21, 1931

BOARD OF DIRECTORS

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PRELIMINARY NOTICE

THE FIFTH ANNUAL FIELD CONFERENCE of the Kansas Geological Society will be held August 30 to September 5, 1931, in the Wichita and Arbuckle Mts., of Oklahoma and the Ouachita Mts., of southeastern Oklahoma and western Arkansas.

The combined route of the four preceeding conferences conducted by the Kansas Society roughly described three-fourths of a circle with Kansas as the center. The conferees have visited the Boston Mts., of Arkansas on the southeast, the Ozark and St. Francois Mts., of Missouri on the east, the Mississippi Valley and northeastern Iowa on the northeast, the Black Hills on the northwest, the Front Range of the Rocky Mts., in Wyoming, Colorado and New Mexico, on the west. The FIFTH CONFERENCE will complete the circle.

The primary thought in the minds of those who inaugurated these conferences was to provide opportunity for interested geologists to study, under competent leadership, the stratigraphy and the larger structural features of the rocks that are penetrated by the drill in the mid-continent area of Kansas, Oklahoma and nearby states. The FIFTH CONFERENCE participants will study stratigraphy and mountain folding that is probably more closely related to the buried rocks and folds of the interior of the mid-continent area than that of any of the areas visited in previous years.

LEADERS

Chas. N. Gould, State Geologist of Oklahoma, Norman, Okla.

George C. Branner, State Geologist of Arkansas, Little Rock, Ark.

C. E. Decker, Professor of Paleontology, University of Oklahoma, Norman, Okla.

Frank Gouin, Consulting Geologist, Duncan, Okla.

C. W. Honess, Geologist, Gypsy Oil Co., Tulsa, Okla.

Hugh D. Miser, Geologist in charge, Geology of Fuels, U.S. Geological Survey,
Washington, D. C.

C. W. Tomlinson, Schermerhorn-Ardmore Co., Ardmore, Okla.

John Fitts, Ada, Okla.

SPEAKERS AT EVENING MEETINGS

Raymond C. Moore, State Geologist of Kansas, Lawrence, Kans.

George C. Branner, State Geologist of Arkansas, Little Rock, Ark.

Chas. N. Gould, State Geologist of Oklahoma, Norman, Okla.

Hugh D. Miser, U.S. Geological Survey, Washington, D. C.

Sidney Powers, Consulting Geologist, Amerada Petroleum Corp., Tulsa, Okla.

C. W. Honess, Geologist, Gypsy Oil Co., Tulsa, Okla.

C. E. Decker, University of Oklahoma, Norman, Okla.

Subjects discussed will include the correlation of the strata of Kansas, Oklahoma, and Texas; the history of the Oklahoma Mts.; history and structure of the Ouachita Mts.; unsolved geologic problems of the Ouachita Mts. and others. One evening will be devoted to a subject of general geologic interest. A new feature, which has been called for by past conferences, is the inclusion in each evening meeting of a short talk by the leader for the next day, in which he will describe briefly the main features that he expects to show in the field.

ROADS AND HOTELS

The roads through the Wichita Mts. are graded dirt roads, heavy going if wet; roads for Monday's, Tuesday's and Wednesday's trips in the Arbuckle Mts., Ardmore Basin and Criner Hills are in large part hard surfaced, but some dirt roads each day; roads for the remainder of the week through the Ouachita Mts., are hard surfaced. Hotel accommodations will be arranged for by the committee. Night repair work at garages will be arranged for except at Medicine Park. A baggage truck will be provided for the entire trip.

OUTLINE OF THE ROUTE

Sunday, Aug. 30. - Wichita Mts. Leader: Frank Gouin.

The route is west from Medicine Park through the central part of the Wichita Mts., with one stop to study the granite and gabbro; return on the north side of the mountains; stops on the Viola limestone at Rainey Mt., on a well exposed section of granite porphyry, Reagan sandstone and Arbuckle limestone; and on an exposure of the Arbuckle limestone in contact with granite porphyry. Complicated folding well exposed. Beautiful mountain scenery in the region of Mt. Scott and Lake Lawtonka. Sunday night at Medicine Park.

Monday, Aug. 31. - Medicine Park to Ardmore.
Leaders: Frank Gouin and C.W. Tomlinson.

The route is east from Medicine Park through Ft. Sill; across the Red Beds to Duncan; east, keeping south of the escarpment formed by the Duncan sandstone, to the Scholem-Alechem oil field at the Stephens-Carter County boundary; through several oil fields to an exposure of the Permian-Pennsylvanian overlap at the west end of the Arbuckle Mts. The afternoon will be spent studying the Pennsylvanian beds in the Ardmore Basin and the Criner Hills.

Tuesday, Sept. 1. - Arbuckle Mts. Leader: C. E. Decker.

The route is north from Ardmore on highway 77, crossing the Caddo anticline, and other steeply folded Pennsylvanian rocks. An hour will be spent on a well exposed stratigraphic section that includes Sycamore, Woodford, Hunton, Sylvan, Viola, Simpson and Arbuckle. A view of Turner Falls will be had en route Davis for lunch. In the afternoon the party will visit "The Spectacles" --a peculiar pattern formed by the outcropping ledges of folded Arbuckle limestone--; the asphalt mine in the Viola limestone; White Mound --a famous invertebrate fossil collecting locality, and Falls Creek.

Wednesday, Sept. 2. - Ardmore to McAlester via Atoka.

Leaders: C.E. Decker and John Fitts.

The route is east from Ardmore, crossing the Trinity sandstone (Cretaceous); stop to study the Tishomingo granite near Tishomingo; north across the Arbuckle Mts., past Connerville; stop on the P. A. Norris ranch near Franks to study an unusually well exposed section of the Simpson; to Ada for lunch. The route in the early afternoon is southeastward through Stonewall, Colgate and Lehigh to Atoka, crossing the Pennsylvanian series; thence north on highway 73; stop at the Stringtown quarry in Talihina chert; stop on the Wapanucka limestone; stop on the Savanna anticline; to McAlester.

Thursday, Sept. 3. - McAlester, Okla., to Paris, Tex. Leader: Hugh D. Miser.

All hard surfaced roads. The route is southeast from McAlester to Haileyville over folded Pennsylvanian beds, past numerous coal shafts; thence east to Victor and southwest into the Ouachita Mts. across the Choctaw fault; stops on the Caney shale of Mississippian and Pennsylvanian age containing pre-Carboniferous boulders; across Windingstair fault; over Windingstair Mt., through Talihina to the Potato Hills for lunch. An hour's stop will be made on the edge of Round Prairie in the Potato Hills, which is a lowland underlain by Stanley shale (Mississippian) and surrounded by rugged hills of pre-Carboniferous rocks, interpreted by Miser as a portion of a window through the plane of the Windingstair fault. In the afternoon the route is southward across the Ouachita Mts., with stops on the Stanley shale and Jackfork sandstone; thence over Cretaceous rocks to Paris, Texas.

Friday, Sept. 4. - Paris, Texas, to De Queen, Ark. Leader: C.W. Honess.

All hard surfaced roads. The route is north from Paris; stop at Arthur's Bluff on Red River, famous collecting locality for fossil plants in Cretaceous beds containing volcanic ash; to Hugo, Okla.; east over Cretaceous rocks to Broken Bow with a stop at the Valliant asphalt quarry. The remainder of the day will be spent studying closely folded and faulted rocks of Cambrian, Ordovician, Silurian, Devonian and Carboniferous age, in the area 5 to 20 miles north of Broken Bow. Dr. Honess spent three years in this region unraveling the complicated geology and will give you the benefit of that work. To De Queen, Ark., for night.

Saturday, Sept. 5. - De Queen, to Murfreesboro diamond mines and Hot Springs. Leaders: George C. Branner and Hugh D. Miser.

All hard surfaced roads. The route to Murfreesboro is over Cretaceous rocks. Mr. Miser has obtained permission from the owners of one of the diamond mines to take the party to the mine. You will be allowed to hunt for a diamond--the average recovery is about a carat for each 5 tons of rock handled. These mines are the only ones of the kind on the North American continent. Beyond Murfreesboro the route crosses 25,000 feet of sediments ranging in age from Cambrian to Carboniferous, through many deep cuts in a recently completed highway showing fine rock exposures. Lunch at Glenwood. An hour's stop will be made at Caddo Gap to study a well exposed full section of the three divisions of the Arkansas novaculite and adjacent formations; the route passes numerous exposures of Womble shale, Mazarn shale, Crystal Mountain sandstone, Collier shale and other formations; a short stop will be made at

a well known graptolite collecting locality in the Womble shale--33 or more species occur here; in Hot Springs the route follows in front of Bath House row, up Hot Springs Mts., for a bird's-eye view of the physiography and complicated structure, supplemented by a short lecture by Miser. This one stop is worth the trip. The last stop is at a whetstone quarry in the Arkansas novaculite.

POST CONFERENCE TRIPS

Sunday, Sept. 6.

Magnet Cove, a famous mineral locality, is only 12 miles from Hot Springs, and can be reached over a good highway. Arrangements will be made to have a competent leader accompany those who desire to visit the locality Sunday morning.

Dr. Honess has logged the route from Norman, Arkansas, via Bigfork, Mena, Page, Heavener, Howe to Victor, Okla., which will be printed in the guide book for use of those who wish to return to Tulsa and other cities in Oklahoma. It is a beautiful winding route past many very excellent exposures.

ROAD LOG

An accurate road log of each day's trip has already been prepared by the leaders. The log contains specific directions to all localities to be visited, giving mileage at all turns, road forks, etc., descriptive matter concerning the localities where stops are made, and prominent geologic and physiographic features seen en route. Directions for hotels, garages, meeting rooms, etc., are given in appropriate places. The following excerpts taken from the log of the last day (Saturday Sept. 5,) are illustrative:

<u>STOP 1</u>	<u>Mileage</u>	Arkansas diamond mine--one of three diamond mines on an old volcanic neck of peridotite. Other mines on the neck are Mauney and Ozark.
1 hour	48.8	
		The diamond mines of Arkansas, which have produced several thousand stones, are the only such mines on the North American Continent.....though some large stones, one weighing as much as 40.23 carats, have been found. (Followed by a description of the mode of occurrence of the diamonds, the mining methods, etc. This will be supplemented by a short lecture by Mr. Miser at the mine.)
	58.0	<u>SLOW DOWN. LONG SLOPE.</u> Pike gravel rests upon peneplaned edges of Atoka formation (Pennsylvanian) which is here 6,000 feet thick and lies in an isoclinally folded syncline.

The route for the next 40 miles between this locality and Mount Ida crosses the full section of Paleozoic rocks in the Arkansas portion of the Ouachita Mts. The

rocks belong to the Cambrian, Ordovician, Silurian, Devonian, and Carboniferous systems, and have an aggregate thickness of about 25,000 feet. Isoclinal folds characterize structure, and great thrust faults that characterize the Oklahoma portion of the Mountains are absent along the route.

In order that the committee may gain an estimate of the attendance at this conference, it is desired that you check the following reply blank and return it by June 5 to the address shown thereon. It will be appreciated if you will return the checked blank whether or not you plan to be one of the participants. Those who are not interested will be dropped from the mailing list for the next announcement.

The amount of the registration fee will be \$10.00, including the price of the guide book.

A second and final notice will be sent out about the first of August. Its receipt will be facilitated if you will place your field or vacation address on the reply blank.

If you know of any geologists who may be interested in this field conference, but who, you have reason to believe, may not receive one of these notices, kindly enter their names and addresses as requested.

N. W. Bass
E. A. Wyman
J. L. Garlough

Field Conference Committee



\$ 10.00

CHALLENGE
BOND

No 738

Western Litho. & Office Supply Company, Wichita, Kansas

Aug. 29

1933

Received of F. T. Thwaites

Dollars

Field trip Reg. Fee

Kans. Geol. Society
By T. L. Farrough

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WICHITA, KANSAS

FIFTH ANNUAL FIELD CONFERENCE

August 21, 1931

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Mr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

On the 17th all of the answers, with the exception of yours, relative to my Cambro-Ordovician correlation chart, (copies of which were sent to Thwaites, McQueen, Edson and Bush) had been received. However, I called the draftsman in Ponca City and instructed him to hold up work on the correlation table another day, since I was certain that yours would be forthcoming, in as much as you are so prompt in your replies. Sure enough, the next day it arrived early in the morning and I wish to thank you for a most interesting letter. I have been glad to take advantage of your suggestions and place lower green sand between the micaceous shale and Mazomanie as members of the Franconia. I have also indicated that the lower part of the Mt. Simon is of upper middle Cambrian age.

From the standpoint of a mid-continent stratigrapher, I would most certainly be against the idea of Raasch who wants to include the Mt. Simon as a member of the Eau Claire. In as much as the Mt. Simon is equivalent to the Lamotte in Missouri, the Reagan of Oklahoma, the Hickory of central Texas, and the Dagger Flat of the Marathon Basin, I think it would be highly advisable to retain its individuality. Approximately 95 percent of the wells which have penetrated into the pre-Cambrian throughout the mid-continent area have revealed a Cambrian basal sandstone which separates the thick section of overlying Cambro-Ordovician dolomites from the pre-Cambrian. It is most convenient to have a definite stratigraphic handle for this sandstone. It is most important that we preserve the unity and individuality of this basal sandstone and not include it as a member of any higher formation.

Please accept my sincere thanks for the information contained in your letter, and looking forward to seeing you on August 28th.

Very cordially yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

Science Hall, Madison, Wis.,
August 21, 1931

Oono Hotel,
Hot Springs,
Arkansas

Gentlemen:

Please reserve single room with bath if possible for me for Saturday
night, September 5.

Very truly yours,

F. T. Thwaites

THE KANSAS GEOLOGICAL SOCIETY

FIELD CONFERENCE COMMITTEE

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FIFTH ANNUAL FIELD CONFERENCE

August 18, 1931

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E. A. WYMAN

Mr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

This is to confirm information in your letter of August 14, stating that you will arrive in Wichita Friday morning, August 28, at 6:20, and that you will accompany Mr. Wyman from here to Medicine Park. Mr. Wyman wishes me to express his pleasure that you will be one of his party. I think you will agree with me after you have reached Medicine Park, that you have been exceedingly fortunate in having Mr. Wyman as a traveling companion. He has worked throughout Kansas, Oklahoma and Texas and is thoroughly conversant with the geology of all three states. In addition he has one of the most pleasing personalities of anyone in this Society.

I am interested to know just how you have reached the deduction that my office is at 919 Central Building. This was formerly the office of the Pure Oil Company, up to the time that their office was closed some months ago. You will find me at 1107 Union National Bank Building, which is approximately four blocks from the Union station.

Unless you receive advice to the contrary, I shall be glad to meet you at the station at 6:20, and we can take breakfast together. In as much as we have no idea of the appearance of the other, I will be standing under the clock in the main lobby of the station. This clock is inserted high up on the wall, directly over the ticket windows. After breakfast we can come up to the office and have a look at the section and discuss some of the interesting problems relative to it.

With kindest personal regards, and looking forward to seeing you August 28, I am,

Very cordially yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK

AUTOMOBILE REPLY BLANK

For the use of those
who plan to bring cars.

Field Conference Committee,
412 Union National Bank Bldg.,
Wichita, Kansas.

Make, and year of car you expect to drive _____

Model of Car.....
Sedan _____
Coach _____
Coupe _____ (Check)
Touring Car _____
Roadster _____

Is your car a company car _____ a personal car _____

If you do not plan to drive your car,
give name of driver _____

Are you taking anyone to Medicine
Park in your car? Whom? _____

Would you care to bring to Medicine
Park someone from your vicinity whom
we might designate (in order to save
him transportation expense) _____

IT IS URGED THAT YOU BRING A FIVE PASSENGER CAR IF POSSIBLE

Please see that your car is in first-class condition.

NAME _____

ADDRESS _____

Aug. 17, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

Yours of the 13th was on my desk this morning doubtless having been delayed because put in second class mail.

I also found a letter from Workman who does not agree with the McQueen-Ulrich correlation table but does not want to be quoted.

So far as the section goes I have little comment to make. The history of the name Mazomanie involves some of the arguments with Ulrich which led to my removal from work on outcrops in 1924, that is work paid for by the Survey. In 1916 Martin and I started some quadrangle work in the western part of the state and Ulrich then definitely stated that the rocks from the Dresbach to the base of the Trempealeau should be called Franconia. Twenhofel and I then published a section on this basis in 1919.

In 1924 I was working on an adjacent quadrangle and Edwards and Raasch on another. Leight was also working on one not far off. In the course of a field conference it appeared that in the time from 1916 to 1924 Ulrich had found (with my guidance) fossils in higher strata than he knew of formerly. In 1916 he had made a collection from the Upper Greensand but seemed to have forgotten this fact. He had named this fossiliferous glauconitic sandstone just below the Trempealeau and Mendota the Mazomanie. Now, in 1924 he recognized that his Mazomanie to the east is equivalent to the Upper Greensand and Yellow Sandstone members of the Franconia as described by Twenhofel and Thwaites. I ventured to protest that the strata now called Mazomanie were originally called Franconia but the result was that Ulrich declared that an unconformity existed and that Twenhofel, Martin, and I had done a poor job in mapping our quadrangles. We had overlooked plain evidence of lensing in and out of the Mazomanie and he had publication of our folio held up. Moreover, Hotchkiss and Bean took Ulrich's side (I never had any personal feeling over the matter but was naturally much disappointed over the result) and laid me off at the close of the season.

Since then Edwards and Raasch have worked in great detail and confirm my contentions of 1924. There is no unconformity and Mazomanie is really upper Franconia. However, the name is now too firmly entrenched to get rid of.

With regard to the matter of the Devils Lake and Mendota formations the best way is to simply forget that Ulrich ever named them. You can see that to try to use them is to get into the realm of impossibilities. I am sorry you were puzzled over the matter but as Ulrich is an authority in Missouri I had to mention the matter to McQueen.

The only suggestion I would make and I hope it gets to you in time, is to show the Lower Greensand between the Micaceous Shale and the Mazomanie. This formation is described by Twenhofel and Thwaites. I am pleased to see that the terms Devils Lake and Mendota do not occur in your table. They simply confuse the issue and it is most interesting to observe that Edwards and Raasch who started out firm followers of Ulrich have without my saying a word changed over to my views as expressed in 1914.

Another point is that I do not like the suggestion of a break between the Lodi (miscalled shale, really a very fine grained sandy dolomite) and the Norwalk. Gradation from Norwalk to Jordan is an accepted fact, however. Raasch now wants to call the Mt. Simon a member of the Eau Claire and extend the Eau Claire down to the pre-Cambrian. We must also realize that since Eau Claire fossiliferous beds are very old Upper Cambrian the Mt. Simon (old usualge) and more particularly the concealed downward extension of that formation are almost certainly Middle Cambrian.

I would follow the Iowa Survey on the spelling of Croixan. It was originally a Minnesota term and very loosely defined as were all their formations. It is a painful fact that the best work ever published on the Minnesota-Wisconsin Cambrian is that of Owen over 75 years ago. Since then Chamberlin, Irving, Wooster, and Weidman all went backward in knowledge of details and of fossils. Ulrich, working on brief trips only, has reached premature conclusions and put them in the literature. When I publish anything I have to conceal my real opinions. Edwards and Raasch have not published anything yet.

Hoping to see you in Wichita,

Very truly yours,

Gasemada

Omeota

~~Van Buren~~

~~Madison~~

~~Emmeline~~

Trempealeau

+ Potosi

~~Dart~~

Ironton

Francis

~~Derby~~

Doer Run

Davis

Upper

La Claire

Bonnetterre

Mr. Simon

La Motte

+

March 1931

THE KANSAS GEOLOGICAL SOCIETY

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WICHITA, KANSAS

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August 13, 1931

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E. A. WYMAN

Dr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Dr. Thwaites:

Inclosed herewith is a copy of the Cambro-Ordovician correlation chart which is to be redrafted onto the geologic cross section of the Central United States. I wish you would be kind enough to check it over very carefully and let me know at once whether or not you have any suggestions of important changes. I must have your answer not later than the morning of August 19. Thereafter it will be too late to make any changes. If you have any suggestions, it might be well to possibly indicate them on this chart and return.

The correlation chart is to be incorporated into the section, since the Cambro-Ordovician stratigraphy of the cross section is more complex than any other part of the structure section. I have taken a good deal of pains to make this as accurate as it is possible for me to do, but I have no doubt that you will have some alterations to make. In the nine right hand ^{columns} ~~corners~~ I have attempted to portray actually what happens on the section. In other words, in northeastern Kansas, the Maquoketa actually extends farther south than the Galena; the Decorah extends farther south than the Galena, but not so far south as the Maquoketa; and the Platteville and St. Peter extend the farthest south of all.

This chart, I think, represents fairly well the combined conclusions of McQueen, Mrs. Edson and yourself, although it may not agree absolutely with all of anyone's points of view. It appears to me, however, to be the most justifiable arbitration of the problem at the present time.

In your letter to McQueen, under date of July 29, you state in the last of the fourth paragraph as follows: "Therefore, if the Devil's Lake is Ozarkian, the top of the Mazanomie is Potosi". I take this to mean that if the Devil's Lake is Ozarkian is upper Mazanomie, then upper Mazanomie is Potosi, since Potosi is basal Ozarkian. Farther on you state: "All this tends to place the Trempealeau higher in the column than you have it, provided the correlation by fossils is correct".

I have spent many an hour trying to get the top of the Mazanomie equal to the top of the Potosi on the correlation chart, but without success. If you still think this is correct, I wish you would draw up a rough correlation chart showing me how this can be accomplished.

I have extended the Trempealeau, as you will see, up into the lower part of the Jordan sandstone to include the Nowalk sandstone member of the Trempealeau as being equal to the basal part of the Jordan. I have used the terms Nowalk, Lodi, and St. Lawrence in order to make things somewhat clearer.

One thing which you may not like in the Wisconsin column on the left hand side is that I have placed the Mazanomie as the upper member of the Franconia. I can not ascertain whether or not it was originally described as being separate from the Franconia, but I do know that Arthur Pentland, in the Journal Sed. Petrol., for May 1931, states that the Mazanomie is correlated with that portion of Franconia which lies above the micaceous shale, which in turn overlies the Ironston.

McQueen wants to make the Potosi equal to the Mendota. However, since ^{you} have found the Devil's Lake to correlate with the upper part of the Mazanomie, and that the Mendota underlies the Lodi shale, I think McQueen is wrong. I have not used the terms Mendota and Devil's Lake, since I did not want to make the problem any more complex than it now is.

By the way, how do you spell St. Croixan? I notice Dake, in his last volume, spells it Croixian, while Bridge, in his last volume, spells it Croixan. Also the Iowa Survey spells it Croixan, which is correct?

With kindest personal regards, and hoping to hear from you at your earliest possible convenience.

Very cordially yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK

STATE OF ILLINOIS
STATE GEOLOGICAL SURVEY DIVISION

M. M. LEIGHTON, CHIEF

305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS

URBANA

August 15, 1931

Mr. F. T. Thwaites
Wisconsin Geological and Natural History Survey
Madison, Wisconsin

Dear Mr. Thwaites:

I am sorry that a number of things have come up to prevent my giving your letter of August 5 a prompt answer.

In accordance with your request we have sent sample sacks to Elgin for the well being drilled by the Gray-Milaeger Drilling Company at the Insane Asylum, and I have myself delivered sacks to the East Moline State Hospital.

I am certainly interested in your observations on the geologic section of the Cambrian from Wisconsin to Missouri. I have done a little observing and thinking on the correlations myself. It seems to me that the glauconitic character of the Bonneterre suggests the Franconia formation and that the druses which we find in the Trempealeau are characteristic of the Potosi. Thus it might be possible that below the Roubidoux, which everyone agrees is New Richmond, the Gasconade may be correlated with the Oneota; the Gunter sandstone, the Jordan; the Potosi, the Trempealeau; the Bonneterre, the Franconia; and the LaMotte, the Dresbach and lower formations. We are gathering data on this and believe that through Illinois the problem can be worked out, for the sample cuttings are now available as far south as Abingdon and as far north as east of St. Louis.

I wonder if you would be able to give me a blue-print of your cross section which you made down through Missouri. If not, I shall certainly be interested in looking up the publication when it comes out.

With best wishes, I am

Yours very truly,

R. E. Workman

Associate Geologist
Section of Subsurface Studies

P.S. Because of the uncertainty of the above correlations as yet I would prefer not to be quoted. R.E.W.

August 14, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

In reply to yours of the 11th I will be most pleased to accept the offer of Mr. Wyman of a ride from Wichita to Medicine Park. I will leave Madison about 4 A. M. on Thursday, Aug. 27 and arrive in Wichita at 6:20 Friday morning. Unless advised to the contrary I take it that I will find you at 919 Central Bldg.

The field trip with the students had been postponed until after I return from the South as I simply could not leave home at present. In order to get in two weeks work before school opens I expect it would be best to take a train from Hot Springs Sunday noon, Sept. 6 which I think will put me home some time the next day. I will then be able to leave for the field early on Sept. 8 and work until the day before school starts.

I will be particularly glad to ride through Oklahoma as we have some lands in the southeastern part of the state where we are going which have come in on foreclosure. I have had the oil possibilities appraised but would be glad to get first hand ideas as to agricultural conditions of that region. I very much fear these loans which were made just after the World War are going to turn out total losses. But I hope I can tell better after seeing the region even if I never see the tracts themselves.

I am glad the cross section is turning out so well.

Thanking you for getting me the ride,

THE KANSAS GEOLOGICAL SOCIETY

FIELD CONFERENCE COMMITTEE

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WICHITA, KANSAS

FIFTH ANNUAL FIELD CONFERENCE

August 11, 1931

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E. A. WYMAN

Dr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Dr. Thwaites:

I am in receipt of your letter of August 8, relative to transportation for yourself to the Fifth Annual Field Conference, which will convene at Medicine Park. Medicine Park is a summer resort in the Wichita Mountains, and the closest town of any size is Lawton, Oklahoma, which can be reached on the Frisco. There is no railroad into Medicine Park, and I am uncertain whether or not it has bus connection with Lawton, but I could find out for you if you so desire.

It is extremely unlikely that I shall be able to attend the Conference. Even if I were, I could not offer you a ride, since I have no company car. I have, however, talked with Everett Wyman, District Geologist with the Amerada Petroleum Company in Wichita, who is a member of the Field Conference Committee, and he asked me to tell you that he will be very happy to have you as a passenger between here and Medicine Park, provided you can reach Wichita, Kansas by Friday noon, August 28. Since he is on the committee, it is necessary that he leave here a little early. I take it that you will wish to attend the pre-Conference trip leaving Medicine Park early Sunday morning, August 30, and if so you would not have to leave Madison very much earlier in order to reach here by Friday noon.

However, if you are unable to arrange your plans this way, please let me know at once, since I think I will be able to promise you transportation in one of the other cars going out of Wichita. However, I think most of the boys plan on leaving here Saturday morning.

If you can so arrange your plans, I would recommend very highly that you accept Mr. Wyman's invitation, since I think you will find him a most agreeable traveling companion. Please let me know at once what disposition you wish to make in this matter, so that I can make certain of your transportation. In as much as all the boys have company cars, there will of course be no charge for your transportation between here and Medicine Park.

The Iowa Section arrived after being forwarded by you to Mr. McQueen, who in turn sent it to Dr. Lees at Des Moines. However, Dr. Lees was at McGregor, so there was some delay in the receipt of the section here

and I did not receive it until August 8. I had not written you, since it was my impression that you were absent in the field conducting a class of students.

Everything has been straightened out highly satisfactorily, due to the efforts of you and Mr. McQueen. I accepted your "brown line" version cutting out the Dresbach east of Des Moines, and making the Eau Claire equal to the Bonnetterre. I can not adequately express to you my thanks for your interest and cooperation in the Iowa portion of the section. It turned out that Iowa was one of the key areas in the Cambrian problem, and without the work done by you and McQueen, it would have been impossible to unravel its structural and stratigraphical history.

The drafting is being done in Ponca City, Oklahoma, and I feel confident that you will be more than pleased with the result of the work when you see the prints. I have been down to Ponca twice and I expect to go twice more before the work is done. The draftsman has promised us the section on August 20, and we will not obtain the final prints in this office until August 27, so I doubt if there will be opportunity to forward one to you before you receive it on the Conference.

Please let me hear from you at once relative to your transportation. I am hopeful that you will decide to come to Wichita by train, since in that way I will have an opportunity to meet you and discuss some of the problems of mutual interest relative to the section before you leave for Medicine Park with one of the boys. By the way, the best connection into Wichita out of Chicago is over the Santa Fe on train #1, leaving Chicago at 11:15 Thursday morning, August 27, arriving here at 6:20 Friday morning, August 28. Most of the trans-continental trains get in either here or at Newton along toward the latter part of the afternoon. However, should this be too early for you, let me know and I will ask Mr. Wyman if he could leave here a few hours later and arrange to meet you at Newton at 2:35 Friday afternoon. If he were to do this, you could leave Chicago on the California limited at 8 o'clock Thursday night, which I presume would be more satisfactory to you, but I can not guarantee that it would be convenient with Mr. Wyman's plans.

With kindest personal regards,

Very truly yours,

Anthony Folger

Anthony Folger

AF:DK

STATE OF IOWA
IOWA GEOLOGICAL SURVEY

DES MOINES

GEORGE F. KAY, DIRECTOR

JAMES H. LEES

ASST. STATE GEOLOGIST

NELLIE E. NEWMAN

SECRETARY

DES MOINES- McGregor, Aug 9

Dear Doctor Shwartz

The Iowa section came from McQueen several days ago and I have forwarded it to Folger. No doubt Anthony was getting anxious, as it should be put into final form very soon. There was little I could do in helping on the correlation, for Wisconsin on one hand and Missouri on the other have the outcrops, and they are so much better for correlations than well sections. I did say to Folger that I should like to see the Eicup shown at Cedar Rapids, because Norton had a better set of samples than I could send you after all these years, and because I had such

Confidence in Doctor Norton, and also because of the Tipton well. What Folger will do, of course I don't know, but his decision will be satisfactory. Iowa has proved to be very interesting ground, for Cambrian correlation especially, and we should get some very useful conclusions. I wish I might go with the field conference, but it seems unlikely at present.

I'm sure there is no rush about returning the samples to Doctor Norton so long as they do get back to him eventually.

Very truly yours
James H. Lees

R.4, Madison, Wis.

Aug. 8, 1931

Kansas Geological Society,
Field Conference Committee,
412 Union National Bank Bldg.,
Wichita, Kansas

Gentlemen:

Enclosed please find attendance and hotel reservation blanks for the Fifth Annual Field Conference. I wish very much to attend but am unable to find out how to get to Medicine Park, Oklahoma. It does not seem to be on a railway nor on any map I have available here. It would seem that the only practical way to get there in the limited time I have available is to meet someone who is driving there from some larger place and have him take me.

On account of this uncertainty I am not enclosing a check.

Very truly yours,

F. T. Thwaites, Lecturer in Geology

Aug. 8, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

The final announcement of the Fifth Annual Field Conference is at hand but I am unable to find out how to get to Medicine Park, Oklahoma. Its does not seem to be on a railroad and as I cannot get anyone to drive down with me (and I havnt time anyway) I will have to come down by rail.

Now the only way I can see at present is to meet someone and drive to the conference. Please advise me what to do as I want very much to attend.

Having heard nothing more of the cross section I assume that everything has been straightened out satisfactorily.

Very truly yours,

Aug. 5, 1931

Dr. James H. Lees,
Assistant State Geologist,
Wild Life School,
McGregor, Iowa

Dear Dr. Lees:

In reply to yours of the first my instructions were to send the Iowa cross section to McQueen and that he was to send it on to you for final approval. I mailed it to McQueen on July 29. I also mailed you a carbon of my letter to him. I will add that the strongest evidence of the verity of a sub-Madison overlap in southwestern Iowa is that it had previously been discovered in Missouri.

The illness of my assistant has delayed returning the samples to Dr. Norton but we will get them off soon. I was glad I did not send them at once as I used a portion of the Grinnell samples to send to McQueen for comparison with other wells. I also sent him some from Dubuque. I think we are now all agreed on the Iowa correlations.

Thanking you for past favors,

Very truly yours,

Lecturer in Geology

Aug. 5, 1931

Dr. H. S. McQueen,
Bureau of Geology and Mines,
Rolla, Missouri

Dear Dr. McQueen:

In reply to yours of the first there are some things I forgot in my last letter.

It seems to me that the strongest point in favor of an overlap at the base of the Madison is your previous discovery of such in Missouri.

In Wisconsin Ulrich places the base of the Madison here except near Baraboo when as I showed in my last letter there is grave difference of opinion as to the stratigraphic location of some fossil localities.

Dr. Lees, to whom you were to forward the cross section of Iowa writes me that he will be at the Wild Life School, McGregor, Iowa this week but that if you want to send it direct to Folger it is all right with him.

Thank you for the samples you are sending. I hope you get something out of these I sent you. I am confident that we will finally agree on correlation.

Very truly yours,

Lecturer in Geology

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STATE GEOLOGIST

STATE OF MISSOURI

BUREAU OF GEOLOGY AND MINES

ROLLA, MO.

August 1, 1931.

Dr. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin.

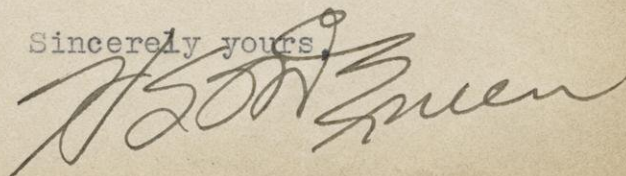
Dear Mr. Thwaites:

I very much appreciate your courtesy in furnishing me with samples from the Dubuque and Grinnell wells. I have not had an opportunity to study the samples carefully, but did find in the Dubuque samples from 590 to 600 feet the silicified sponge spicules which I have mentioned before. I also noted that the Trempealeau division in the Grinnell well was very much the same as the upper part of the Cambrian section at Frankford, Pike County, Missouri.

I received the sections and agree with you as to the distribution of the Upper Cambrian beds in south-west Iowa. In this connection I will leave the matter of the Dresbach to you and Folger. Because of your experience with this formation, I am inclined to respect your opinion.

I appreciate very much the information that you have given me relative to the Upper Cambrian beds. I realize that they offer very complex problems, similar to those with which we have struggled in southeastern Missouri. As soon as I can examine the samples I will furnish you with a copy of my results, and at the same time will send to you some typical samples from Southeast Missouri. You may find them to be of interest.

Sincerely yours,



McQ/McC

STATE OF IOWA
IOWA GEOLOGICAL SURVEY
DES MOINES

JAMES H. LEES
ASST. STATE GEOLOGIST

GEORGE F. KAY, DIRECTOR

NELLIE E. NEWMAN
SECRETARY

Dear Doctor Shwaites

DES MOINES August 1

Thank you very much for the blue print of Fulton's new well. I am very glad to have it. It will be useful in comparing with Clinton wells.

If you have not sent the cross section to me and are still planning to do so you might send it to Mr. Gregor, Iowa, C/o Wild Life School. That would save time. If you are sending it to McQueen or Folger, that will be all right.

Very truly yours

James H. Lees

STATE OF IOWA
IOWA GEOLOGICAL SURVEY
DES MOINES

JAMES H. LEES
ASST. STATE GEOLOGIST
NELLIE E. NEWMAN
SECRETARY

GEORGE F. KAY, DIRECTOR

DES MOINES, July 30, 1931

Dr. F. T. Thwaites,
University of Wisconsin,
Madison, Wisconsin.

My dear Doctor Thwaites:

I have your letter of the 27th enclosing your letter of July 16 and the various determinations and copies of other letters which you enclosed. I am very glad to have your determinations of these well samples and particularly of course the Clarinda prospect. This Clarinda well is proving to be an eye opener with regard to the geology of southwestern Iowa. I notice that in your determinations you place everything below 3577 feet in the pre-Cambrian. Is it your idea that this pre-Cambrian belongs in the Red Clastics or in the Sioux Quartzite? Mrs Edson and Mr. McQueen called it Red Clastics at first but perhaps they have changed their ideas. I am finding this discussion of the Cambrian very interesting and enlightening as it presents a number of new problems to me.

I am going to be at McGregor for the next two weeks and so I shall probably be somewhat out of the way for discussion of the cross section, but I am sure that you and Mr. McQueen are well qualified to carry on the work. When you send the cross section I shall be glad to look it over and make any suggestions which occur to me.

With regard to the quartzite at Cedar Rapids it may be that you are correct in doubting its presence. Since Doctor Norton identified the quartzite at Tipton the presence of quartzite at Cedar Rapids seems to me to be somewhat strengthened. It may occur in that part of the state as a sharp ridge just as you suggested. It is certainly unfortunate that no better sets of samples of the Iowa wells along our section have been preserved.

Very truly yours,

James H. Lees
James H. Lees,
Asst. State Geologist.

July 29, 1931

Dr. H. S. McQueen,
Asst. State Geologist,
Bureau of Geology and Mines,
Rolla, Missouri

Dear Dr. McQueen:

Your letter of the 27th and the package of samples from Greenfield, Iowa are at hand and I wish to thank you for them. I have read over the letter several times and have looked at the samples to the best of my ability.

I fully recognize the validity of your arguments for the Bonneterre age of the dolomite at Clarinda and accept this without qualification. However, I am not so sure about correlations between Missouri and Wisconsin. If Ulrich had not committed himself on the age of the Mendota the matter would be much simpler. He makes that basal Ozarkian.

Now the Trempealeau of Wisconsin is not a simple formation. It varies widely in lithology with frequent lensing out of lithologic types. Raasch tells me that its fauna varies likewise and that, leaving out the Mendota for the present, several Ozarkian species occur in the Trempealeau.

Ulrich's Devils Lake sandstone which underlies the Mendota is also classed as Ozarkian. In the course of a recent field conference with Raasch and Wanermacher, who is making a detailed study of the Baraboo region, it was proved to the satisfaction of all that the Devils Lake is Upper Mazomanie. Therefore, if the Devils Lake is Ozarkian the top of the Mazomanie is Potosi.

Raasch working with fossils, and he has collected more from the Trempealeau than anyone else, makes the Mendota underlie the Lodi member of the Trempealeau. Twenhofel working with heavy minerals does the same. So did I years ago by actual tracing in the field. We now know beyond question that the sub-Mendota dolomite Ulrich called Trempealeau at Baraboo is actually basal Franconia or Ironston.

All this tends to place the Trempealeau higher in the column than you have it PROVIDED THE CORRELATION BY FOSSILS IS CORRECT.

I have always laid much stress on the glauconitic horizons as markers. In this I follow Ulrich as well as my own experience. Your table fits very well with the distribution of glauconite except that it is particularly abundant just at the base of the Trempealeau and in the Franconia. None is ever found in the true Dresbach although there is some in the Ironston. The table is not full enough to show if this is true.

Now the Des Moines well shows no glauconite free zone or true Dresbach. This seems to fit with your idea that the typical Dresbach (which really reaches even 100 feet in very few spots, the 250 being an error) pinches out to the south. I had always thought that it equalled the LaMotte because of the distance to which fresh waters have penetrated it in western Illinois seems to indicate an outlet to the south but I may be wrong about that.

I would amend the thicknesses of the sum of the Mazomanie and Franconia to not over 170 feet, of the Dresbach to 40 to 100 feet.

This raises the question of making your Davis (190 feet) equal to Mazomanie-Franconia and your basal Davis to the Ironston. Dresbach held to be missing in Missouri and Bonnetterre equal to Eau Claire. With this very minor modification I think your section will fit my "brown line version" on the cross section of Iowa. I had, by the way, drawn this version before your letter came.

The only real point I had against accepting the Bonnetterre age of the Glarinda dolomite was the absence of glauconite. But this mineral is not everywhere common in the Eau Claire, so that would be all right.

Your choice of the location of the angular unconformity (of course it is the enormous vertical exaggeration which makes it so conspicuous) agrees with mine except that I would say it is sub-Madison and not sub-Jordan. The Madison (basal Ozarkian in most of Wisconsin) is clearly separated by a marked break from the true Jordan. Ulrich restricts the name Jordan to a coarse sandstone a few feet thick. The original Jordan (and that is what I have shown on the cross section and Lees has also) includes Ulrich's Norwalk member of the Trempealeau. There is a similar overlap at the base of the St. Peter, Sardeson to the contrary notwithstanding. Indeed, I am at times inclined to think that what we call Prairie du Chien or Lower Magnesian in Chicago wells is basal Trempealeau or Mendota (our definition of latter). Your finding of a similar overlap in Missouri strongly supports the "brown line version."

I certainly wish we could get together and talk things over. I always think of something I forgot just after sealing the envelope. Maybe I should be like the little girls I overheard at Woolworths last Christmas. One said to the other " Lets start home and then we'll think of what we forgot." So perhaps I will pretend to seal this and then think of something else!

Please DO NOT SHOW THIS LETTER TO ULRICH. He has been after me for not using all his formation names and there is no use starting any more arguments. I was taken off work on outcrops in 1924 because I did not agree with him on all things. I have great respect for his observations but reserve the right to reach different interpretations from the same facts, that's all.

The second cross section is Folger's version and substantially equals my "red line version." It is also to go forward to Lees for final transmission.

I hope we have ironed out substantially all our troubles and hope that nobody will think I have changed views too rapidly. After confidently expressing my belief in the red line version what changed me was first the Des Moines log and second your findings of an overlap based on the Greenfield samples. I hope you get time to look at Grinnell and Dubuque samples. Please do not regard the stratigraphic position of the Trempealeau as a settled matter.

Sincerely,

Geologist in charge of well records, Wisconsin
Geological Survey

Lees

Folger

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STATE GEOLOGIST

STATE OF MISSOURI

BUREAU OF GEOLOGY AND MINES

ROLLA, MO.

July 27, 1932

Dr. F. T. Thwaites,
Department of Geology,
University of Wisconsin,
Madison, Wisconsin:

Dear Dr. Thwaites:

I regret the delay in replying to your letters of recent date. Since July 18, I have been in bed as the result of illness, and prior to that date, have been engaged in field work.

It is inevitable that the troublesome problem of the Upper Cambrian would arise in the course of preparing the regional cross-section. My thoughts regarding certain aspects are briefly stated below:

The dolomite from 3340 to 3554 feet in the Clarinda well is classified as Bonneterre for the following reasons:

1. The residues are the same as those from a division of this formation in the type locality.
2. The residues are different from those obtained from the younger Upper Cambrian beds of Missouri.
3. The lithology is that of the Bonneterre, the red dolomite crystals being noted in places in Southeast Missouri. Red dolomite is also found in the Davis and Eminence of Mo., but the three give very distinct residues.
4. The formation designated as Bonneterre at Clarinda can be traced from southeastern Missouri by well to well correlations, also into southwestern and western Missouri and into eastern Kansas.
5. The younger Upper Cambrian beds occur throughout eastern Missouri, and as far west as the middle portion of the state but do not occur in the western half, where, in

general, the Eminence dolomite rests upon the Bonneterre; the younger Upper Cambrian beds and the basal Ozarkian, Potosi dolomite, being absent.

6. It should be mentioned that in studies of Upper Cambrian residues, silicified cruciform sponge spicules have been found in the youngest beds of this series in the deep well at Frankford, Pike County Missouri; in samples from Southern Oklahoma; and from Central Texas. They were not observed at Clarinda. I believe they come at or near the horizon of the Trempealeau, and Ulrich has so noted them. The residues from this zone are unlike those from the Bonneterre.

It seems to me that we must recognize the presence of a pre-Cambrian high in Southwest Iowa, and a consequent thinning of the Upper Cambrian and the loss of the highest beds. In turn, this calls for an overlap by the Jordan, thus supporting Dr. Ulrichs' idea of a major unconformity at this point in the section, and substantiating his Cambrian-Ozarkian Systems.

Regardless of the merits of his Ozarkian system, the fact remains that there is an unconformity of magnitude in Missouri at this point in the section, with Potosi resting on Bonneterre, and in some instances, even younger Ozarkian formations resting on lower Upper Cambrian. Further proof of the cutting out of the younger beds is indicated by the presence of what I take to be Upper Davis below the Jordan, at Greenfield from 3425 - 3435 feet.

The pink dolomite at Clarinda is similar to that in the Bonneterre in Southeast Missouri, particularly in areas where red muds from the pre-Cambrian rocks were introduced into the Bonneterre sea.

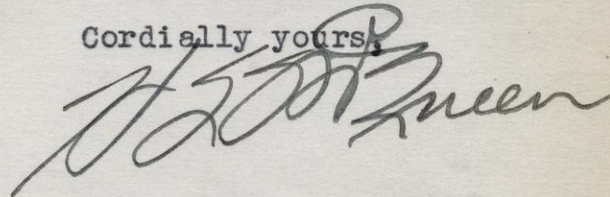
What appears to be the Mazomanie equivalent in Missouri, is generally a fine grained white, angular sand, cemented with dolomite, and sparingly glauconitic. It often drills up into fine chips, which upon being dissolved leave loosely cemented and porous masses of sand. At Clarinda, the sand 3554-3570 is coarser, with a slight tendency toward rounding and less frosting and being in general, colorless. Also, this sandstone is the same throughout eastern Kansas and Western Missouri where we have designated it as Lamotte. In Missouri, as already pointed out, the Upper Cambrian thins from the top down, and the Bonneterre Lamotte are the most persistent formations.

I enclose, herewith, a correlation table which has been suggested by a study of many Upper Cambrian drill samples, and to some extent field studies. Please drill it full of holes. I am also sending you several samples which are typical of our Upper Cambrian beds.

I realize that it is difficult to bring the matter under discussion to a head by correspondence. I regret that we cannot get together over many samples. Your idea of a Mississippi Valley section is an excellent one. Perhaps we can get at it some day, but at present, I am pretty well buried under a mass of stuff that must be done without delay.

After I have examined the sections, which Folger advised, by long distance telephone (and to the tune of \$7.90) that you were sending, I will transmit to you any additional ideas I may have.

Cordially yours,

A handwritten signature in dark ink, appearing to read "H. S. Green". The signature is fluid and cursive, with the first name "H." and last name "Green" clearly distinguishable.

Mc Q/DS

TENTATIVE CORRELATION TABLE, UPPER CAMBRIAN
(For Discussion - Not Publication)

by H S W Green

MISSOURI		WISCONSIN	
Absent		Jordan	
Probably represented in part at least, by sponge spicule bearing beds in highest beds of Upper Cambrian, section in deep well near Frank- ford, Pike County			
Doe Run	60' +-	Trempealeau	125'
Derby	40' + -		
Upper Davis Basal dolomites carry fine white sand and glaucon- ite	75' +-	Mazomanie	100' - 165'
Lower Davis	115' +-	Franconia	120' - 170'
Basal dolomites of Lower Davis with abundant medium sized frosted sand grains and glauconite - 15'		Dresbach	40' - 250' +-
Bonneterre	90' - 600'	Eau Claire	200' - 350'
LaMotte	0' - 450' :	Mt. Simon	100' - 700'

The thicknesses for Missouri are taken from measured outcrops and deep well sections. Those for Wisconsin are after E. O. Ulrich, Wisc. Acad. of Sciences, Arts and Letters; Vol. XXI, PP. 82-83, 1924.

July 27, 1931.

Mr. Anthony Folger,
Box 1144,
Gypsy Oil Company,
Wichita, Kansas.

Dear Anthony:

I am back on the job after an enforced lay-off.

Enclosed, herewith, are my conclusions regarding the Greenfield samples. They do not suggest anything at Clarinda, which doesn't help you perhaps, but ~~does~~ give me an idea as to what is happening in Southwest Iowa. I will indicate on the cross-sections as soon as they come from Thwaites.

I have gone over some samples that must be Trempealeau. They haven't anything in common with Clarinda. The ones examined contain sponge spicules. I don't believe I violate Joe Bridges confidence when I say the sponge spicules indicate high Upper Cambrian, and probably Trempealeau.

Cordially yours,

McQ/DS
Enclosure.
cc - Mrs. Edison
Dr. Lees ✓
Mr. Thwaites

GREENFIELD IOWA SAMPLES

Two samples from this well were submitted by Mrs. F. C. Edson. They come below the Jordon sandstone (3390-3425-35 feet).

They may be described as follows:

The dolomite from 3425 to 3430 is finely crystalline and sandy. The insoluble residue prepared from chip samples, which are common, is white sand, the grains being extremely fine, very white, and angular; a small amount of pyrite was noted. In the residue prepared from the general samples, coarser grains of sand (probably Jordon) are common, together with dark green shale. The shale is dense, and studded with crystals of pyrite. It breaks with a splintery fracture.

The sample from 3430 to 3435 feet is essentially similar, although the dolomite is slightly more crystalline, and shale is less common.

I would classify these samples as of Upper Cambrian age. They suggest the Upper Davis of Missouri because of the extremely fine grained sand at 3425-3430; the green shale, with splintery fracture is likewise characteristic of that portion of the Davis formation. The pyrite is similarly suggestive.

The samples may range higher in the Upper Cambrian, but I am inclined to the conclusion presented above.

It should be noted that they differ from the samples in the Clarinda well from 3340 - 3554 feet. In this interval the dolomite is more crystalline and has a tendency to drill up into individual crystals of dolomite, white and in some instances, pink in color. This suggests Bonnetterre. The residues from this interval, and particularly 3340 to 3445 and decidedly small, lack the pyrite, fine sand and splintery green shale. Those below 3445 contains a large percentage of green shale, apple green in color, and marked by dolocasts. Both are characteristic of the Bonnetterre. There is no sand except that caved from the overlying Jordon, and that sand contaminates the samples from each well.

In making the above determinations, I have taken occasion to re-examine the Clarinda samples and check also those from other deep wells in Missouri. It is difficult to place two samples, but the information at hand suggests the above conclusions for the Greenfield well.

H.S. MeQueen.
Missouri Bureau of Geol. & Mines

Rolla, Mo.
July 27, 1931.

July 28, 1931

Dr. H. S. McQueen,
Assistant State Geologist,
Missouri Bureau of Geology and Mines,
Rolla, Missouri

Dear Sir:

Your telegram telling that you had sent the Greenville, Iowa, samples to me came about supper time last night. Thank you very much.

This morning I looked up some samples to send you. Unfortunately Mr. Raasch who has done all the work on outcrops since 1924, seems to be away so that I was unable to get a complete set of chips from the Trempealeau taken from an outcrop. I did, however, take chips from hand specimens collected by me at Mazomanie in 1914. Raasch has all my notes on these except the list of specimens. I trust that these will fill your needs for otherwise I would have to make a 50 mile trip to this locality. I would be glad to do this but today for several reasons I did not happen to be keen on going.

I also included two sets of samples from Iowa wells. These are all of those from Grinnell, No. 6, city. ~~They run~~ from 2190 to 2500, total depth. Enclosed is my description of same. The other set is from a Dubuque well, Farley and Loetscher. The samples cover what I called Trempealeau. I have no log available to send you but please note that depths do not match those of No. 5, city, the well used on the section. I did not see samples from that. THESE SAMPLES DO NOT HAVE TO BE RETURNED. There is plenty left.

With the other samples I included in a paper envelope the bottom sample from Des Moines, Iowa, Greenwood Park. This came to me through Mrs. Edson and is to be RETURNED TO DR. NORTON. Even if you do not have a chance to look at the other samples I would very much like your opinion of this. I called it typical of the Eau Claire dolomitic siltstone.

All the bulletins I requested have come except 20. Thank you very much.

What "throws the monkey wrench in the gears" is the Des Moines well. If we knew more about that there would be less to worry over. However, I have (and still hope to) learned a lot by reason of my connection with the cross section project. I hope that someday we can with Workman's help get up the section I propose from Wisconsin to Missouri. But for reasons I do not desire to mention here it may be better to wait a few years. Meantime I will spare you what I really think about long distance correlations by means of a few poorly preserved fossils whose position in the column is not definitely known!

Whatever examinations you make will be greatly appreciated. If I can get you more material from Wisconsin please feel free to call for it by writing to me.

Very truly yours,

Geologist in charge of well records, Wisconsin

Geological Survey

July 27, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger;

Your letter of the 24th arrived Sunday Morning and your two telegrams of today followed close upon one from McQueen. I thought the matter over and then wired McQueen for the Greenfield samples.

I am now sending Lees all the material on Iowa except the cross section. Your section checked my "red line version" except at Des Moines where I had changed some of the formation boundaries and not sent you the data. I am now coming to the angular overlap theory because (a) McQueen gets different sub-Jordan (more likely Madison) dolomites, and (b) the normal Drebach is missing at Des Moines. Moreover, Glarinda is much nearer to the Missouri outcrops than to those in Wisconsin, not in miles but to well logs correlated on the Missourian basis.

But may not this insoluble residue method lead us astray? It is just an adaptation of lithologic comparison. Twenhofel was strong for heavy mineral correlation until one of his students found entirely different heavy minerals in the same formation in different parts of the state. I have used insoluble residues for many years myself and have found them useful but not to be ranked above other methods of correlation. Certainly I have a Missourian attitude toward the wonderful things claimed (not by McQueen) for this method. I wonder how the Glarinda pre-Cambrian may affect the matter.

Enclosed is a structure map of Wisconsin, an advance copy of what is now in hands of the Geological Society of America for publication. I think it will answer your questions on the relation of the Wisconsin arch to the LaSalle Anticline. I could never see the difference but Newcombe objected strongly to a statement to this effect in my description so I cut it out. I could not just get his reason but judge that it had to do with age of earth movements. Inasmuch as we have none of the younger formations in Wisconsin I do not just see his point.

Attached statement about the Trempealeau was omitted from former letter.

I am interested in your reaction to paleontologists correlations. I too have sought for "paleontologists outcrops" and have had them say a formation is "missing" when it is really simply concealed by talus of a higher formation. And as for faults which vanished on following a key bed and pinching out of formations postulated from incomplete sections, well, the less said the better.

Hoping to be able to forward the section to McQueen soon,

Very truly yours,

Lecturer in Geology

July 27, 1931

Dr. James H. Lees,
Assistant State Geologist,
State Capitol,
Des Moines, Iowa

Dear Dr. Lees:

The enclosed material was prepared for transmission to you on July 16. However, it was held up on request of Mr. Folger who changed his plans about the Iowa part of the cross section. Nevertheless, I think that it is best to send on this material WITHOUT THE CROSS SECTION so that you will have a chance to read it before the drawing reaches you. I am still waiting for a letter from McQueen and have sent for the Greenfield samples. If his determination is correct, and I see no reason to doubt it, we will have to show an angular unconformity at the base of the Madison. It is certainly too bad that we have no full set of samples from the old well at Des Moines.

Very truly yours,

Geologist in charge of well records, Wisconsin
Geological Survey

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F T THWAITES=

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CAN YOU SEND ME TYPICAL TREMPLEAU WELL SAMPLE MAILED
GREENFIELD=

H S MCQUEEN.

557P.

PHONE NO.

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TO DELIVER

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FRED T THWAITES, DEPARTMENT OF GEOLOGY SCIENCE HALL=
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HOWELL HAS FAILED TO SHOW THE WISCONSIN ARCH ON HIS
TECTONIC MAP BUT EXTENDS THE LASALLE ANTICLINE NORTHWARD
TO JUST WEST OF NORTHEAST CORNER OF GREENE COUNTY
WISCONSIN STOP CAN YOU FORWARD ME A SMALL STATE MAP OF
WISCONSIN SHOWING COUNTY BOUNDARIES AND MARK THEREON THE
APPROXIMATE AXIS OF WISCONSIN ARCH STOP I NOTE TWENHOEFEL
DESCRIBES IT AS A BROAD ARCH TRENDING NORTH AND SOUTH
APPROXIMATELY THROUGH THE CENTER OF THE STATE DOES IT
PROBABLY CONNECT OR ALMOST CONNECT WITH THE LASALLE
ANTICLINE=

ANTHONY FOLGER.

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BY TO BE
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TJ34 68 DL=WICHITA KANS JUL 27 1151A

FRED T THWAITES, DEPARTMENT OF GEOLOGY=

UNIVERSITY OF WISCONSIN SCIENCE HALL MADISON WIS=

MCQUEEN STATES GREENFIELD SAMPLES SUGGEST POSTBONNETERRE
 UPPER CAMBRIAN POSSIBLY UPPER DAVIS STOP IF WE ACCEPT THIS
 DETERMINATION IT WILL SOMEWHAT ALTER THE PICTURE BUT I AM
 LEAVING IT ENTIRELY TO YOU SHOULD YOU DESIRE STUDY THESE
 SAMPLES THERE IS STILL TIME FOR YOU TELEGRAPH MCQUEEN OUR
 EXPENSE AND HAVE HIM FORWARD THEM SPECIAL DELIVERY STOP
 WHEN MATERIAL IS FINALLY MAILED MCQUEEN PLEASE WIRE ME
 COLLECT TO THAT EFFECT=

ANTHONY FOLGER.

THE QUICKEST, SUREST

1258P..

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TJ27 10=ROLLA MO JUL 27 1058A

F T THWAITES=

WISCONSIN GEOLOGICAL SURVEY MADISON WIS=

GREENFIELD SAMPLES SUGGEST POST BONNETERRE UPPER CAMBRIAN
 POSSIBLY UPPER DAVIS=

S S MCQUEEN.

1115A.

u/s 9 W

H.S. McQueen, geologist Survey, Rolla Mo

please send me greenfield samples
 special delivery per Folger's request
 Thwaites

TELEPHONE NO.

TELEPHONED TO

TIME DELIVERED

TO BE

ATTEMPTS

THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAPH OR CABLE

du 1144a

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July 24, 1931.

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PERRY R. HANSON

WALTER W. LARSH

E. P. PHILBRICK

PAUL A. WHITNEY

E. A. WYMAN

Mr. F. T. Thwaites,
University of Wisconsin,
Madison - Wisconsin.

Dear Mr. Thwaites;

Your letters of July 16th and 17th have come to hand, together with copies of letters to Lees and Mc Queen, copies of sample determinations of Iowa wells, as well as your written discussion relative to the problems resulting from this sample analysis and a correlation table. For all of which I am deeply indebted. Allow me to here express my sincere appreciation for the thoroughness with which you have attacked this problem, and for the hours of labor spent in behalf of the Cross Section project.

Yesterday I talked to Mc Queen on the telephone for twenty minutes relative to the problem of the Clarinda well, together with a hasty discussion of Cambrian correlations in Wisconsin, Iowa, and Missouri. Mc Queen has been ill in bed for the past week which has prevented his examination of the two samples at the bottom of the Greenfield well. He hopes, however, to look at these at least by Sunday and will wire you the result of this study.

Upon receipt of this information from Mc Queen will you complete your interpretation of the Cambrian and Pre-Cambrian portion of the Iowa section and transmit at once, by special delivery mail, to Mc Queen who plans to be in Rolla at least a portion of next week. Mc Queen will then draw a rough sketch showing his ideas of the problem and will forward his sketch and yours (I hope the same day as received) to Lees by special delivery. I am asking Lees to forward all of this material to me by special delivery just as soon as received, together with a third sketch showing his ideas, to me. Then the fun will begin. I trust I shall not have too many gray hairs by the time we get this mess straightened out.

Mc Queen told me yesterday that he has answered, or is answering, the copy you sent him of the material forwarded me, by a letter almost as long as the one you wrote me. Also he has drawn up a correlation table showing his conception of the Cambrian correlations. A copy will be sent to me but it has not yet arrived. Mc Queen told me very positively that he is certain the sub-Jordan dolomite in the Clarinda well is Bonnetterre, since he has traced it up from Missouri to Clarinda from well to well correlation. Knowing Mc Queen's character of work, as well as the fact that he does not commit himself positively unless he is more than sure of his ground, I am inclined to back him to the limit and agree that this sub-Jordan dolomite is Bonnetterre.

Next on the scene appears Thwaites, coming out of Wisconsin into Iowa, and examining all of the samples across Iowa to the Clarinda well inclusive. Thwaites seems confident that this same sub-Jordan dolomite in the Clarinda well is Trempealeau.

Fanny Edson, for whose ability I have learned to have a very high regard, believes this dolomite is Trempealeau or St Lawrence or what have you. Our own Arthur Price, petrologist for the Gypsy, thinks it is Trempealeau. So also does Fred Bush.

So far well and good. However Mc Queen, partially from his own ideas and studies, and partially following Ulrich and Joe Bridge (good old bald-headed Joe; I've known him 15 years and greatly admire and respect his opinions) says that the Bonnetterre is equivalent to a portion of the Eu Claire. Thwaites expresses the idea that the Trempealeau may possibly be equal to the Derby-Doerun, or, that the correlative of the Trempealeau may be entirely absent in Missouri. Ulrich wants to place the ~~Bonnetterre~~ Potosi equal to the Trempealeau. Thwaites say he thinks Ulrich has erred in attempting to bring the Wisconsin Cambrian in line with the Missouri Cambrian. Mc Queen seems to think Ulrich is allright.

Finally, I think you will all agree that it is time for Folger to get up on his high horse and make some dogmatic and sarcastic, statements.

We are already assured of two sketches of the Iowa problem, Thwaites and Mc Queen. Lees will make a third. Why not a fourth? With this in mind, I have plotted Thwaites' Cambrian points on the Iowa section over to the Des Moines well, and have completed all contacts down to the Pre-Cambrian, by interpretation and imagination, over to Clarinda. I have taken off a hurried and rough sketch of this which I enclose herewith. When you forward the material to Mc Queen will you please send it to him; he to Lees, and Lees back to me.

Probably none of you will like it, or agree with it. Notwithstanding, I do like it. Gentlemen, as I see it, here is the solution. Briefly, we all agree that there is a structural high at Clarinda; an old land mass onto which we can conveniently overlap and cut out what beds we wish. But this much is certainly true - Ulrich and Bridge and anyone else to the contrary (including any paleontological evidence; when paleontology does not fit the structural picture, throw it out; and in this case the paleontological evidence from Wisconsin is very poor) - the Bonnetterre must be equal to the Trempealeau. How can any other logical conclusion be arrived at? Mc Queen certainly should know Bonnetterre; Thwaites certainly should know Trempealeau. Therefore, if this sub-Jordan dolomite at Clarinda (and you have both picked its top and base to the foot) is called Bonnetterre by one and Trempealeau by the other, it has got to be equal to each other. All overlapping and cutting out of Cambrian beds onto this Clarinda land mass has got to take place below the base of the Bonnetterre-Trempealeau, and I believe below the base of the ~~Reagan~~ Lamotte-Franconia. Thwaites thinks the sandstone below the Bonnetterre which Mc Queen calls Lamotte (and which I agree must be Lamotte) has characteristics of the Mazomanie-Franconia; although on his correlation table he suggests a correlation of the Lamotte with the Ironston. Why could not the Lamotte be equal to the entire Mazomanie-Franconia-Ironston interval? I cannot see that the Reagan-Lamotte has to be equal to the Mt Simon as so many wish. Just because each is a basal sand resting on Pre-Cambrian is not argument. The fact that Wisconsin has such a tremendous thickness of Cambrian, and Missouri Kansas and Oklahoma so little (relatively) would seem to me very suggestive of

the fact that the lower portion of the Wisconsin Cambrian is not represented in Missouri and Kansas, and that the Lamotte instead of being equal to the basal sand in Wisconsin is, in reality, equivalent to one of the sands higher in the section.

As you will note from my enclosed diagram I would maintain a complete Wisconsin Cambrian section as far southwest as Des Moines (which may well be one of the lowest points in the Forest City Basin) and then immediately begin to cut out the pre-Franconia Wisconsin section onto the Clarinda land mass so that by the time Clarinda is reached all of the Dresbach, Eau Claire, and Mt Simon is gone.

Gentlemen, the statements in this letter may be all wet. If I am wrong, prove me wrong. I shall be the first to admit it cheerfully. You all realize my position. Here I am down here in Wichita unable to discuss this highly important problem except by letter and telephone (which cost the Society \$7.90 in the case of Mc Queen) and yet I have to try and harmonize all of this conceptions and ideas. Even though the statements in this letter are wrong, if by stating them it will help solve the problem I will be satisfied. Personally I believe Ulrich is all wrong in the correlation of the Bonnetterre with the Eau Claire. As we see it down here we boys think he must be wrong if both Mc Queen and Thwaites are right. We are dealing with the same sub-Jordan dolomite, in the same well, and if this dolomite is Bonnetterre in Missouri and Trempealeau in Wisconsin, then verily the two must be equivalents. All the land masses in the world won't help. For if you use a land mass to cut out one of them and leave the other, then the two are not equal, and I repeat, they must be equal.

Probably I have said too much already. Therefore accept my very best regards and thanks for all the help you are rendering.

Very cordially your friend,

Anthony Folger.

Anthony Folger.

Copy to H. S. Mc Queen, Rolla.

Copy to James H. Lees, Des Moines.

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Received at

TJ29 91 DL=WICHITA KANS JUL 23 1054A

FRED T THWAITES, DEPARTMENT OF GEOLOGY SCIENCE HALL=
UNIVERSITY OF WISCONSIN MADISON WIS=

HAVE JUST FINISHED LONG TELEPHONE CONVERSATION WITH MCQUEEN
HE HAS BEEN ILL BUT EXPECTS TELEGRAPH YOU RELATIVE TO
GREENFIELD WELL WITHIN NEXT TWO DAYS STOP AS SOON AS YOU
RECEIVE THIS DATA WILL YOU COMPLETE YOUR INTERPRETATION OF
IOWA SECTION AND MAIL SPECIAL DELIVERY TO MCQUEE WHO IN
TURN WILL TRANSMIT IT TO LEES STOP MCQUEEN PLANS TO REMAIN
ROLLA MOST OF NEXT WEEK BUT THEREAFTER WILL BE IN FIELD SO
THINK IT ADVISABLE THAT IOWA SECTION BE SENT MCQUEEN BEFORE
LEES STOP YOUR LONG LETTER RECEIVED WILL ANSWER SHORTLY
REGARDS=

ANTHONY FOLGER.

1124A..

USE OF NAME TREMPPEALEAU IN IOWA

According to information received Trowbridge objects to the use of the name Trempealeau in Iowa. He seems to regard the St. Lawrence dolomite at Lonsin⁹, Iowa, as not a part of the Trempealeau formation of Wisconsin. The name Trempealeau was proposed for the strata between the coarse sandstone just below the Onondaga dolomite (neglecting the finer grained Madison and basal Onondaga sandstones) and the base of the original St. Lawrence dolomite of Winchell. The changes in usage of the name St. Lawrence were fully explained by Ulrich in his paper of 1924 entitled "Notes on new names in table of formations, etc.". However, the name has never to the knowledge of the writer been formally adopted by the Board of Geologic Names of the U. S. Geological Survey. It has however, been used since that time by the state surveys of Wisconsin, Illinois and Iowa. It is the opinion of the writer that its adoption was justified by the radically different boundaries given for the old St. Lawrence formation. When the new formation name was adopted the name St. Lawrence was retained as a member name for the dolomite near the base of the formation. The writer opposes the use of geographic names for members of formations for all too soon they come to be used as formation names and we have too many of those already. Trowbridge must confuse the two kinds of names. The Trempealeau formation is well represented in Wisconsin just across the Mississippi from Iowa and has been definitely traced into that state in well sections. Throughout most of Iowa, however, the Lodi member (mi scaled shale by Ulrich) seems to be absent. On the section of the U. S. most of the Norwalk member, a fine grained white sandstone, has been included with the Jordan following the evident original intent of the name Jordan sandstone as first applied in Minnesota and Iowa.

F. T. Thwaites,

July 20, 1931

CAMBRIAN FORMATIONS IN IOWA SECTION OF COOPERATIVE CROSS SECTION
OF THE UNITED STATES

F. T. Thwaites

Sources. The following study was undertaken at request of Mr. Anthony Folger as part of the cooperative cross section of the United States from Lake Superior to the Rio Grande. Samples were examined from wells at Clarinda, Grinnell, Homestead, Cedar Rapids, Anamosa, and Dubuque, Iowa. Other information was obtained from Norton, W. H., Deep wells of Iowa: Iowa Geol. Survey, vol. 33, 1928; Norton, W. H., and others, Underground water resources of Iowa: U. S. Geol. Survey, Water Supply Paper 293, 1912 also published as vol. 21, Iowa Geol. Survey, 1912 and from letters from Messers McQueen, Folger, and Lees.

Well sections

Clarinda. The Clarinda well was an oil test (Iowa Oil Development Co., No. 1, Wilson, Sec. 24, T. 68 N., R. 37 W.) Samples were examined from 3200 to 4668 the total depth. Nothing out of the ordinary was noted down to 3313. The dolomite is cherty and is free of oolitic chert. It is probably older than Oneota and may be Potosi. The Jordan sandstone is very dolomitic; possibly the upper part is Madison. The dolomite from 3340 to 3554 is pink and carries a little finely divided chert but no glauconite or sand. McQueen correlates it with the Bonneterre but the writer is not convinced but that it is Trempealeau. Continuity to the northeast suggests the latter. From 3554 to 3570 McQueen places as Lamotte but to the writer this sandy dolomite free of glauconite may be Mazomanie although he is far from convinced. Alternative Missouri correlations would be Davis overlying Bonneterre but the writer is not in a position to judge. The rock below 3570 is quartzite with many beds of red, purple, and greenish gray shale or slate. This rock is like the pipestone beds of the Sioux quartzite with which the writer tentatively correlates the entire thickness from 3570 to 4668.

Des Moines. The well at Greenwood Park, Des Moines is an old pole tool job finished with a 3 inch hole. A good set of samples seem to have been examined by Norton but the only one furnished to Mrs Edson and by her forwarded to the writer was from 2995 to 3000, total depth. It is almost impossible to correlate the Cambrian of this hole from the published description although that is unusually explicit. The Jordan and Trempealeau seem to be just about the same as at Clarinda and to the northeast although the former is only 12 feet thick (2418 to 2430). Below 2565 all the rock carries glauconite. Glauconite is a good marker in Wisconsin and Illinois for the Mazomanie-Franconia although it is also present in the Eau Claire. However, the thickness, 435 feet is much too great for these formations as shown to the northeast. We must make the assumption that either (a) the Dresbach is present from 2565 to 2730 as a somewhat glauconitic phase, the Ironston (once called a member of the Franconia but later regarded as a separate formation lumped in Wisconsin with the Dresbach) or (b) the Dresbach is cut out entirely by an upturn of the Eau Claire. The second hypothesis is rendered unlikely because the thickness assigned to Eau Claire would then be rather too great.

Grinnell. The writer examined a good set of samples from 1990 to total depth of 2500 from No. 6, city, Grinnell. The strata are easily correlated with the Wisconsin section by lithology and general relations. Their thickness demonstrates that the formations are essentially parallel with the top of the Jordan from here northeast. The base of the Trempealeau is easily recognized at 2390. Why this well was not drilled into the Dresbach is not clear.

Homestead. Samples from 1800 to 2200 taken from the Amana Society well at Homestead were submitted for examination. This was an old pole tool job with a 4 inch hole at bottom. This means that material was finely pulverized. Moreover, it seems clear that the samples were taken very carelessly. However, it seems clear that the base of the Trempealeau is at about 2100. The bottom of the hole may reach the Ironston, here lumped with the Dresbach. In any case ignorance caused the abandonment just above a good water sand.

Cedar Rapids. Samples were sent from 1150 to 2025 from No. 1, city, and from 1390 to 1445 from the Y. M. C. A. well, Cedar Rapids. Both holes were very carelessly sampled and some samples seem to have been taken from the slush pit. The writer is confident that the Dresbach lies between 1690 and 1790. Eau Claire is indicated down to the last sample at 2025 and probably to 2150. The log states that quartzite was encountered below. This would involve a pre-Cambrian high which is so far as the writer can see not reflected in the overlying Paleozoics. If there is any effect from such a buried monadnock it lies in the low arch which trends southeast from here to that along Mississippi River. In such a small hole as the deep well must have been (the report does not give the size but states that upper part was reamed to 8 inches later) a slow cutting sandstone is pulverized and is easily mistaken for quartzite. The writer made this error several times before he learned that quartzite breaks in chips. Slow drilling is not evidence of hard rock but of a crooked hole, improper tool dressing, etc. Until convinced by a sample the writer will regard this rock as Mt. Simon.

Anamosa. Samples from 1335 to 1750 from the city well were sent but those from the much deeper penitentiary well used on the section seem to have been lost. Despite rather poor sampling Norton's log is not difficult to correlate with the Wisconsin section.

Dubuque. The section as drawn by Dr. Lees lumped the two wells No. 5 city, and No. 2 Linwood cemetery. These are at different elevations for the latter is in the hills west of the business district. There are no samples from the second well. The writer examined samples from the Farley and Loetscher well which is slightly shallower than the No. 5 city. Correlations given on section are those by Norton; the writer differed only in making the Eau Claire somewhat thicker and as this is immaterial for the present purpose he did not insist on this matter.

Correlations. The Iowa section involves the question of correlating the strata of Missouri with those in Wisconsin. Iowa and Illinois have used the Wisconsin names for several years. The writer desired to avoid this highly controversial question especially as he has never seen any of the Missouri formations and it is one certain to lead to controversy. However, two different correlation tables are here given as suggestions.

Correlations suggested by Thwaites on basis of insoluble residues

MISSOURI		WISCONSIN	
Formation	Residue (McQueen)	Formation	Residue (Thwaites)
Eminence	Chert; glassy, oolitic, spongy	Oneota	Chert, dense and oolitic; quartz; sand and green shale at base
Potosi	Quartz, drusy; chert, brown; pyrite; marcasite	Absent	
Absent		Madison	Sand
Absent		Jordan	Sand (here includes part of Trempealeau)
Derby-Doerun	Shale, gray, green; quartz; chert, rare	Trempealeau	Sand; glauconite at base
Davis	Sand, coarse; glauconite; shale, platy, micaceous; silt, dolocastic	Mazomanie	Sand; some glauconite
Bonneterre	Shale, green, brown; sand; glauconite; pyrite	Franconia	Sand; glauconite; shale, red, green, some micaceous; pyrite
Lamotte	Not given	Iron-ton	Sand, coarse; glauconite; shale, green
		Dresbach	Sand, very clean

McQueen, H. S., Insoluble residues as a guide in correlation of the Missouri and Wisconsin geologic survey, *Missouri Geol. Survey, Annual Rept.*, 1931, pp. 102-131, 1931

Eminence	Jordan
Potosi	Trempealeau
Derby-Doerun-Davis	Mazomanie, Franconia, Dresbach
Bonneterre	Eau Claire
Lamotte	Mt. Simon

In the first table it might be better to put the formations in the Wisconsin column below the Jordan up one place thus making the Trempealeau absent in Missouri. But this makes the Bonneterre, a dolomite, equal to the Iron-ton, a coarse sandstone. On the other hand the correlations ascribed to Ulrich (who has never expressed himself in print so far as known to the writer) make sandstones equal to dolomites. The correlations by fossils are open to several objections: (a) most of the fossils in Wisconsin are poorly preserved and best found in float of vague derivation, (b) fossils are not especially common in Missouri, and (c) the interpretation of fossils in relation to sedimentation is a disputed one. Space forbids more extended discussion as well as mention of Ulrich's efforts to bring the Wisconsin section into line with Missouri.

Methods of correlation. Judging from purely practical results the writer has found that tracing through of lithologic units on sections gave the best correlations. In this work stress has been laid on contacts of particular pairs of formations. Of course, this method has limitations if the distance is too great. Using this method, however, it is not difficult to follow the top of the Dresbach far from Wisconsin into Iowa. This contact is marked by the change from the overlying dolomitic and glauconitic Mazomanie-Franconia to clean, almost white, sands in the Dresbach (here including the Ironston). The section clearly brings out the essential parallelism of the formations throughout eastern Iowa. If we follow the same method with the upper pre-Jordan formations there is no escape from the correlation of the sub-Jordan dolomite at Clarinda as Trempealeau. However, the Des Moines well wrecks this hypothesis. There we must choose between three hypotheses: (a) the Dresbach as we know it to the northeast pinches out and is replaced by glauconitic sandstone not met with elsewhere, (b) the Trempealeau and Mazomanie-Franconia thicken abruptly and the Dresbach lies below the bottom of the hole, (c) the pre-Madison formations turn upward, speaking stratigraphically, and pass out successively in an angular unconformity below the Madison. No other horizon in the section seems possible for such an overlap. If there is such at the base of the Madison it would strongly support Ulrich's Ozarkian period. In this connection we must omit the controverted Mendota dolomite of Wisconsin. Such a condition is rendered reasonable because of the pre-Cambrian high at Clarinda. This would make the sub-Jordan dolomite in that hole equivalent to the Eau Claire thus checking Ulrich's correlation of that formation as equivalent to the Bonnetterre. The writer, however, urges that the lack of glauconite in the Clarinda dolomite is more in accord with its Trempealeau age than with an older position in the column. Another strong point against hypothesis (c) is that it is just as hard to get rid of the Dresbach east of Des Moines as with hypothesis (a). The writer has, therefore, left this portion of the section unfinished but has indicated two possible relations.

Structure indicated at Clarinda. A pre-Cambrian high as at Clarinda would not be expected under a syncline. It is possible, however, that the highest part of this monadnock was not reached. Its slight effect on the overlying formations is also remarkable. At Clarinda it seems probable that the pre-Cambrian layers are essentially horizontal for the alternating hard and soft rocks would almost prevent drilling if highly inclined. If so, this may be the bottom of a syncline in the pre-Cambrian and the Thurman-Wilson fault to the northwest may be along the northern edge of a quartzite range. It may be suggested that this quartzite formation strikes to the northeast, then curves to the north under the Ames anticline, and thence northwest to the Sioux quartzite outcrops in the corner of Iowa, Minnesota, and South Dakota. In that region quartzite is found below the younger sediments over a large area. The structure of the Sioux quartzite seems not to have been studied in recent years, so that the reasonableness of this hypothesis has not been tested.

F. T. Thwaites,

July 17, 1931

July 17, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

I was all set yesterday to go on a field conference in the Baraboo region with Messers Ranch and Wanenmacher and that prevented my mailing the Iowa cross section to Lees. When I got to the office this morning I found your letters of July 14 and 15 together with letters from Lees and Howell.

It is certainly too bad about the Des Moines samples. When I see how poorly other states keep their samples I realize that we havnt done so badly. This morning I got out some of the first samples I ever looked at for an engineer to examine and did so in an instant. Illinois is good also.

I wish you would consider sending the Iowa section to McQueen for the southwestern end or possibly you can fix this to suit yourself. I have indicated two possible interpretations in different colors.

I have all the Iowa reports, both at home and in my office.

There is no need to send the lone Des Moines sample to McQueen, I should think but I am holding the section until I hear about the bottom of Greenfield. Personally I do not rely on the residues alone and think that other opinions are possible. However, I am not sure about anything down there.

I notice that I have failed heretofore to acknowledge the help on this project rendered by my wife, Amy M. Thwaites. She has done all the typing and editorial work which her work with me in the office before our marriage made her well fitted for.

Tomorrow we go into the field again to study the west end of the Baraboo Range. Wanenmacher gets a syncline also in the Paleozoics doubtless due in large part to initial dip for we find that extending up onto the quartzite in a way which could not be due to slump or settling.

The Iowa section will go forward the instant I hear from McQueen.

Very truly yours,

Lecturer in Geology

July 16, 1931

Dr. H. S. McQueen,
First State Geologist,
State Geological Survey,
Rolla, Missouri

Dear Sir:

I am sending enclosed my report on examination of samples from wells on the Iowa section of the cooperative cross section of the U. S. prepared for Mr. Anthony Folger, also some letters relating to the same.

I wish you would shoot the correlation table of Wisconsin and Missouri as full of holes as you can. I did not know anything of modern ideas about Missouri until I read your paper Sunday. The report states my ideas but very likely most of them are wrong. I could not find where Ulrich has expressed himself about this in detail. He has, I think, mixed up the Wisconsin section by trying to adapt it to Missouri. Branch tells me that many Ozarkian fossils occur in the Trempealeau.

I am sorry you have only been able to examine the Brewtown section for that log is not a good one. So many formations are missing. If you desire I could send you samples from a more complete well or from outcrops.

Would appreciate copies of Missouri bulletins 16, 20, 22, 23, 24 if you could get them for me as well as a copy of your paper on reptiles I asked for in another letter. Will send you some of my papers soon.

In regard to the section I feel confident of some kind of an upturn in the Cambrian northeast of Clarinda but just what kind I leave to you to suggest.

How about getting up a cooperative section from Wisconsin to the Ozarks?

Very truly yours,

J. T. Thurston, Lecturer in Geology

*Lee
Folger*

July 10, 1931

Dr. James H. Lees,
Asst. State Geologist,
State Capitol,
Des Moines, Iowa.

Dear Dr. Lees:

Yours of July 10 and the samples are at hand. Thank you for them. I have finished with the samples and will send them back to Dr. Horton soon.

Enclosed please find:

Copy of letter to Mr. Folger
Report on the Iowa section.

Logs of the Iowa wells which I examined and my interpretations of logs which I did not see samples from.

Copy of Iowa part of the cooperative section of the U. S. with my formation boundaries and depths marked in red ink.

My previous letter explained some of the troubles in explaining old samples and the report takes up things in more detail. I feel that there must surely be some sort of an upturn in the Cambrian northeast of the Clairville quartzite but just how to draw it I leave it to you. Possibly Huguon could help on this. I am sending copy of the logs and report to him for suggestions. I am not at all sure of Missouri section since I did not study any modern information from there until Sunday of this week.

I trust that you will not mind my altering your section. You may want to subordinate the quartzite at Cedar Rapids but if you do it should be a rather sharp mountain peak like those at Berthoo I think.

I wish we could get up a section right down to the Ozark dome either through Iowa or Illinois. Maybe I will talk that up for some time in the future.

Thanking you again,

Very truly yours,

Lecturer in Geology

Lees
Folger
Mr. Quen

July 16, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas:

Dear Mr. Folger:

In reply to your note of July 11 and letters of July 9 I received the Iowa and Clairinda samples and put in my full time on them up to date. I regret to report that they are a miserable lot and worst of all the Des Moines not forwarded through Mrs. Mason turned up missing except for the last sample from the hole. What others were sent I cannot say but that is all she received as her note on the sack says. I include Clairinda in this list since that hole went into pre-Cambrian quartzite so high in the Cambrian column that it does not tell much of anything.

Enclosed please find:

Report on my work on the Iowa portion of the section with suggestions on Wisconsin-Illinois correlations

Logs of wells in Iowa

Copy of letter to Dr. Leach transmitting the section.

You will note that I check Hegenauer on the Clairinda pre-Cambrian but am doubtful on his correlations with Wisconsin since the only knowledge of that state he has was based on the Browntown log in which all the formations from the St. Peter to the Jordan are absent by reason of the sub-St. Peter unconformity.

With regard to Auboy, Illinois, all I can say is that both the purple, red, and pink sandstone and the arkose are older than any Mt. Simon we have seen at the surface. Now the exposed Mt. Simon does not have any fossils so far as known at present. Since the earliest Eau Claire fossils are very old Upper Cambrian French suggests that the Mt. Simon, particularly in its extension below the known outcropping part is Middle Cambrian. If this is correct then Stoffer's fossils may be from a zone of the Mt. Simon. I hardly think that these fossils from one locality justify us in thinking that all the Red Glauconitic series (which by the way is sub-Mt. Simon and not sub-French) is Middle Cambrian. None of the wells on the section are known to reach Red Glauconitic although the unsampled No. 2 Linwood Cemetery, Dubuque, Iowa might very well reach them. Now just what we mean by Hegenauer is open to question. Leitch thinks that the Upper Hegenauer may easily be non-marine Cambrian. I have discussed this matter in a paper now being published by the G. S. A.

I think you will find more information on the Hagenketa of northeastern Wisconsin in my 1928 paper. It is known mainly in wells particularly around Sturgeon Bay. Can send more data if desired but no time today if I am to get the section off to Leach.

In regard to pre-Cambrian floor at Dubuque Leach lumped two wells. I took both into consideration.

The Illinois report was mailed on July 14.

Very truly yours,

Leach
Folger
Mr. Owen

STATE OF IOWA
IOWA GEOLOGICAL SURVEY

DES MOINES
GEORGE F. KAY, DIRECTOR

JAMES H. LEES
ASST. STATE GEOLOGIST
NELLIE E. NEWMAN
SECRETARY

DES MOINES,

July 15, 1931.

Dr. F. T. Thwaites,
University of Wisconsin,
Madison, Wis,

My dear Doctor Thwaites:

I have just received your letter of the 13th and as I said before I am sorry that the samples I sent you were not more complete. The few small samples from the city well at Anamosa were the only ones we could find from that town. Doctor Norton says that a good many years ago he sent a lot of samples to our office at Des Moines and the Anamosa samples may have been among them. I am thankful that I am not responsible for these samples, for they were sent here before I came to the office and I have never been able to find them. I suppose that this accounts for the incompleteness of some of Doctor Norton's sets.

I hope with you that your study of the samples will indicate that the boundaries of the formations were correctly placed even if we can not be sure of the character of the samples. It is hard enough even yet to get drillers to help us carefully, although they are much better about this work than they used to be.

Very truly yours,

James H. Lees

James H. Lees,
Asst. State Geologist.

Ulrich per Dake

TELEGRAM

Missouri		Wisconsin	
Eminence		Jordan	
Potosi		Trempealeau	
Elvins Group	Derby + Doe Run	?	
	Davis	Mazamonic + Franconia	
		Dresbach	
Bonne terre		Eau Claire	
Lamotte		Mt Simon	
?			

TELEGRAM

July 15, 1931.

Thwaites:-

Fanny Edson has just advised me that the samples on the Des Moines well extend from 1390~~t~~^{to}2025 feet, with the exception of one sample from 2995 to 3000 feet which she forwarded you.

I presume therefore it will be unnecessary for you to bother to send any samples to Mc Queen, unless you desire to send him the one Fanny sent you. His examination might add confirmatory evidence to your own.

It is most unfortunate that these intervening samples have been lost as this was a key well.

I presume we will have to be satisfied with an interpretation of the log of the well, made up from samples, which appears in Vol 21 of the Iowa Survey. I suppose you have Volumes 21 and 33 which gives all of the Iowa Logs. If not telegraph me *collect* and I will forward copies of ^{these} ~~this~~ logs by air mail to you.

Folger.

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July 14, 1931

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Dr. Fred T. Thwaites
Wisconsin University
Madison, Wisconsin

Dear Dr. Thwaites:

I believe McQueen has raised a very essential point in his letter to me of July 8, a copy of which was forwarded you last week, in stating that the Bonneterre can not be equal to the Trempealeau, since the underlying Mazomanie and Franconia are equal to a portion of the Elvins group, which overlies the Bonneterre. If this is true, it automatically renders entirely incorrect my interpretation of the pre-Jordan stratigraphy across Iowa in the section forwarded you some time ago.

I now understand from Dr. Dake that Ulrich's last idea is that the La Motte is equal to the upper part of the Mt. Simon, the Bonneterre to the upper part of the Eau Claire, the Davis to the Mazomanie, Franconia and Dresbach, the Potosi to the Trempealeau, and the Eminence to the Jordan.

We are therefore right back to where we started. I am, however, extremely hopeful that you and McQueen will be able to bring order out of the chaos. I am going to leave the entire problem up to your own good judgement, with the exception that I think it would be highly advisable to have McQueen ^{examine} samples on the Des Moines well, that Mrs. Edson tells me she has forwarded. ^{to you} I wonder, therefore, if you would be kind enough to transmit these samples at once to McQueen and request him to analyze them, in order to determine whether or not this test penetrated to any sediments referable to the Potosi, Davis and Bonneterre. I have requested so much of McQueen that I am somewhat hesitant, (although he is a personal friend of mine) to impose on his good nature, so I would prefer that you do not advise him that I have requested you to send these samples. I think, if the request comes from you direct, it would be much better. Since the element of time is so important, I would suggest that you request McQueen to either telegraph or telephone you of the results of his determinations, and if you will advise me of the charges, we will be glad to reimburse you. If, as McQueen suggests, the Bonneterre is overlapped eastward into Iowa by higher and higher beds of the Cambrian, it is very important to determine just what section was actually penetrated at Des Moines in the terms of Missouri nomenclature.

L. F. HOWELL

Samples on the test at Greenfield, Iowa, between Clarinda and Des Moines, have just been examined by Mrs. Edson, and she reports that the test stopped in St. Lawrence dolomite, the top of which was found at 3425 feet. Will you please therefore make this correction on the Iowa section. I have requested her to send these samples from 3425 to 3535 feet to McQueen, in order to determine whether or not this is Bonneterre or Potosi, and I shall write you just as soon as I hear the results of his decision.

At the present time McQueen is spending a large portion of his time in the field, and it may therefore be some days before we will have an answer from him. I think he tries to be in Rolla week ends, and so if these samples on the well at Des Moines can be sent to him at once, they might catch him before he leaves again for the field.

I shall be interested to learn where you put the top of the pre-Cambrian in the Clarinda well. In as much as the Bonneterre evidently can not be equal to the St. Lawrence, and if we accept this correlation of McQueen's that the interval from 3340 to 3560 feet is of Bonneterre age, then this automatically means that all of the St. Lawrence, Franconia and Dresbach is absent in this well, and since this is the case, it would be very inadvisable to correlate the interval from 3560 to 3935 feet as La Motte, (despite the fact that I thought I had worked out a very pretty hypothesis which would make this Dresbach sandstone), unless it appears to you upon examination of these samples that the interval from 3560 to 3935 feet is equal to the Mt. Simon. This is still a possibility which I think we should consider.

In as much as the problem of the correlation of the Cambrian beds across Iowa has become so involved, I think it is essential that you examine the samples which I sent you on the Clarinda well, in order that we may have the benefit of your interpretations.

I trust you will let me know shortly about how soon I may expect the Cambrian portion of the Iowa section. Of course, the date that you will be able to transmit it will depend partially upon McQueen. I would suggest that you request him to advise you by approximately what date he will be able to forward the information to you. Then if you do not hear from him at once, it might be advantageous to get in touch with Dr. Buehler and find out when McQueen is expected in from the field.

With kindest personal regards.

Very truly yours,

Anthony Folger.

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

J. V. HOWELL

Geologist

PONCA CITY, OKLAHOMA

July 14 1931.

Dr. F. T. Thwaites,
Wisconsin Geological Survey,
Madison, Wis.

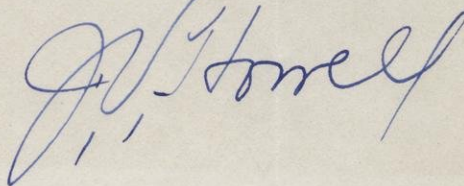
Dear Sir:-

I wish to acknowledge, with many thanks, receipt of your maps and notes on structure of Wisconsin and Michigan. These have been incorporated into the general map to accompany the guidebook. I have tried to follow out all suggestions in your letter, and trust that the completed map will have no errors due to failure to copy what you have prepared.

In preparing this map I have tried to show only the major folds and the exposed uplifts, so that the cross section may be better understood, and general grain of the mid-continent be more clearly pictured. Its shortcomings will undoubtedly be apparent as soon as the field trip members begin to peruse and criticise, but at least it will be a beginning, and may serve as a frame in which to place the accumulating data.

At the beginning an attempt was made to designate, by patterns, the varying ages of the folds. This had to be abandoned, for the time being, as the data are yet too uncertain. It is my ambition some day to accomplish this, but I fear it will not be this year.

Very truly yours

A handwritten signature in blue ink, appearing to read "J. V. Howell". The signature is fluid and cursive, with the first name "J. V." written in a more compact, stylized manner, and the last name "Howell" written in a more extended, flowing script. There are some small, light-colored marks or ink splatters below the signature.

TELEGRAM

July 11, 1931.

Thwaites:-

The enclosed letter from Mc Queen contains statements which seem to be in accord more or less with some of the ideas expressed in your letter to me of July 8th.

I therefore thought you might be interested in reading a copy of it.

Your publications arrived this morning (I see one of them is referred to be Mc Queen.) I will go over it over the week end and ponder upon the situation which Mc Queen believes exists. Personally I am unqualified to offer a solution and I feel strongly that whatever solution is arrived at, if any, should be the result of cooperative effort and thought by you and Mc Queen. I should be glad to have you correspond with him if you feel the urge. He is a stratigrapher of the first rank with an open mind.

Anthony.

STATE OF IOWA
IOWA GEOLOGICAL SURVEY
DES MOINES

GEORGE F. KAY, DIRECTOR

JAMES H. LEES
ASST. STATE GEOLOGIST

NELLIE E. NEWMAN
SECRETARY

DES MOINES, July 10, 1931.

Dr. F. F. Thwaites,
Madison, Wisconsin,

Dear Doctor Thwaites:

I went to Mount Vernon and looked up with Doctor Norton's aid the samples from Anamosa, Cedar Rapids, Homestead and Grinnell. These I boxed and Doctor Norton is sending them to you today. I was very sorry to find that with the exception of Grinnell the samples were few and far between. Doctor Norton's department has been moved several times and doubtless the collections have suffered with each move. Then too the wells were drilled many years ago, with much chance for samples to be lost since.

I shall be interested in knowing what you are able to make of the samples. When you are through with them please return them in their entirety to Doctor Norton.

Very truly yours,
James H. Lees
James H. Lees,
Asst. State Geologist.

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July 9, 1931

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Dr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Dr. Thwaites:

In going over my correspondence on the cross section project, which has now become quite voluminous, I find that I have not specifically acknowledged the receipt of your manuscript on the Wisconsin and Michigan sections. Although it is slightly over five pages of single spacing, it is not at all too long, and I am glad that you have gone into so much detail, in as much as so few of us know anything relative to the stratigraphy and structure of these two states.

In particular was I interested in your statements on page 4, relative to the stratigraphic succession in the lower part of the Amboy Oil and Gas Company #1 McElroy in Sec. 30-20N-10E, Illinois. I would infer from your text that the 755 feet of sandstone (which you mention on line #3) is referable to the Mount Simon, that the 1010 feet of purple, red and pink sandstone is referable to the Red Clastics (which may in turn be equal to a part of the Lake Superior sandstone) and that this in turn rests on 180 feet of Arkose before granite is reached. Will you please inform me whether or not this interpretation is correct. Also you state that these lower rocks are in all probability older than upper Cambrian and possibly are Keweenawan. This last statement is not clear. Do you mean that the 1010 feet of sandstone may be Keweenawan, or that the Arkose and granite is Keweenawan. I presume that you mean the latter, since it is my understanding that the Red Clastics are of middle Cambrian age. yes ?

If the 1010 feet of sandstone in the Amboy well is equivalent to the Red Clastics, I would like to ask in this connection if it may be possible or probable that the 733 feet of Arkosic sandstone in the lower portion of the Clarinda well may be in part equal to the 1010 feet of sandstone in the Emboy well. Although we have included this Arkosic sandstone in the well at Clarinda in the pre-Cambrian, we of course recognize that the test has not hit granite and it is only meant that the Arkosic sandstone more or less represents the same horizon as is called pre-Cambrian in Kansas and Oklahoma.

Also of interest were your statements on page 9, relative to the Maquoketa shale. In this you state that only a few miles east of the section the Maquoketa reaches a thickness of 550 feet. This indeed is an unusual thickness for the Maquoketa, as we know it. I wonder if you will inform me of the specific locality, east of the section, where the Maquoketa is pre-

sent in this thickness, whether it is exposed on the surface or in a well, and if a lithologic character of the Maquoketa is entirely shale or if it is composed of dolomites and shales as it is in some portions of Iowa. 1923 paper

Your manuscript will appear in the guide book exactly as you have prepared it, without revision, and I wish to again thank you both for the excellence of the subject matter and for the thought which went with its preparation.

With kindest personal regards.

AF:DK
cc/ N.W. Bass

Very truly yours,

Anthony Folger.
Anthony Folger
Box 1144

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July 9, 1931

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E. A. WYMAN

Dr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Dr. Thwaites:

I have just forwarded to Dr. Lees a complete revision of his Iowa section, which I have asked him to examine and return to me at once with a notation as to whether or not the revision is approved. I had expected, as mentioned in my last letter to you, to have Dr. Lees forward this to you, in order that you might get the regional picture of Iowa and have you return it to him, together with your conclusions of the pre-Jordan-Cambrian stratigraphy after you had completed the examination of the samples which he has agreed to send you.

I now find, however, that such a plan will be impractical, since I have been advised that the Oklahoma and Texas sections will be received the end of this week and it will be necessary to have the Iowa section at hand in order to explain to the draftsman the procedure which he is to take.

Therefore, I have prepared for your convenience a duplicate copy of the Iowa section from the top of the St. Peter sandstone on down, having left uninked and uncolored all of the correlations below the Prairie du Chein. This, I believe, will give you a sufficient regional picture and at the same time will save you the trouble of having to lay out on coordinant paper the Cambrian portion of the Iowa stratigraphy.

After you have completed the examination of the samples, I would be genuinely appreciative if you would complete the Iowa section below the Prairie du Chein group according to your own ideas, using the same conventional symbols and colors which you used on the Wisconsin section.

When this has been done will you be kind enough to forward it by special delivery mail to Dr. Lees, and I have requested Lees to immediately transmit it to me after he has examined it. The element of time at the present moment is a very necessary factor, since we are practically ready to begin the drafting of the section, and I shall probably request the draftsman to omit all of the lines on the Iowa section below the Prairie du Chein until I hear from you.

I have forwarded to you samples on the Clarinda well which you may or may not wish to examine, and I wish you would return them to me after you have finished with them. Mrs. Edson will transmit to you the samples on the Des Moines well immediately upon their arrival in Tulsa.

You will note that it has been necessary to make one small change of your pre-Cambrian contact in the well at Dubuque. On your section you show the well at Dubuque as being 1500 feet deep, whereas Dr. Lees shows this well to have a total depth of 1954 feet. The Iowa publications state that it stops in the Mount Simon sandstone. Just how much of the Mount Simon exists between the bottom of this well and the top of the pre-Cambrian is of course problematic, and I have lowered your pre-Cambrian contact the minimum amount. If you think it should be lowered an additional amount, I wish you would do so. By the way, I presume you have examined samples on the Dubuque well, but if you have not and so desire, I am quite certain that Dr. Lees would be glad to forward them to you if you will telegraph him to do so.

I have today received a letter from Dr. Lees which states that Dr. Trowbridge believes Iowans are wrong in subdividing the St. Lawrence into Trempealeau and Franconia, that he believes there is no Trempealeau in Iowa and that the term St. Lawrence should be used for the dolomites above the Franconia sandstone and below the Jordan sandstone. I think it might be well if I quote two of his paragraphs relative to this problem.

"Referring to your statements as to the Franconia. I recall seeing these beds on both sides the Mississippi between Prairie du Chien and Wabasha, Minn., and they show the green glauconite bands very distinctly. I have samples from several localities. These are very similar to beds at Lansing. They lie below the dolomite beds so well shown on Firebell hill at Lansing, in which trilobites were found. Here let me say that Trowbridge is very emphatic in saying that we are wrong in dividing the St. Lawrence into Trempealeau and Franconia (that we have no Trempealeau) in Iowa, and that we should continue to call the upper dolomite as seen at Lansing the St. Lawrence and give the name Franconia to the glauconitic sandstones beneath the dolomites and above the generally cleaner sandstones of the Dresbach. I suppose Thwaites will disagree, but Trowbridge is a very careful and experienced worker and I'm strong for accepting his decision. He has done a lot of work in Wisconsin as well as in Iowa and is familiar with the literature also."

"With regard to the correlation of the Cambrian I don't feel well qualified to make suggestions as my studies have been limited. I am going to discuss it with Doctor Norton and may be able to offer you some of his ideas. I agree with you, however, as to persistence of beds in character. That seems to be the general rule."

Whatever may be the relationship between the upper dolomite of the St. Lawrence and the Trempealeau of Wisconsin, it seems obligatory for at least a portion of the St. Lawrence dolomite to be equal to the Trempealeau (or, correspondingly, a portion of the Trempealeau to be equal to the St. Lawrence) in as much as the upper and lower boundary of the St. Lawrence dolomite on Dr. Lees' original section corresponds exactly with the upper and lower boundary of the Trempealeau on your own section. I wish you would be kind enough to advise me of your ideas relative to the correlation of the St. Lawrence dolomite and the Trempealeau. I see no special objection to the use of the term in Wisconsin, and the term St. Lawrence in Iowa, provided the term Franconia sandstone appears below it and provided its usage is explained in the Iowa text.

May I again express our sincere appreciation at your willingness to examine the Cambrian portion of a number of the Iowa wells, and I am confident that the results of your sample determinations will add much to the accuracy of the Iowa section. Please rest assured that full credit for your efforts in this behalf will be given you on the section.

I trust that your duties in Wisconsin will allow you to complete the examination of these Iowa wells in record time.

With kindest personal regards.

Very cordially yours,

Anthony Folger.

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

Your letter of July 8th has just come in. I do not have a copy of your paper on Illinois and if you have an extra copy I should like very much to have it. otherwise I shall write to friend Leighton for a copy. more later.

Anthony.

*sent
July 14*

C O P Y

BUREAU OF GEOLOGY AND MINES
Rolla, Mo.
July 8, 1931.

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas.

Dear Anthony:

I have studied your letter of June 30, and the accompanying correlation table and correlation of the Clarinda well.

Relative to the thickness of the St. Peter, Dr. Lees has advised that he will attempt to obtain the samples covering the interval from 3021 to 3067 feet, and if these are available, the exact base of the St. Peter may be determined.

With reference to the Bonneterre interval 3340 to 3560: The character of the dolomite and the insoluble residues therefrom are characteristic of this formation. In fact, the residues are the same as those prepared from samples of this formation in Southeast Missouri, and in northwest Missouri (Jackson County) and Northeast Kansas (Oak Mills).

The characteristic residues of the Potosi are entirely lacking, likewise are those of the post-Bonneterre Upper Cambrian beds. On the correlation table, which you submitted, the Bonneterre is shown as the equivalent of the Trempealeau. I cannot agree with this as studies of well samples would indicate that the Trempealeau is much younger than the Bonneterre, as the underlying Franconia-Mozomanie beds correspond, in part at least, to the Elvins group; (the Davis, Derby and Doe Run formations of Missouri). In fact, the sandy glauconitic residues of the Davis of southeast Missouri, ^{and} the Northeast Missouri correspond to and are essentially the same as a zone in the upper Cambrian as determined from a study of deep well samples from Browntown, Wisconsin.

I have also had the benefit of discussions with Dr. Ulrich regarding the correlations of the Upper Cambrian beds of the upper Mississippi Valley and I don't believe I am mistaken when I say that he would place the Bonneterre below the position shown in your correlation table. At any rate, there is nothing in the residues to indicate the presence of post-Bonneterre Upper Cambrian beds in Northeastern Kansas, Northwestern Missouri, or Southwestern Iowa. These beds are likewise absent in Western and Southwestern Missouri. On the other hand, they are well developed in Central, Northeast^{er}, and Southeastern Missouri.

It is not unreasonable to assume that the Bonneterre passes beneath younger Upper Cambrian beds in Iowa and Wisconsin, and in fact may be overlapped by them in that direction.

The Upper Cambrian problem of Wisconsin has been thoroughly reviewed by Dr. Ulrich (Trans., Wisc. Acad., of Sciences, Vol. XXI, pp 71-110). Perhaps our own differences have resulted in part from the use of the term St. Lawrence, now restricted in the above mentioned report, but used in a broader sense in other reports.

I note that you mention the absence of Mt. Simon and Eau Claire beds west of Cedar Rapids and Des Moines. It seems possible that they, in part, reappear to the southwest in beds to which I have given Missouri names.

In placing the top of the pre-Cambrian at 3570 feet, I did so because of the distinct change in lithology at that depth, and also because of the similarity of the material below 3570 feet and the bottom of the hole. There are samples above and below 3955 feet that have much the same characteristics. At the time I studied these samples, I obtained a small chip from the sample marked 3587 feet, and had a thin section prepared from it. Two petrographers, independently, pronounced it as quartzite.

The samples below 3570 feet certainly do not suggest the Lamotte sandstone of Missouri, and the thickness, if 3955 feet is taken as the base, is considerably greater than any known thickness of the Lamotte in wells to the southwest. If the feldspars and associated minerals from this interval were derived from the Nemaha Island, it seems strange that similar characteristics should not prevail in the basal Cambrian sandstone drilled in the Hummer well in Kansas, which is certainly closer to the Nemaha Axis. It seems reasonable to assume that a pre-Cambrian mass may exist in the general vicinity of the Clarinda test. The presence of such might reasonably explain some of our present difficulties.

It would seem advisable to present the Missouri-Iowa-Wisconsin portion of the cross-section to those responsible for those states before it is finally drafted. Such action might result in ironing out the present differences in opinion.

Cordially yours,

H. S. McQueen (signed)

McQ/DS

cc - Mrs. F. C. Edson
Dr. J. H. Lees.

July 13, 1931

Dr. James H. Lees,
Assistant State Geologist,
Des Moines, Iowa

Dear Dr. Lees:

The samples which Mr. Folger requested you to send me arrived and I started to look them over on Saturday. However, there are none from the deep well at Anamosa, only the shallow city well. I wonder if this can be taken care of? Thank you for sending the others so promptly.

From examinations so far I can see that the trouble which Mr. Folger called attention to is due almost entirely to poor sampling of the early wells. The drillers of those days had not been trained to take samples and did so rather unwillingly. When they did condescend to take them they went to the slush pit and scooped up a handful of the fine material on top. Thus an impure sandstone like the Franconia would be represented by a mixture of finely divided dolomite and some clay and thus be reported as a shale. Another error was to take material from the bit. Moreover, the old pole tool rigs made small holes in which everything was ground up fine. I have examples of different interpretations based upon samples taken in different ways from wells only a few feet apart. I trust that when we get through we will find that the original formation boundaries are essentially correct although the descriptions of some may be in error.

Very truly yours,

Geologist in charge of well records

July 13, 1931

Dr. H. S. McQueen,
Missouri Geological Survey,
Rolla, Missouri

Dear Sir:

I am working on the cross section of the United States sponsored by the Kansas Geological Survey and note that you are another of the contributors. This work has involved me in the correlation of the deeply buried Cambrian of Iowa. In this connection I would greatly appreciate a copy of your recent paper on the use of insolubbbheresidues. I have been using this method for some years particularly in finding the Mazomanie-Franconia which is dolomite at great depths. I have also used it to search for oolitic chert.

I have been interested in the correlation of the Missouri and Wisconsin Cambrian for some time since it involves the distribution of fresh waters in western Illinois. They extend so far to the southwest there that I have thought that the Dresbach must be equivalent to at least part of your Lamotte.

Any information you can furnish me on this question will be much appreciated.

Very truly yours,

A. T. Thwaites, Geologist in charge of well records

July 8, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

In reply to your letters and telegrams of dates up to July 6, I will be pleased to examine the samples from Iowa. I have already examined some from that state but not any of those you mention. I started my correlations from Norton's work at Clinton, worked across Illinois and then up the Lake Michigan coast back to northeastern Wisconsin so you can see that extension of the field to the southwest is easy. I quite agree with you ideas except that the Jordan does seem to pass out of the picture in northeastern Illinois. I presume you already have my paper on Illinois and yesterday I had copies of my first paper and Ulrich's solo report on Wisconsin mailed you from the Survey office. I am just finishing up some samples from Fulton, Illinois, which as I recall is just across from Clinton, Iowa. I get a lot of out of state samples from Wisconsin drillers who prefer my reports to those of the local state surveys. I will be through with these before the others come, I hope.

With regard to the correlation chart I do not know much about the Missouri Cambrian but am under the strong impression that it is all high in the section. I think that Ulrich told me at Toronto that nothing lower than Ironston or basal Franconia had been found. He ought to know about this but seems peeved at me because of my not using the terms Ozarkina, etc. (I think)

The only change I would make is to omit the name Prairie du Chien from the Wisconsin section for it is not used by our Survey. It was put on the section to agree with Iowan usage as per your directions. We use the names Oneota and Shakopee but not New Richmond, that is we use them where we can which is in few spots so far. There are several sandstones in this group and just which is the original New Richmond of Wooster which he discovered in a dug well nobody can say. I do not recall ever seeing an exposure of this contact although Ulrich's notes show one near Prairie du Chien, how distinguished I do not know. The group term in Wisconsin is still "Lower Magnesian." The Madison sandstone is thin and more closely allied to the Oneota than to the Jordan from which it is separated by a distinct physical break.

Mrs. Edsons correlations should be disregarded. She did not even copy the Wisconsin section accurately since she left out the Trempealeau (St. Lawrence). Ulrich's paper explains very well the varying usage of the name St. Lawrence. Her matching with Missouri is I am sure not based on ~~only~~ field observation. When she went to school here the Upper Cambrian of Wisconsin was all "Potsdam." This does not affect the rest of her paper but simply the suggested correlations.

Ulrich has calmed down a bit in a later letter.

I am trying to interest others in the field conference and Dr. Durand of the Geography Department thinks he can come down with me.

Very truly yours,

THE KANSAS GEOLOGICAL SOCIETY

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July 6, 1931

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PAUL A. WHITNEY

E. A. WYMAN

Mr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

Your telegram of July 2 has just come to hand, and I wish to assure you of my genuine appreciation for your willingness to examine samples on the Cambrian portion of a number of Key wells on the section in central and eastern Iowa. I am convinced that the Iowa Geological Survey has interpreted incorrectly most of the Cambrian interval in its published reports. I am inclosing herewith a carbon copy of my letter to Dr. Lees, requesting him to send samples to you on wells at Anamosa, Cedar Rapids, Homestead and Grinnell. The correspondence also sets forth the problems attendant with the examination of these samples, and from it you will obtain an idea of the views which we hold at this end on the problem.

Samples on the deep well at Des Moines have been forwarded to Mrs. Edson in Tulsa, for her examination, and I have requested her to transmit to you, immediately upon their arrival in Tulsa, cuttings from 2400 to 3000 feet, which will include the interval from the top of the Jordan sandstone down to the total depth.

I also plan to send you next week, from this office, our set of samples on the Clarinda well, below the top of the Jordan sandstone. Should you have time, I would be interested in knowing your conclusions as to the correctness of the correlations of Mrs. Edson and Arthur Price on this well, since it is one of the key wells on the section. Also, an examination of these samples (should you care to look at them) will give you a complete picture of Cambrian sedimentation across Iowa. Will you be kind enough to return these samples to me after you have finished with them.

After studying the problem in detail I have come to the conclusion that the correlations listed below are probably more correct than those used by Dr. Lees on his section. You may find, however, upon examination of these samples that the both of us are wrong. However, I am including them for your use and you can accept them for what they are worth.

Anamosa Well

Jordan	1250 - 1345
Trempealeau	1345 - 1580
Franconia	1580 - 1770 *
Dresbach	1770 - 1995
Mount Simon	1995 - 2007

*It is possible that the Franconia extends from 1580 to 1875 feet, and the Dresbach from 1875 to 1995 feet. However, this would result in a local thinning, with immediate thickening again to the southwest in the Dresbach sandstone.

Vol. 21, Page 552, 1910 - 1911, Iowa Geological Survey.

Cedar Rapids Well

Jordan	1400 - 1463 *
Trempealeau	1463 - 1790
Franconia	1790 - 1950
Dresbach	1950 - 2150
Sioux Quartzite	2150 - 2225

*The Franconia may extend to 1690 feet, since the Iowa Survey records sand in their sample examination from 1400 to 1690 feet. I have, however, used Lees' base of the Jordan sandstone as 1463 and it has occurred to me that possibly they have identified dolomite as sandstone, which is a very easy thing to do if one is not careful.

Vol. 21, Page 540, 1910 - 1911, Iowa Geological Survey.

Homestead Well

Jordan	1770 - 1870
Trempealeau	1870 - 2100
Franconia	2100 - 2200
Dresbach	2200 - 2224

Vol. 21, Page 482, 1910 - 1911, Iowa Geological Survey.

Grinnell Well

Jordan	2190 - 2250
Trempealeau	2250 - 2470
Franconia	2470 - 2500

Vol. 33, Page 220, 1927, Iowa Geological Survey.

Des Moines Well

Jordan	2418 - 2458
Trempealeau	2458 - 2553
Franconia	2553 - 2730
Dresbach	2730 - 2910
Eau Claire	2910 - 3000

Clarinda Well

You have already received a carbon copy of my letter to Edson and McQueen, which contains a tabular statement of the correlations on this test.

It has been necessary for me to entirely reconstruct and redraft Dr. Lees' section through Iowa. I expect to have this done within the next few days and plan to forward it to Dr. Lees for his approval. At that time I shall request him to send it on at once to you. On this revised section I have not inked in any of the lines below the base of the Jordan sandstone, since I plan to wait until you have transmitted to me the results of your sample determinations.

My idea in having Lees send you the Iowa section is to afford you the opportunity of getting a complete picture. I would suggest, so as to preclude any possibility of stepping on anyone's toes down in Iowa, that you take a new sheet of coordinant paper and prepare your idea of what the section should be below the top of the Jordan sandstone, using the same lithologic symbols and colors which you used on the Wisconsin section and which were so very satisfactory. After you have completed your work, you can return my revised section, together with the section showing your ideas of the Cambrian stratigraphy, to Dr. Lees for his approval, and he can then transmit them to me.

I am confident that there will be no trouble in convincing Lees that he is wrong, if he is, since he seems only too glad to have the aid of others in helping solve some of the problems in Iowa. If it were not for the fact that this geologic cross section has become so extremely important and will have such a tremendous circulation, I would hesitate to suggest other than minor changes in Dr. Lees' section. However, I am convinced that we are going to put out a splendid piece of work and it is necessary that it be as accurate as is consistent with our present knowledge, and all of us who are contributing to it can not expend too much effort to bring it as nearly as possible to perfection.

I am hopeful that your duties in Wisconsin will allow you to complete this work within a very short time after the samples are received from Dr. Lees, since our time is getting all too short and there is still a tremendous amount of work to be done in the final drafting of the section.

Again let me thank you for your willingness to cooperate, and with kindest personal regards.

Very cordially yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

Lees is going to Mt Vernon, Iowa, on Tuesday & will attempt to ship the samples to you Tuesday night or Wednesday.

*Letter answered by Lees
everything O.K.*

July 3, 1931

Dr. James H. Lees
Iowa Geological Survey
Des Moines, Iowa

Dear Dr. Lees:

I was indeed glad to receive your telegram this morning, stating that you are again in Des Moines, since I have a most important matter to take up with you. In bringing up this subject I am going to ask you to discount the personal element and view the cross section project with me as a cold, hard proposition, demanding the greatest possible accuracy, as well as being a proposition on which it is necessary for us to welcome the views of others as well as ourselves.

During your absence in New York I have spent a great deal of time studying the literature of Iowa stratigraphy and have given much thought to your cross section throughout. Here I am down in Wichita, receiving from time to time the individual state sections from the different contributors, unable to talk with them personally, and yet I must be the sole judge as to whether or not they are correct in every detail.

I am well satisfied in general with your correlations down to the base of the Jordan sandstone, but I must confess I am not at all satisfied, and I note from the way in which your section has been prepared that you are probably not absolutely certain, relative to your correlations between the base of the Jordan sandstone and the top of the pre-Cambrian. I well remember that on the first annual field conference of the Kansas Geological Society Dr. Kay took us to a locality at Lansing where we studied outcrops from the Glenwood shale down to and inclusive of the upper part of the Franconia. In the bluff just north of town the uppermost 125 feet of the Franconia is exposed as a soft, incoherent and well specified sandstone, locally cross bedded, generally of grey or brown color, and containing narrow bands of green and yellow sandstone. This, as I remember, is one of few exposures of the Franconia in the state of Iowa. It is important to note that as exposed at Lansing it is a sandstone and not a dolomite. In Wisconsin the Franconia is a fine grained and well bedded sandstone, containing glauconitic layers and is quite dolomitic. Here again, however, is a sandstone and not a dolomite. I reiterate, as I wrote to Edson and McQueen the other day, that one of the cardinal principals of Cambro-Ordovician stratigraphy throughout the Central United States is that while the formations of the Cambro-Ordovician may change in thickness, in general the lithologic continuity of the sandstones and dolomites remain constant; once a sandstone almost always a sandstone, though in some places it may be shaly, in other places dolomitic.

and once a dolomite or limestone it usually remains a dolomite or a limestone, though in some places it may be sandy and in others cherty. This, however, does not hold true so well of the shale intervals, as well illustrated by the change of the Decorah from a shale to a dolomite.

In this connection, you show the St. Lawrence (Trempealeau), entering Iowa as a dolomite and the Franconia as a sandstone. At Cedar Rapids you show the St. Lawrence wholly as a sandstone and the Franconia wholly as a shale. Between Homestead and Newton you show all of the St. Lawrence interval as a dolomite or limestone, and at Des Moines you indicate the St. Lawrence as a limestone and the Franconia as a sandstone. I am inclined to believe that all of the interval on your section between the base of the Jordan sandstone and the top of the Dresbach sandstone is really of upper St. Lawrence age, (Trempealeau), and that the Franconia-Dresbach zone begins at the base of the dolomites and the shales.

I recognize that in Iowa reports the Franconia has been described from records of wells as a limestone, dolomite shale and a sand. Is it not possible, however, that errors in these old determinations were made by Dr. Norton.

I am going to ask you to do me a favor, not because I doubt your ability to come to a satisfactory solution of this problem, but because it is necessary that I, as Chairman of the cross section project, receive, as well as yours, the opinion of another on this problem. After it is received we can get our heads together and decide what we are going to do about it.

Will you be kind enough to forward at once to Mr. Thwaites at Madison samples on the Anamosa, Cedar Rapids, Homestead and Grinnell wells, from the top of the Jordan sandstone to their total depth, in order that he may study them in the light of his knowledge of Cambrian stratigraphy in Wisconsin. All of this Cambrian interval is exposed in Wisconsin; it is not exposed in Iowa, and I think it highly advisable that we have the opinion of Mr. Thwaites on this matter. I have arranged with him to do this work within the next two weeks.

Specifically, the samples which I would like forwarded to Thwaites are as follows:

Anamosa well	1200 to 2007 feet
Cedar Rapids well	1400 to 2225 "
Homestead well	1700 to 2224 "
Grinnell well	2100 to 2500 "

This will enable him in every case to examine a few feet of the Oneota, in order that he may catch the full thickness of the Jordan sandstone. I have asked Mr. Thwaites to return these samples to you when he has completed his examination.

By joining together all of the sections from Lake Superior to Kansas it is evident that Iowa represents the key area in the thinning of the Cambrian between the great thickness exposed in Wisconsin and the small thick-

ness which remains by the time the Kansas line is reached. For this reason the identification and the thickness of the Cambrian formations in Iowa is of the greatest importance to the success of the cross section project. Dr. Thwaites has spent a large portion of his time in a study of the Cambrian of Wisconsin, and I feel we should have the benefit of his opinion on this matter.

Norton Possibly I am absolutely wrong and that actually the Franconia does change from a sandstone to a shale, to a dolomite and back again to a sandstone between Dubuque and Des Moines. However, you can readily understand that I must be absolutely certain of this lithologic change and if I am wrong and you are right, then I am perfectly willing to have you tell me "I told you so". In as much as the samples on the Greenfield and Stuart wells are in Dr. Norton's office at Ames, I take it that possibly the above samples requested for Dr. Thwaites may also be at Ames. There is not much time left. If Dr. Nelson is too old to be hurried, I wonder if it would be asking you too much to drive up to Ames from Des Moines, I see that the two towns are quite close together, and personally see that there is no delay in the shipment of these samples to Dr. Thwaites.

If you have any remarks to make relative to the solution of this problem, I wish when you write them to me you would be kind enough to send a carbon copy to Dr. Thwaites, in order that he may have the full benefit of your long experience in Iowan stratigraphy.

I presume by this time you have received and read my carbon copy to Edson and McQueen, relative to the Clarinda well, and I am anxious to receive your reaction to the correlations which they propose, which are so totally different from yours below the base of the Decorah shale. I wish to emphasize that I am not making any changes in your Iowa section without your express approval.

Hoping that you enjoyed a most pleasant vacation in New York, and with kindest personal regards.

Very cordially yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

Kansas	Missouri	Iowa	Wisconsin	Extreme North-eastern Kansas	Extreme North-western Missouri	South-western Iowa	Central Iowa	Northeastern Iowa	Wisconsin
Arbuckle	Powell	Shakopee chain	Shakopee chain						
	Cotter			Cotter	Cotter	chain Shakopee	chain Shakopee	chain Shakopee	Lower Prairie
	Jefferson City								
	Roubidoux	New Richmond	New Richmond	Roubidoux	Roubidoux	chain New Richmond	chain New Richmond	chain New Richmond	du Magnesian Chien
	Gasconade + Van Buren	Onyota	Onyota	Gasconade + Van Buren	Gasconade + Van Buren	Prairie Onyota	Prairie Onyota	Prairie Onyota	
	Eminence	Jordan	Jordan	Eminence	Eminence Jordan	Jordan	Jordan	Jordan	Madison + Jordan)
	Potosi	St Lawrence	Mazomanie						
	Davis	Franconia	Franconia						
	Bonnetterre		Dresbach	Bonnetterre	Bonnetterre	St Lawrence Trempealeau	St Lawrence Trempealeau	St Lawrence Trempealeau	Trempealeau
			Eau Claire			Franconia	Franconia	Franconia	Mazomanie + Franconia
Basal Sand	Lamotte		Mt Simon	Lamotte	Lamotte	Dresbach	Dresbach	Dresbach	Dresbach
Pre Cambrian	Pre Cambrian		Pre Cambrian				Eau Claire	Eau Claire	Eau Claire
								Mt Simon	Mt Simon
				Pre Cambrian	Pre Cambrian	Pre Cambrian	Pre Cambrian	Pre Cambrian	Pre Cambrian

non-disposition

TELEGRAM

Thwaites:-

The Clarinda well discussed in the enclosed letter is in extreme southwestern Iowa.

Please take a red pencil and mark up the enclosed correlation chart and pick all the holes in it you may wish. You cannot hurt my feelings. I have prepared it with the idea that it may make others, better qualified than I, to think and aid them in arriving at the correct solution of the problem.

Your manuscript received and is excellent. Will acknowledge it a little later

Folger

Correlation of Clarinda, Iowa well by McQueen, Edson, and Price

				Edson	Price	McQueen	Suggested Arbitration Folger	
Pennsylvanian	Shannon			No Examination	25 - 140	25 - 140	25 - 140	
	Douglas				140 - 375	140 - 375	140 - 375	
	Lansing				375 - 540	375 - 540	375 - 540	
	Kansas City				540 - 660	540 - 660	540 - 660	
	Pleasanton and Henrietta				660 - 822	660 - 920	660 - 920	
	Cherokee				822 - 1610	920 - 1610	920 - 1610	
Mississippian	Meramec			1610 - 1896	1610 - 1896	1610 - 1765	1610 - 1765	
	Osage					1765 - 1858	1765 - 1858	
	Chautauq					1858 - 1895	1858 - 1895	
	Kinderhook shale					1895 - 2016 ¹	1895 - 2016	1895 - 2016
Devonian	Cooper - Wamsutter			None	2016 - 2101	2016 - 2101	2016 - 2101	
Silurian	Silurian			2124 - 2555	2101 - 2555	2101 - 2555	2101 - 2555	
Ordovician	Maquoketa			2555 - 2591	2155 - 2571	2555 - 2595	2555 - 2595	
	Galena			2591 - 2950	2571 - 2950	2595 ² - 2945	2595 - 2945	
	Beulah			2950 - 2995	2950 - 2995	2945 - 2992	2945 - 2992	
	St. Peter			2995 - 3067	2995 - 3067	2992 - 3021	2992 - 3067	
	Shakopee			3067 - 3120	3067 - 3124	3021 - 3124	3067 - 3124	
	New Richmond			3120 - 3142	3124 - 3166	3124 - 3162	3124 - 3162	
----- ----- ----- ----- ----- -----	Cheota			3142 - 3315	3166 - 3315	3162 - 3315	3162 - 3315	
	Jordan			3315 - 3340	3315 - 3340	3315 - 3340	3315 - 3340	
Cambrian	St. Lawrence	Trepoalem (Inner St. Lawrence) Franconia		Rometerre	3340 - 3554	3340 - 3550	3340 - 3550	3340 - 3554
				Lanotte	3554 - 3577	3550 - 3593	3550 - 3570	3554 - 3593
	Drabach				3577 - 3935	3593 - 3935		3593 - 3935
	Pre-Cambrian				3935 - 4668	3935 - 4668	3570 - 4668	3595 - 4668

1. - Mrs. Edson does not recognize any Devonian, but her shaly-limestone zone from 2021 to 2124 as basal Kinderhook.

2. - McQueen places the top of his Galena at 2735, and is undecided on the age of the strata from 2595 - 2735. Edson and Price regard this as the upper part of the zone they have been referring to the Galena (used as a group name and recognizing that it may extend higher than the true Galena of Iowa) in Kansas wells.

June 30, 1931

Mrs. Fanny Carter Edson
Shell Petroleum Corp.
Tulsa, Oklahoma

Mr. H. S. McQueen
Bureau of Geology and Mines
Rolla, Missouri

Dear Examiners of Well Samples:

I have received from Mrs. Edson, under date of June 27, a letter relative to the Clarinda, Iowa well, together with a complete copy of her microscopic determinations on this test. The correlation on this well by Mr. McQueen have been received under date of June 22. I wish to express my sincere appreciation to both of you for your very thorough examination of this test.

In as much as Mr. Price has been away from this office for some time on his honeymoon, his own examination of this well has been somewhat delayed. However, his work is now complete and, pursuant to the promise of Mr. Hall and myself, I am inclosing herewith a copy of his determinations. This inclosure sets forth in tabular form the correlations of Edson, Price and McQueen, and in the right hand column I have attempted to arbitrate between whatever differences of opinion may have existed, and have indicated the suggested correlation on the Clarinda well which will be used on the Central United States cross section.

It will be noted from the inclosed table of correlations that the determinations of all of you down to the top of the St. Peter sandstone check remarkably well. In some cases the top and bottom of a formation are in exact agreement, and where there is difference of opinion the discrepancy is but a few feet. The only difference of importance above the St. Peter is that Mrs. Edson did not recognize the existence of any Devonian in the Clarinda well, whereas Price and McQueen are both in accord as to its top and bottom. Since the recognition of this interval as Devonian fits in very nicely with other Iowa wells to the east, and with Missouri and northeastern Kansas wells to the southwest, I am inclined to accept the views of Price and McQueen in this instance.

You will therefore observe that in my arbitration column I have accepted the correlations of McQueen without change down to the top of the St. Peter sandstone, with the exception that I am inclined to agree with Edson and Price that the strata from 2595 to 2735 feet is of Galena age, using Galena as a group term, and recognizing that in doing so it may extend somewhat higher

stratigraphically than the Galena at the type locality. My reason for accepting McQueen's tops and bottoms of all formations down to the top of the St. Peter is that his Missouri section is complete and by so accepting his correlations no change in his work will have to be made. If any changes were to be made, it would represent such a very few feet that I do not believe it would make any difference economically.

Relative to the thickness of the St. Peter sandstone, McQueen follows the drillers' log and places it from 2992 to 3021 feet, whereas both Edson and Price regard the St. Peter interval as extending from 2995 to 3067 feet. This is based on the fact that the sample from 3067 to 3071 feet still contained 50 percent St. Peter sandstone. Unfortunately, all of your samples between 3006 and 3067 feet were missing. It seems to me that since the St. Peter sandstone is still 90 feet thick at Oak Mills, Kansas, since the Clarinda well is in both a Cambro-Ordovician and pre-Cambrian syncline, it is reasonable to expect that the St. Peter at Clarinda would be at least 72 feet in thickness rather than 29 feet, as suggested by McQueen. Therefore, I respectfully suggest that we use 2992 feet as the top of the St. Peter and 3067 as its base.

From here down to the base of the Jordan sandstone at 3340 feet there is no appreciable discrepancy in your correlations, and thus, for the same reason given above, I have used McQueen's figures in my arbitration column.

Between the base of the Jordan sandstone and the top of the pre-Cambrian exists the only really important differences of opinion, and I am inclined to believe that this difference can be satisfactorily solved more easily than one might at first think. At the present time I have received the completed sections from Michigan, Wisconsin, Iowa and Missouri, and possibly therefore I am able to look upon this problem of the correlation of the Jordan to pre-Cambrian interval in the Clarinda well with a somewhat better regional point of view than would be possible in any other way.

76x The principal bone of contention appears to be that Edson wants McQueen to refer his Bonneterre (3340 to 3560 feet) to the Potosi instead of to the Bonneterre, on the basis that she believes the Bonneterre is equal to the Dresbach. I do not think this is at all necessary. Personally I feel strongly that McQueen is preeminently fitted, through his work with siliceous residue, to recognize accurately the different divisions of the Cambro-Ordovician interval in Missouri. If McQueen believes that the interval from 3340 to 3560 feet is of Bonneterre age, I am all for accepting this correlation without challenge, especially since it correlates unquestionably with strata in northeastern Kansas wells which he has likewise classified as Bonneterre.

It seems to me that the principal error is the correlation of the Bonneterre as a Dolomite with the Dresbach as a sandstone. One of the cardinal principles which seems to apply to the Cambro-Ordovician of the Central United States seems to be, that while the thicknesses of the individual formations may change laterally, their lithologic character is maintained throughout the entire area. In other words, once a formation is in general a Dolomite (although in some places it may be sandy and in other places cherty), it remains a Dolomite. Once a formation is in general a sandstone (although locally it may be dolomitic), it seems to remain a sandstone throughout. It is hard for me to believe that the thick Dresbach sandstone at Des Moines, having retained its complete sand-

stone character all the way down from Wisconsin to Des Moines, suddenly changes completely into a pure Dolomite at Clarinda in a distance of a hundred miles.

It is my contention that we have erred in believing the Bonneterre equivalent to the Dresbach, and I would suggest for your consideration the fact that the Bonneterre is equal to the upper portion of the St. Lawrence (Trappean of Wisconsin), and that the La Motte instead of being equal to the Mt. Simon is equal to the Dresbach and possibly as well to the Franconia.

more so X
One of the impressive and important features illustrated by joining together the Michigan, Wisconsin, Iowa and Missouri sections is that this section clearly demonstrates that all of the Mt. Simon is cut out a short distance west of Cedar Rapids, that the Eau Claire is next cut out a short distance west of Des Moines so that by the time the Clarinda well is reached Dresbach sandstone rests directly upon pre-Cambrian. While I recognize that in constructing a correlation table it would be quite logical to correlate the La Motte and the Mt. Simon, I believe this cross section has demonstrated that the lower portion of the Cambrian section of Wisconsin is gradually cut out as it extends southwestward into Iowa, so that the La Motte sandstone of Missouri actually correlates with sandstones of the middle portion of the Cambrian section in Wisconsin.

I have prepared quite hastily a rough correlation table which is inclosed herewith, which embodies these suggested changes in correlation as appear to be illustrated in the Central United States cross section. I wish each of you would give it your consideration and let me know your reaction to its somewhat reactionary ideas. It may be, however, that it will be necessary for you to actually see this cross section joined together before you will appreciate my point of view.

Another point which favors the correlation of the Bonneterre of the Clarinda well with the upper portion of the St. Lawrence, is that a Dolomite of upper St. Lawrence age, and of approximately the same thickness, exists in the well at Stuart (between Clarinda and Des Moines), between the Jordan and the Franconia. In the normal Iowa section the upper St. Lawrence Dolomite should exist at Clarinda below the Jordan, and the fact that there is a Dolomite present and that this dolomite actually runs in to what McQueen has called Bonneterre, is a strong point in favor of the correlation of the Bonneterre with the upper part of the St. Lawrence.

ms
The only other point of disagreement lies in the determination of the top of the pre-Cambrian, since McQueen places it at 3570 feet, whereas Edson and Price place it at 3935 feet. In this regard I am inclined to believe that Edson and Price are correct. The base of the Dresbach sandstone is defined as the top of the Red Clastics of Wisconsin. Despite the fact that the sandstone above 3935 feet in the Clarinda well has a slightly reddish tinge, actual red shale and predominantly red color does not occur until 3935 feet, and it seems to me that this is a most excellent place to draw the contact between the Dresbach and the pre-Cambrian.

Irrespective of the top of the pre-Cambrian in the Clarinda well, it is necessary to thin the 400 feet of sandstone at Des Moines belonging to the Franconia and Dresbach to 25 feet at Oak Hills, Kansas, belonging to the La Motte. The question seems to be whether to thin this 400 feet abruptly down to 10 feet at Clarinda or to thin it to 342 feet at Clarinda and thence gradually down to 25 feet at Oak Hills. Since the Clarinda test is in both a Cambro-Ordovician and pre-Cambrian syncline, it seems to me that it would be somewhat illogical from a structural standpoint to thin all of this 400 foot interval in the trough of a syncline, but that we have a most excellent place to thin this interval in northwestern Missouri on the east flank of the Forrest City Basin as it approaches the structural high just northeast of St. Joseph, Missouri. The fact that the Dresbach sandstone is usually a clean sandstone, whereas much of the Dresbach in the Clarinda well contains varied portions of angular and subangular feldspar does not in my opinion militate against it still being Dresbach. The presence of the feldspars, as well as their angularity, can be explained by the fact that this test is only 50 miles northeast of Kansas Island (the structurally highest portion of the Granite Ridge, located on the Kansas-Nebraska line, and the only portion of the Granite Ridge which appears to have stood well above water throughout all of that period of time from the base of the Oread down to the pre-Cambrian, and the only portion of the Granite Ridge which actually served as a stratigraphic barrier,) and that much of the sandstone and the included feldspars were derived by erosion from the exposed granite surface of this island.

If McQueen is willing to accept the classification of the strata in the Clarinda well from 5593 to 3935 feet as Dresbach (equal to La Motte), then this will simply call for a gradual thickening of the La Motte sandstone from his well #5 to the Clarinda well and a continued gradual thickening of the Franconia and Dresbach sandstones to the well at Des Moines.

I wish you would both be kind enough to study the inclosed arbitrated correlations on the Clarinda test and let me know if they are satisfactory to you. Especially may I request that you give your consideration to the inclosed correlation table and let me know whether or not you believe it to be of value and if you regard the correlations as approximately correct. I am inclined to believe that the name Trempealeau should be used in Iowa instead of the term St. Lawrence, since it occupies the same interval as is called Trempealeau on the Wisconsin section and since unfortunately the St. Lawrence includes both the Trempealeau and the Franconia.

Again let me thank you for the exhaustive study that you have both made of the samples from the Clarinda well, and you may rest assured that you have contributed, in the study of this one well, to a large portion of the success of the cross section project.

With kindest personal regards.

Very cordially yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK
cc/ P.T. Thwaites
Madison, Wisconsin
James H. Lees
Des Moines, Iowa
Roy H. Hall, Wichita, Ks.
H. W. Bass, Wichita, Ks.

Anthony Folger 919 Central Bldg Wichita Kansas
will be glad to examine Iowa Samples if sent
here

Thurates B4321

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TJ23 104 DL=WICHITA KANS JUL 2 858A

FRED T THWAITES, DEPARTMENT OF GEOLOGY=

UNIVERSITY OF WISCONSIN SCIENCE HALL=

AM GREATLY DISSATISFIED WITH LEES CORRELATIONS ON IOWAN
SECTION BELOW JORDAN SANDSTONE LETTER MAILED YOU YESTERDAY
WILL PARTLY EXPLAIN THIS STOP THE COMBINED STATE SECTIONS
ILLUSTRATE THAT IOWA IS THE KEY AREA BETWEEN THE GREATLAKES
AND MIDCONTINENT FOR THE THINNING OF THE CAMBRIAN IT IS THUS
IMPERATIVE THAT CAMBRIAN STRATIGRAPHY IN IOWAN WELLS BE
INTERPRETED CORRECTLY STOP WOULD YOU BE WILLING TO CONTRIBUTE
FURTHER TO THE SUCCESS OF CROSS SECTION PROJECT BY EXAMINING
SAMPLES ON FIVE CENTRAL AND EASTERN IOWAN WELLS FROM
JORDAN SANDSTONE TO THEIR TOTAL DEPTH AND INTERPRET THEIR
STRATIGRAPHY IN THE LIGHT OF YOUR KNOWLEDGE OF THE WISCONSIN
CAMBRIAN ANSWER COLLECT=

ANTHONY FOLGER.

1031A.

My dear Thwaites,

I have read your article & find it very interesting, well stated, and for the most part in accordance with my own conceptions. There are however a few points about which I would like to state a somewhat dissenting opinion.

(1) Since the Mt. Simon is now generally accepted by the Milwaukee Museum, Wisconsin Survey, & National Museum groups as a member of the Eau Claire formation, whose total thickness (including the typical Mt. Simon) does not exceed 350 feet in the area of outcrop, it does not seem to me, in the light of the modern interpretation that there is any license for calling strata, ^{from} 400 feet below the base of the Shebach on down, Mt. Simon. These strata are very evidently older than any exposed Cambrian in Wisconsin and are quite likely to prove Middle Cambrian since the oldest Eau Claire fauna is very early Upper Cambrian. May I suggest that the term Mt. Simon (no longer regarded as a true formation) be dropped from the well nomenclature, retaining Eau Claire for the upper ^{usually} shaly or dolomitic member, and substituting pre-Mt. Simon for the false Mt. Simon. The addition of the three word prefix should not cause too much confusion among the drillers.

(2) The combined thickness of Shebach and Ironston, however much each may vary, does not to my knowledge exceed 90 feet or fall below 65. On the Stoddard Quadrangle the ~~Ironston~~ ^{Shebach} is 30 feet thick but the Ironston approaches 50.

(3) The base of the Shebach is not conspicuous, but it is very definite in decent exposures. I do not think it is judicious to represent it as indistinct or uncertain. On the other hand, from well samples, I should think it would take a remarkable combination of luck and skill to distinguish the separation where the Mt. Simon phase of the Eau Claire immediately underlies the Shebach.

(4) I think in speaking of the Tranton you should mention that it is separated from the Stetsbach by a stratigraphic break. Edwards informs me that Ulrich now regards the Tranton as a separate formation, a view to which I also incline for independent reasons.

(5) I do not think it possible to define any difference between Franconia and Mazomanie which will hold over a considerable area. On Stoddard, for example, the Franconia and Mazomanie together constitute a continuous and lithologically indivisible sequence of greensand. On Mauston the sequence is largely white sandstones. The separation, if such be desired, must be made on faunal grounds.

(6) I like your treatment of the Trempealeau and I think the term a very good one, which cannot be said of any of the others that have been coined for various parts of this sequence. However in the 15th line of the paragraph, I think you mean underlain by instead of underlying.

(7) I do not see that the local details near Madison or Baraboo merit coordinate treatment along with the general discussion of the formation. At most, I feel, the matter should be reduced to a footnote. The unusual thing about the Trempealeau in the area mentioned is not its character, but the interpretation which has been placed upon it. The Trempealeau is in a sense "unusual" everywhere, since it varies greatly in faunal and lithologic succession in different places, and the intercorrelation has not yet been established. I am absolutely confident that no one at present writing understands the details of the Trempealeau succession.

Since Ulrich is the only worker familiar with the local stratigraphy who regards the Devil's Lake, ~~Madison~~ and Mendota as post-Jordan, I think it is a mistake to emphasize his conclusion, either pro or con. Since his is the more complex interpretation, the burden of the proof is upon him, and until he publishes all his evidence, the simpler conception must dominate.

(8) I agree with which in considering the term Prairie du Chien an unscientific, if sometimes convenient, appellation. In as much as the Shakopee is at best a very thin formation, and over much of the state has been eroded preceding St. Peter deposition, my usage is to call all of the Lower Magnesian Onesta except where strata can definitely be proven Shakopee.

(9) ^{With which,} I am absolutely convinced that the unconformity between Onesta - Shakopee and St. Peter is erosional, despite isolated cases which may point in other directions.

(10) Leutenkel, Ehlers, Savage and others now regard the Mayville and Byron as pre-Clinton, an opinion which it is easy for me to follow.

Some of the above is definitely data and ~~others~~ some is more or less arbitrary statement of opinion. I have no idea that you will care to alter your paper to correspond to all of my opinions, since every worker will naturally have a somewhat different interpretation of a problem of this scope, and it is hard enough to please oneself as this stage of knowledge let alone pleasing Tom, Dick & Harry. Nevertheless, I thought you might care to have on record some of my opinions upon the local section. Thank you for the opportunity.

The immoderate heat is slowing up the work on the Stoddard sheet but nevertheless I think I can complete it by July third as I had planned. Contrary to expectations I have found the full thickness of Desbach underlain by fossiliferous Eau Claire. The section now extends from Eau Claire to Platteville. I am again find the base of the Onesta distinct and readily recognizable but still fail to find Madison fossils.

Very truly yours,

Tillbert O. Raasch.

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DEPARTMENT OF CONSERVATION

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June 26, 1931

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Mr. F. T. Thwaites
University of Wisconsin
Geological & Natural History Survey
Madison, Wisconsin

Dear Mr. Thwaites:

I was glad to receive your letter of June 22nd and thank you very much for the copy of your paper describing the section in Michigan, Wisconsin and Illinois. The blueprint will also come in very handy in the future.

The controversial matters between yourself and Dr. Ulrich are very interesting as they bring up certain arguments that I have had with the paleontologists at the University of Michigan. I have also argued with Prof. Ehlers from the time that I was an undergraduate that too much credence was often given to fossils at the expense of tracing stratigraphic sequence from place to place. These matters of difference of opinion have never lead to personal antagonism and I have always felt that they were largely a product of intensified training along certain lines. It is often deplorable that men trained in one field cannot see the problem of a man trained in another field.

We are expecting a very small amount of drilling activity this summer in the petroleum industry. However, three or four interesting wildcat wells are now in progress and should add a great deal to our information relative to the section and also the structural features of certain parts of the state. This lapse in drilling activity will give us an opportunity to study much of the information which has piled up in the past few years.

With cordial regards, I am

Yours very truly

R. B. Newcomb

GEOLOGICAL SURVEY DIVISION
Petroleum Geologist

RBN:M

June 28, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

The Post Office telephoned^d me this morning to come in for your special delivery letter of June 25 (postmarked 1 P. M., June 26).

With regard to assistance I am responsible for the correlation of all the records including the two in Michigan (Nos. 1 and 2) with the exception of the Galena, Illinois and Dubuque, Iowa wells. I had no help from anyone in the actual drawing of the section except that Dr. C. K. Leith, Chairman of the Department of Geology, made some suggestions about the Lake Superior basin. Under the circumstances I hardly feel that any name except mine is needed on the section.

The manuscript was submitted to Mr. L. E. Workman, Associate Geologist, Section of subsurface studies, Illinois State Geological Survey, and Mr. R. B. Newcombe, Geologist, Michigan Geological Survey. The others who read it contributed nothing to the point and even these did not change anything on the drawing. Mr. Workman correlated the Galena well.

Most of my salary comes from the University as Lecturer in Geology. I have a small salary from the Wisconsin Geological and Natural History Survey. Owing to the recent vote of most of the appropriation and the transfer of that organization from a separate body to a part of the University the status of this work after July 1 is not known to me. I have not cared to ask any questions about these political affairs. It does not make any difference which title you use so far as I am concerned.

One other contributor to the text was Mr. Gilbert O. Ransch, Curator of Geological Museum, University of Wisconsin (my former job). I neglected to mention him above.

I hope you can change the vertical scale. I have used the sections along the International Boundary prepared by Daly passed together into a long strip. I tack this to the walls around half the room. Except for expense of blueprinting I would not be afraid of length. I hope to soon redraw this section and some others as well on a scale of 1 inch to 4 or 5 miles and a vertical scale of 1 inch to 600 feet.

In this weather I am not sorry that I did not get a job in the South this summer!

Very truly yours,

Lecturer in Geology

THE KANSAS GEOLOGICAL SOCIETY

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June 25, 1931

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Mr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

I wish to call your attention to provision A-A of the instruction sheet forwarded you some time ago, which calls for a statement of the names of the individuals or companies who have aided you in preparing your section, and to whom you desire credit given as assistant contributors.

This does not refer to individuals who gave you information on only one well, but if anyone has given you material assistance on the section as a whole or on any considerable portion of it to the extent that you think their names should appear on the section as assistant contributors, I wish you would advise me in this regard.

Also, I wish you would inform me relative to what title you wish yourself referred to on the section. I notice that some of your letters are signed, Lecturer in Geology, Department of Geology, University of Wisconsin, and others, Geologist in Charge of Well Records, Wisconsin Geological Survey. I should be appreciative if you will straighten me out relative to this matter.

Very truly yours,

Anthony Folger.

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

Also the titles of the assistant contributors.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

3

WASHINGTON

June 26, 1931

Mr. F. T. Thwaites,
Geological Department,
University of Wisconsin,
Madison, Wis.

Dear Mr. Thwaites:

Let me set myself right on at least one of the points raised in your reply of June 22d. Namely, it was quite unnecessary for you to mention the limitations of studies of well drillings in the precise determination and delimitation of stratigraphic units. I know them very well from my own experience. Moreover, I have for years past noted your work on deep-well determinations as among the very best, and that the confidence in your results by the well-drillers is thoroughly deserved.

As you will remember I have on a number of occasions discussed and reviewed your determinations and only in a few instances found cause to question or correct your conclusions. I know also that as far as the practical application of your determinations is concerned the recognition of every stratigraphic boundary, however important taxonomically, and the separate naming of small units or members is neither essential nor possible in many cases. Therefore, it follows that I am not criticising the part of your paper for which you can properly accept full responsibility, but only those parts that pertain strictly to the classifications of the deposits. On the latter, I maintain, my wide experience in world stratigraphy and fossil faunas gives me the better right to speak and decide.

As regards Raasch's opinions on the Mendota my confidence in them is severely tempered when I recall how badly he fell down in the meantime in his conclusions (since abandoned) regarding the intimate relations of certain Devonian beds in east Wisconsin to the late Silurian Waubakee limestone. I fear very much that he does not know as much about the relations of fossils of beds adjacent to the Cambro-Ozarkian boundary as he ought before expressing anything like a definite opinion as to their ages and the correlations of the concerned beds. For no other reason than that we are finding more and more that fossil types of long approved stratigraphic range are not confined to one system or series, that that their very similar ancestors in the preceding period and their descendants in the following epoch are likely to be confused with the real fauna in the intermediate zones. It is this previously unknown and generally unsuspected

or ignored fact that is responsible for past and present uncertainties and controversies as to just where the boundaries between practically every succeeding pair of systems of the geological column should be placed.

If there were not a worthwhile amount of truth about my views regarding Paleozoic stratigraphy is it likely that constantly since 1925 one to three representatives of European and Asiatic public institutions and of State Surveys of this country and Canada spend weeks to years each with the purpose of learning what they can of my methods? That, in my estimation, overbalances the unsupported contradictions of my methods and innovations. As a rule they come from established college professors who are either merely unable to understand and appreciate them or dislike everything that discredits their teaching. I have been engaged in very many controversies, but so far the essentials at least of my views have always prevailed. Pardon this perhaps unnecessary "blowing" but, like you, it seemed like I had to say enough to justify my attitude.

Very sincerely yours,

E. O. Ulrich

NN

WELL RECORDS

		Base of, depth																	
No.	Well	Elev	Drift	BR	St.	P.	L.	M.	J.	Tr.	M.	F.	Dr.	E.	C.	Mt.	S.	T.D.	Ref.
1	Wells	590	65	170	—	426	445	605	670						760	790	84846		
2	Escanaba	590	106	220	—	480	500	635	700	795					854	855	50416		
3	Marinette	600	69	160	—	420	460	560	700						795	978			
4	Peshtigo	605	13	116	—	367	—	410	—							504	54155		
5	Green Bay	590	80	230	240	440	—	475	615	?	?				855	863	81945		
6	De Pere	615	142	250	320	455	—	500	610							730	53398		
7	De Pere	610	37	180	470	—	—	—	540						781	781	75752		
8	De Pere	610	22	159												816			
9	L.Rapids	640	85	160	260	380										303	81723		
10	L.Rapids	655	119	185	270	380										456			
11	Wrights.	657	102	280	295	465	—	520	—							595	75918		
12	Rapide C.	605	66	237												408	76960		
13	Kaukauna	645	4	170	220	340	—	380	510							726	53064		
14	Kaukauna	" ?	—	190	230	—	—	400							807	807			
15	G.Locks	675	21	212	240	370										790			
16	Kimberly	695?	12	154	—	350	?	384	500							661	73856		
17	Appleton	730	111	148	—	344	?	377								501	80229		
18	Appleton	720?														822			
19	Neenah	750	20	105	120	278	?	330	485							660	84632		
20	Oshkosh	770	60			300									714	961			
21	Oshkosh	760	92	111?	—	300	—	?	500	580	618				685	695			
22	Klitzke	970	40	84	101											101			
23	Ripon	905	7	16												150	83520		
24	Lone Tree	889	10	—	—	85	95	150	265	310	?					560	52558		
25	Donahue	850	218													218			
26	Wis.Dells	928	?											?	450	999			
27	Baraboo	980														304	82648		
28	Baraboo	856	120												424	428	16613		
29	Philipp	859	190											520	540	625	54347		
30	Sauk City	757	128											400	523	525	53365		
31	Britting.	1020	22			74	130	152	269							279	50001		
32	Knudsen		40			65	95	125	229							241	77629		
33	Madison	856	10						115	210	425	835				840	72151		
34	Lake For.	850	70						120							219	52803		
35	Oregon	936	100						110	240	435	850				860	83135		
36	Brooklyn	979	168													168			
37	Evansville	898	100	—	215	—		280	380	485	780					1014	82321		
38	Smiley	900	0	—	100	130	175	265								340	15534		
39	Monroe	1004	32	125	160	390	435	500	580	710	950					1334	80753		
40	Brown.	785	45	—	240	—	290	350	450	560	845					1025	75287		
41	Shalls.	960	23	188	520	—	—	610	713	806						1000	51542		
42	Crawford	881	3													208	16198		
43	Galena	600	58	155	345	435	490	610	700	810	970					1513			
44	Dubuque	625	118	—	257	340	445	565	655	850	950					1500			

STATE OF ILLINOIS
STATE GEOLOGICAL SURVEY DIVISION

M. M. LEIGHTON, CHIEF
305 CERAMICS BUILDING
UNIVERSITY OF ILLINOIS CAMPUS

URBANA

May 25, 1931

Mr. F. T. Thwaites
Lecturer in Geology
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

It will be perfectly all right for you to use the log of the Galena well in your cross section. These samples were examined by Mr. Thurston and the log is therefore not very reliable, but the major characters of the formations are all right. I have gone over the samples hurriedly and would suggest the following interpretation:

Drift	58	58	✓
Platteville, Glenwood			
at base	82	140	✓ 155
St. Peter	175	315	345
Prairie du Chien			
(Oneota?)	130	445	✓ 435
Jordan	40	485	490
Trempealeau	115	600	610
Mazomanie	90	690	700
Dresbach	120	810	840
Eau Claire	160	970	1050
Mt. Simon	543	1513	

Enclosed is a complete study, should you need it.

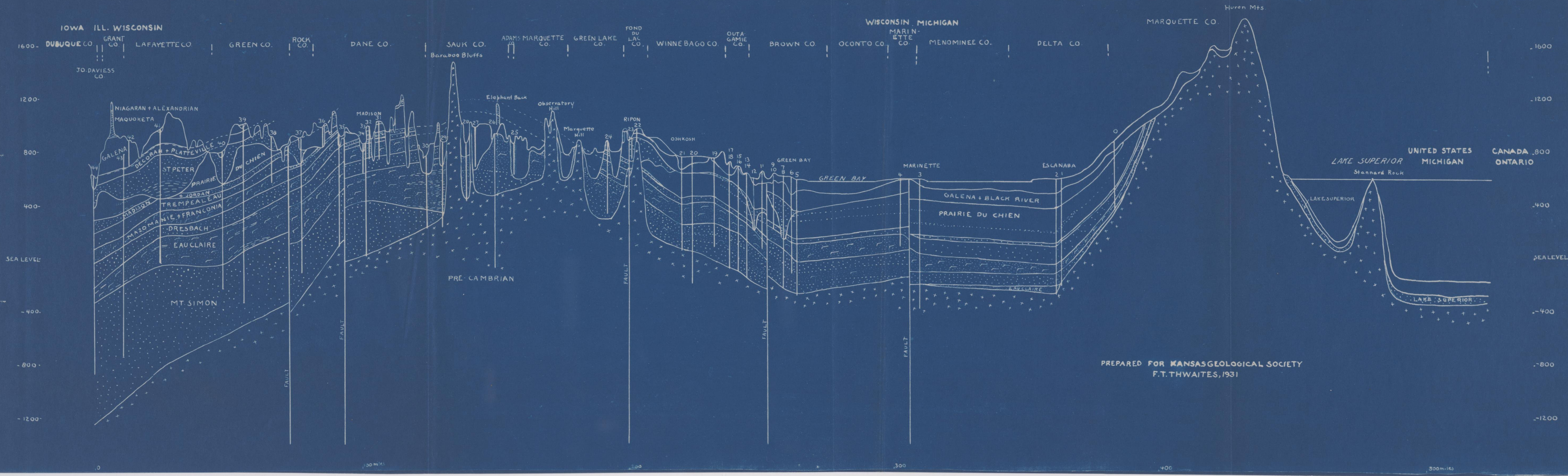
Perhaps the most interesting well in that part of the country which we have now is the Amboy Oil and Gas Company--McElroy No. 1, a log of which I am enclosing. This, as you see, went down to the granite. If it is not too far away it would be a much better log to use.

Kindly return the logs when you are finished with them. I will be glad to help out if there is anything further that I can do.

Very truly yours,

L. E. Walman

Associate Geologist
Section of Subsurface Studies



file

DESCRIPTION OF SECTION IN MICHIGAN, WISCONSIN, AND ILLINOIS

F. T. Thwaites

Introduction.— The cross section through northern Michigan, Wisconsin, and northwestern Illinois, 525 miles in length, starts at the international boundary in Lake Superior; crosses the Huron Mountains, turns southeast to Escanaba; follows approximately parallel to the strike of the Paleozoics of the Michigan basin to Oshkosh; then crosses the Wisconsin arch through Baraboo to the northwestern tip of Illinois opposite Dubuque, Iowa.

Sources and acknowledgments.— Material for the section has been drawn from the published works of Chamberlin and Irving¹, Leverett², Grant and Burchard³, Van Hise and Leith⁴, Smith⁶, Weidman and Schultz⁵, Alden⁷, Ulrich⁸, and Thwaites⁹. Assistance and unpublished information

- ¹ Chamberlin, T. C., and Irving, R. D., Geology of Wisconsin, vol. 2, 1877, Atlas.
- ² Leverett, Frank, Flowing-well districts in the eastern part of the northern peninsula of Michigan: U. S. Geol. Survey, Water Supply Paper 160, pp. 29-53, 1906; Moraines and shore lines of the Lake Superior region: U. S. Geol. Survey, Prof. Paper 134 A, 1929 (includes topographic map).
- ³ Grant, U. S., and Burchard, E. F., Lancaster and Mineral Point quadrangles: U. S. Geol. Survey, Geol. Atlas of U. S., folio (No. 145), 1907.
- ⁴ Van Hise, C. R., and Leith, C. K., Geology of the Lake Superior region: U. S. Geol. Survey, Mon. 52, 1911.
- ⁶ Smith, R. A., Results of deep borings: Michigan Geol. and Biol. Survey, Pub. 24, pp. 209-256, 1917.
- ⁵ Weidman, Samuel, and Schultz, A. R., The underground and surface water supplies of Wisconsin: Wisconsin Geol. and Nat. Hist. Survey, Bull. 35, 1915.
- ⁷ Alden, W. C., Quaternary geology of southeastern Wisconsin: U. S. Geol. Survey, Prof. Paper 106, 1918 and field notes.
- ⁸ Ulrich, E. O., Notes on new names in table of formations and on physical evidence of breaks between Paleozoic systems in Wisconsin: Wisconsin Acad. Sci., Trans., vol. 21, pp. 71-107, 1924.
- ⁹ Thwaites, F. T., The Paleozoic rocks found in deep wells in Wisconsin and northern Illinois: Jour. Geology, vol. 31, pp. 529-535, 1923; Stratigraphy and geologic structure of northern Illinois: Illinois State Geological Survey, Rept. Invest., No. 13, 1927.

has also been received from R. B. Newcombe, Michigan Geological Survey; L. E. Workman, Illinois Geological Survey; and G. O. Raasch, University of Wisconsin. Most of the well logs are based on samples studied by the writer. Thanks are due to the numerous well drillers and engineers who cooperated in their collection.

STRATIGRAPHY

General.-- The cross section shows rock formations which range in age from earliest pre-Cambrian to Silurian. Throughout much of the distance a heavy mantle of glacial drift has retarded knowledge based on outcrops. Information from well logs has run considerably ahead of modern study of the paleontology and exposed sections.

Pre-Cambrian.-- The exposed pre-Cambrian rocks are summarized by Van Hise and Leith and shown on the 1916 geologic map of Michigan by Allen. A paper by the writer on their buried extension beneath the Paleozoic cover is in press. The Huron Mountains consist almost wholly of granites, commonly called Laurentian. The north and south slopes, however, show Huronian slates, iron formations, and quartzites of Huronian age. The famous Marquette iron range lies on the south flank. Talc schist, probably associated with the Menominee iron range, has been found in wells at Escanaba. Almost all the wells on this section in Wisconsin from which samples have been seen found granite. Rhyolite is present at Oregon and forms Observatory and Marquette hills. Basalt and granite gneiss occur at Wisconsin Dells (Kilbourn). The Baraboo Bluffs are quartzite with associated slate and iron formation. Quartzite is also known at Marinette and very likely forms the concealed knob at Ripon (well No. 22).

Aside from the region northeast of Baraboo the surface of the pre-Cambrian is of low relief in Wisconsin, for even topography is related

to areas of homogeneous rocks. In the rugged area resistant rhyolites and quartzites form the monadnocks above the pre-Cambrian peneplain. The abrupt change of slope at Escanaba, Michigan, is due to the change in direction of the section. North of the Huron Mountains lies the great basin of Lake Superior. Standard rock is Keweenaw felsite.

Cambrian

Lake Superior sandstone.-- The Lake Superior sandstone has not been studied in the light of modern stratigraphy and sedimentation. On the line of the section it forms a low shelf along the foot of the Huron Mountains. The name is applied by the Michigan Survey to all sandstones below the Ordovician dolomite. These sandstones are mainly red, conglomeratic, and arkosic and are poorly and irregularly bedded. A portion is undoubtedly equivalent to the proved Upper Cambrian strata to the south, but a large part of the Lake Superior is unlike those marine deposits. It is not unlikely an older continental accumulation which may or may not be unconformable below the Upper Cambrian. Similar rocks in Minnesota are called the "Red Clastic Series" and are known to be in part of Middle Cambrian age¹⁰.

¹⁰ Thwaites, F. T., Sandstones of the Wisconsin coast of Lake Superior: Wisconsin Geol. and Nat. Hist. Survey, Bull. 25, pp. 58-61, 1912; Stauffer, C. R., Age of the red clastic series of Minnesota: Geol. Soc. America, Bull., vol. 38, pp. 469-478, 1927.

Mt. Simon sandstone.-- The basal Cambrian of Michigan and far northeastern Wisconsin has not been studied in recent years. Well records suggest that the Mt. Simon sandstone does not occur north of Peshtigo. This formation consists of quartz sandstone, fine to very coarse grained, and light gray to pink in color. There are a few layers of green, blue, or red shale. Only a small part of the 900 feet at Dubuque, Iowa, has been

seen in outcrops and only 530 feet has been studied in samples/ ^{in Wisconsin.} An oil test (Amboy Oil & Gas Company, McElroy No. 1, S. 1/2 sec. 30, T. 20 N., R. 10 E., Lee County, Illinois) in northern Illinois shows 735 feet of sandstone which grades from gray at the top down into pink and red; below this lies 1010 feet of purple, red, and pink sandstone unlike anything known at the outcrop unless it be the western part of the Lake Superior sandstone. This latter sandstone is underlain by 180 feet of brown arkose which rests on red granite. These lower rocks are in all probability older than Upper Cambrian and may be Keweenawian.

Eau Claire.-- The Eau Claire formation consists of sandstone and shale in widely varying proportions at different localities. The amount of shale is at a maximum just south of the Baraboo quartzite knobs which formed islands in the Cambrian sea. The sandstone is almost wholly fine grained and well cemented with dolomite. The shales are gray, green, and red in color and are mainly dolomitic. Some glauconite is present. Drillers log the red shale as "marl". North and northeast of Baraboo the Eau Claire cannot be defined easily as it differs from adjacent formations only in thinner bedding. The thickness of the Eau Claire is hard to fix in many wells; it seems to decrease from about 400 feet south of Baraboo to 100 feet at the southwest corner of Wisconsin.

Dresbach sandstone.-- The Dresbach consists of heavily bedded medium grained soft sandstone, most of which is pure white. On the outcrop it case-hardens into cliffs well shown in Elephant Back near Wisconsin Dells. The base is hard to define as explained above. On the section it varies in thickness from 50 to nearly 200 feet. ^{and} at the top ^{includes} Ulrich's Ironston member of the Franconia which differs only in having coarser grain.

Franconia and Mazomanie sandstones.-- The Franconia sandstone is thin bedded and fine grained and contains several highly glauconitic layers; it

is all dolomitic. The overlying Mazomanie is slightly coarser grained and more heavily bedded. On the outcrop the Franconia forms benches and the Mazomanie cliffs and crags. The combined thickness, for discrimination is difficult in wells, varies from 80 to 135 feet. These formations are an excellent horizon marker and can be identified in several states. Irving, is a later (Osarkian) formation deposited in a narrow trough eroded in the subjacent strata. At Baraboo a bed of dolomite which resembles

Trempealeau and associated formations.-- The term Trempealeau (not approved by Board of Geologic Names of the United States Geological Survey)

^{now} is used in Wisconsin to include all strata between the top of the Mazomanie and the base of the dolomitic fine grained Madison sandstone. Authorities disagree on the correlation of this sandstone and the base of the dolomitic fine grained Madison sandstone which immediately underlies the basal Ordovician dolomite. In this section, however, the Madison has because of its thinness (in most localities differences of opinion is so small (wells 52 and 53) that the writer has included less than 10 feet) been included with the sandy top of the Trempealeau.

This sandy horizon is called Jordan in Iowa and Minnesota and from the standpoint of the well driller it is desirable to retain this nomenclature. Ulrich terms the lower and finer grained portion of this the Norwalk member (here / the Jordan) is included with the Trempealeau formation. The Norwalk member (here / the Jordan) is never been able to identify it in wells.

absent in much of northeastern Wisconsin although it seems to be present in northern Michigan. The Trempealeau below the Norwalk consists of very

Prairie du Chien or Lower Magnesian group.-- The Madison sandstone is classified by Ulrich as the base of his proposed Ozarkian system. Underlying local thin lenses of sandstone and non-cherty dolomite (St. Lawrence member). The thickness of the Jordan, and Madison sandstones varies up to a maximum of 95 feet and increases toward the southwest.

The portion of the Trempealeau below the sandstone horizon in Wisconsin varies from 74 to 120 feet and increases in the same direction. In northern Michigan beds referred to the Trempealeau reach 160 feet in thickness.

Formations near Madison and Baraboo.-- Near Madison and in a spot

south of Baraboo too small to show on this section the normal Trempealeau

is replaced by firm gray, non-cherty dolomite with purple blotches. This dolomite is overlain by a few feet of rock which resembles the Lodi member and that in turn is covered by white sandstone similar to the Norwalk member. In the opinion of Ulrich, based on fossils, this, the Mendota dolomite of Irving, is a later (Ozarkian) formation deposited in a narrow trough eroded in the subjacent strata. At Baraboo a bed of dolomite which resembles the Lodi occurs below the Mendota outcrop and rests directly upon the Dresbach. A similar dolomite, however, is present in other places on or not far above the Dresbach. Authorities disagree on the correlation of this bed and G. O. Raasch found what he regards as a Lodi fauna above the Mendota near its type locality at Madison. The area affected by this difference of opinion is so small (wells 32 and 33) that the writer has ignored the Mendota in his section. Immediately below the Mendota at Baraboo Ulrich has named a thin fossiliferous sandstone Devils Lake. The thickness, character, and relations of this formation in a normal section away from the ancient quartzite islands are not known and the writer has never been able to identify it in wells.

Ordovician

Prairie du Chien or Lower Magnesian group.-- The Madison sandstone is classed by Ulrich as the base of his proposed Ozarkian system throughout most of Wisconsin. It is overlain by gray dolomite with some sandstone, a little shale, and both dense and oolitic chert, known as the Prairie du Chien formation in Iowa and Illinois. In Wisconsin the old name, Lower Magnesian, survives. Ulrich, following the Minnesota Survey, divides this series in ascending order into Oneota dolomite (Ozarkian) and Shakopee dolomite (Canadian). On account of scarcity of exposures in the small areas studied in

recent years it has proved impracticable to make this separation in the field, nor has the writer attempted to apply it to well logs. The Shakopee contains more layers of sandstone and shale than does the Onondaga and is finer grained. The sandstones, all of which are rather thin, are not persistent. The thickness of the group varies widely and rapidly from total absence to a maximum probably not over 250 feet. These irregularities can be shown on the section only in the most generalized manner.

St. Peter sandstone.-- The St. Peter sandstone is medium grained and for the most part light gray. At the surface red and yellow tints are common. The basal part of the St. Peter contains much red and green non-calcareous shale interbedded with chert-sandstone conglomerate. These beds are thickest where the formation is thickest and that is where the underlying Lower Magnesian is thin or absent. In some of these places the St. Peter rests on either the Jordan or Trempealeau. Interpretations of this phenomenon differ. Ulrich regards it as a profound erosional unconformity which marks the division between the Ordovician and his proposed Canadian systems. Sardeson¹¹ claims that the irregularity of the

¹¹ Sardeson, F. W., Shakopee dolomite and its cone domes; Pan-Amor. Geologist, vol. 45, pp. 29-48, 1926. He that work lies at the top

of the bluish dolomite which extend to about 100 feet above the top of underlying dolomite is depositional feature. It is true that in many places the strata of the Prairie du Chien dip at the same angle as the slope of its top, but the general stratigraphic relations added to the evidence of weathering afforded by the red shales and chert beds makes the former view preferable even if we do not accept the systemic value of the break. The thickness of the St. Peter reaches a known maximum of 352 feet at Shullsburg, Wisconsin. Locally, as west of Ripon, it is cut out by mounds of Prairie du Chien which rise into the horizon of the overlying section does the Glenwood member, about 10 feet in thickness.

Black River which rests on them with marked angular unconformity. In northeastern Wisconsin and northern Michigan the formation is absent for long distances. In this region both the sandstone lenses of the Prairie du Chien and the underlying Jordan sandstone have been mistaken for St. Peter by some geologists. True St. Peter almost everywhere shows at the base either red non-dolomitic shale or chert conglomerate.

Black River group.-- In southwestern Wisconsin the Black River group is divided in ascending order into the Platteville limestone and the Decorah shale. East of Shullsburg, however, the limestone gives way into what Ulrich terms the Beloit dolomite. The latter name is not officially used in Wisconsin at the present time, but the group term is applied to all the strata. The Platteville is a blue-gray limestone with some chert and dolomite layers. The Decorah shale is much thinner than in Minnesota or Iowa. It is probably nowhere over 5 feet in thickness; some is bituminous ("oil rock"). The Platteville is about 75 feet thick. The top of the Platteville is fine grained and is known to drillers and miners as "glass rock" on account of its conchoidal fracture. In northeastern Wisconsin the writer has not hazarded a division at the top of the Black River although it seems possible that such lies at the top of the bluish dolomites which extend to about 100 feet above the top of the St. Peter. At the base of the Black River group there is a few feet of green shale interbedded with very dolomitic sandstone, much of which (Glenwood member) is rather coarse grained. There are some layers of pure dolomite and dolomite with floating sand. Part of this rock is almost pure white in color. There thin the shale is not uncommonly missed in samples. In northeastern Wisconsin the Glenwood shale is known only because it causes numerous fishing jobs in some localities. At no point on the section does the Glenwood member exceed 10 feet in thickness. thick

It cannot be shown on the section.

Trenton group.-- In Wisconsin, ~~and probably in northern Michigan~~ as well, the Trenton group is represented by the Galena ~~cherty~~ dolomite. It is a gray dolomite which on the surface weathers to a buff colored open texture which somewhat resembles a sandstone. It contains a little chert. The thickness varies from 100 to about 250 feet and increases to the southwest.

Maquoketa shale.-- The Maquoketa shale of the Richmond group occurs in the section only in Sinsinawa Mound near the southwestern corner of Wisconsin. It is a blue dolomitic shale with thin layers of bluish gray dolomite and limestone. The thickness is roughly 200 feet. The formation does not show in the section in northeastern Wisconsin although it occurs with a thickness up to 550 feet only a few miles to the east. In this area there are two members of brown bituminous shale. Well records indicate that a slight angular unconformity exists at both top and bottom but which line should be called the base of the Silurian is a question not touched upon here.

Silurian

Niagaran and Alexandrian series.-- About 100 feet of cherty dolomite referable to the Niagaran and Alexandrian series occurs on top of Sinsinawa Mound. The subdivision of these rocks is best left to the Iowa section. In northeastern Wisconsin formations of Clinton and Lockport age occur a few miles east of the section. They consist of cherty light gray and pink dolomite and are subdivided in ascending order into the Mayville, Byron, Waukesha, and Racine formations.

Pleistocene

Older drift.-- A thin mantle of old (pre-Wisconsin) glacial drift occurs from Browntown to Evansville. It is in few places over 10 feet thick

and has been deeply weathered. Alden ascribes it to the Illinoian stage.

Young drift.-- Young, slightly eroded, and slightly weathered glacial drift occurs with a maximum thickness of over 200 feet from Evansville north. The Middle Wisconsin drift is composed of gray till and clean sands and gravels. North of Ripon it is overlain by Late Wisconsin drift which consists of red clay till with associated red lake clays and clayey gravel and sand.

STRUCTURE

Introduction.-- The section through Wisconsin and northern Michigan appears to show two anticlinal uplifts, but as a matter of fact these are parts of the same anticlinorium, the Wisconsin arch, which is crossed diagonally in the southern part of the section and is then reached again because the section turns northwest at Escanaba, Michigan. ~~This uplift is the northern continuation of the La Salle anticline of Illinois.~~

Lake Superior basin.-- The depression at the north is part of the basin of Lake Superior which appears to be wholly enclosed by bed rock. It is thought by some authorities that it was formed by glacial erosion of soft early Cambrian and Upper Keweenaw sediments. Others think that it is due to earth movements in relatively recent time. In comparing these views it is well to recollect that on a section drawn without exaggeration of the vertical scale the basin is so shallow as to be almost invisible.

Huron Mountains.-- The Huron Mountains seem to have been monadnocks on the pre-Cambrian peneplain probably on account of superior resistance of their bed rocks.

Michigan basin.-- From Escanaba to Ripon the section passes along the west flank of the Michigan basin. Three normal faults have been found.

Of these the northern one strikes west of north. To the southeast of the section it forms the northeast side of the Two Rivers anticline which makes the great point in Lake Michigan north of the city of that name. The middle fault strikes east and is lost under heavy drift somewhere on the crest of that anticline. The apparent terrace near Oshkosh is due to change in direction of the section. A third zone of faulting is present at Ripon where one small fault is exposed in a quarry and a larger one is inferred.

Wisconsin arch and monadnocks.-- Where the section crosses the southern part of the Wisconsin arch there are many pre-Cambrian monadnocks. The pre-Cambrian highs seem to affect the structure of the Paleozoics by controlling the nature of sedimentation, by causing high initial dips, and by bringing about differential settling. The anticline east of Ripon seems from the meager available information to belong to the last class. On account of scarcity of outcrops little is known about the attitude of the formations around Marquette and Observatory hills and the Baraboo region is only now undergoing intensive detailed exploration. As noted above, knowledge now at hand indicates a profound change in the character of the Eau Claire formation on the two sides of this large island in the Cambrian sea.

Southwestern slope.-- It is not definitely known that pre-Cambrian rock has been struck in Wisconsin south of Oregon (well No. 35). The slope of the buried peneplain appears to be regular although the sharp angle in the section at Evansville affects its portrayal. The large east-west normal faults have been discovered and it is highly probable that smaller ones occur. There appears to be a slight anticlinal bulge near Shullsburg. The pre-St. Peter valley there may really be narrower

than is shown, judging from conditions farther east and northeast where there are more closely spaced wells.

- F. T. Thwaites,
June 9, 1951.

KEY TO WELL LOGS

No.	Location	Elevation	Reference or first sample number in University of Wisconsin collection
<u>Michigan</u>			
0	Sec. 8, T. 41, R. 24 W.	8731	Leverett, 1906, p. 46 (no samples, incomplete log)
1	Wells, E. and L.S. R.R. Sec. 18, T. 39, R. 22 W.	590	84946
<u>Wisconsin</u>			
2	Escanaba, C. and N.W. R.R. shops, SE. NW. sec. 29, T. 39, R. 22 W.	590	50146
<u>Wisconsin</u>			
3	Marinette, city test	600	Smith, 1917, pp. 214-215, (samples)
4	Peshtigo, Peshtigo Paper and Pulp Co.	605	54153
5	Green Bay, city, 9th and Ridge Sts.	590	81945
6	De Pere, State Reformatory	615	53398
7	De Pere, city, Main St.	610	75752
8	De Pere, Paper Mill	610	Weidman and Schultz, 1915, p. 248 (no samples)
9	Little Rapids, County Sanitorium	640	81723
10	Little Rapids, Lindauer Stock Farm, sec. 13, T. 22, R. 19 E.	640	Log by J. J. Faust, driller
11	Wrightstown, Fox River Dairy Co.	657	75918
12	Rapide Croche, Power House	605	71960
13	Kaukauna, city No. 4	645	53064
14	Kaukauna, city No. 3	645	Tube of samples in residence of J. J. Faust, driller
15	Combined Locks, Paper Mill	675	and Weidman/Schultz, 1915, p. 490
16	Kimberly, city	695	73856
17	Appleton, Appleton Coated Paper Co.	730	80229
18	Appleton, city No. 3	7201	Weidman and Schultz, 1915, p. 489 (no samples)
19	Neenah, city No. 5	730	84632
20	Oshkosh, Northern State Hospital	770	Chamberlin, 1877, p. 153

KEY TO WELL LOGS (cont.)

No.	Location Wisconsin	Elevation	Reference or first sample number in University of Wisconsin collection
21	Oshkosh, Algoma St.	760	Chamberlin, 1877, p. 153, and tube of samples in geology laboratory, Lawrence College
22	H. A. Klitzke, SE.SE. sec. 14, T. 16, R. 14 E.	970	Alden, field notes, no samples
23	Ripon, Ripon Dairy Co.	905	83520
24	Lone Tree Farm, sec. 36, T. 16, R. 12 E.	889	52558
25	Jos. Donahoe, SW.SW. sec. 23, T. 14, R. 7 E.	830	Alden, field notes, no samples
26	Wisconsin Dells (Kilbourn), exploration	928	Tube in geology museum, University of Wisconsin
27	Baraboo, test hole, SE. SW. sec. 15, T. 12, R. 6 E.	980	82448 Samples 70 to 208
28	Baraboo, city test hole near R.R. station	856	16613
29	Philipp Farm, SW.NE. sec. 15, T. 10, R. 6 E.	959	5447
30	Sauk City, city No. 1	757	53365
31	T.M. Brittingham, SE.SE. sec. 13, T. 7, R. 8 E.	1020	50001
32	J.J. Knudsen, Sunset Point		77629
33	Madison, Unit Well no. 1, Knickerbocker St.	856	72151
34	Madison, Lake Forest Co. NE.NW. sec. 34, T. 7, R. 9 E.	830	52803
35	Oregon, State Ind. School, NE.SE. 936 sec. 26, T. 6, R. 9 E.		83135
36	Brooklyn, Sargent well	979	Alden, field notes, no samples
37	Evansville, city No. 1	898	82321
38	Wm. Gailley farm, SE. sec. 30, T. 3, R. 9 E.	900	15574
39	Monroe, city No. 3	1004	80733
40	Browns town, Merrell-Soule Condensary	785	75287

KEY TO WELL LOGS (cont.)

No.	Location	Elevation	Reference or first sample number in University of Wisconsin collection
41	Shullsburg, city	960	51742
42	Crawford Mining Co., test, NE.NE. sec.30, T.1, R. 1 E.	881	16198
<u>Illinois</u>			
43	Galena, city, (projected onto line)	600	Record in files of Illinois Geological Survey
<u>Iowa</u>			
44	Dubuque, city No. 5	625	Norton, Iowa Geol. Survey, vol. 33, p. 135, 1928

June 26, 1931

Mr. J. V. Howell,
300 North 6th St.,
Ponca City, Oklahoma

Dear Sir:

At the request of Mr. Anthony Folger I am sending enclosed the following:
1926 geological map of Wisconsin
Base map of Michigan
Blue line structure map of top of pre-Cambrian in Wisconsin
Description of the Clover Bluff structure, Wisconsin

All of these maps indicate structural features mostly in red pencil. The information for Wisconsin is almost wholly based on personal observations in the southern part of the state but in the north is in part from Publication 13, Michigan Geological Survey. The same publication was used for northern Michigan with some data from the 1926 map of that state. In southern Michigan I used a new map just published by Mr. R. B. Howards of the Michigan Survey. The eastern part of Lake Superior is taken from Irving, U. S. G. S. Monograph 5.

I have tried to differentiate between anticlines and synclines. Most of the iron ranges are the latter. The former have in most cases been cut through to the basement complex. Please note that these lines of folding do not in all cases influence the Paleozoics. For instance the Clover Bluff structure is not on a known line of disturbance in the old rocks. This matter is taken up in a paper now in hands of the Geological Society of America. The blue line print is an illustration from that and is therefore not to be published as a whole. Mr. Folger speaks of the Baraboo uplift. As a matter of fact it is a synclinal remnant. It is true that the Paleozoics dip away from it locally. Mr. J. Wannamacher, who was with the Gulf for five years, is now working on this problem for his doctors thesis. The buried ridges of pre-Cambrian are quite commonly reflected in the structure of the overlying rocks but this fact cannot be worked out in much detail, for there are too few deep wells.

A few lines of strike in northern Wisconsin are based on magnetics only. Mr. Aldrich who has been with the Survey and has done much geophysical work in the north could doubtless indicate other suggested faults but is now away. However, I think that I have the major features so far as known. Probably I have more than you can show anyway.

If I can do anything else please let me know.

Very truly yours,

Geologist in charge of well records

June 26, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

Your special delivery letter of the 23rd reached me yesterday.

I had prepared the map but forgot to enclose it with the section and then decided to keep it until the manuscript was ready. It is now enclosed herewith.

The manuscript has been approved by Messrs. Bean, Newcombe, Raasch, and Workman. Dr. Ulrich objected to its "reactionary trend". After reading his three page letter I concluded that he reached this opinion because I did not subdivide the Prairie du Chien into Onondaga and Shakopee, had lumped the Madison, his Jordan, and his Norwalk member of the Trempealeau, and had not been very enthusiastic about the elusive Mendota and Devils Lake formations. On the first point I feel that discrimination is not possible in view of slight knowledge based on outcrops seen by modern geologists. The second is a practice justified by original use of the term Jordan added to present practice in Iowa, Minnesota, and Illinois. On the third question Ulrich stands alone among competent observers and the correlation of Mendota as basal Trempealeau is urged by Twenhofel, Raasch, Edwards, Workman, and myself as well as the older published reports of Chamberlin and Irving. The argument is based on the importance to be attached to a very few rather poorly preserved fossils. I have tried to be neutral and have therefore suffered the usual fate of an "innocent bystander" at a fight. Nevertheless, I made some changes in this part of the manuscript and sought to conceal my real opinion.

I am sending the other maps to Mr. Howell as per your request. The blueprint is not for publication as a whole since it is now in hands of the Geological Society of America. Other information is mostly based on published information except a few folds in Door County mapped by me before I knew about the hydraulic theory of oil accumulation. There is now no reason for keeping secret their location.

I do not expect to go into the field until August. Until then my address will be as usual. After that mail will be forwarded from my home, R. D. 4, Madison, Wisconsin. I hope to be able to attend the conference if I can get someone to drive down with me.

Very truly yours,

Geologist in charge of well records

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FIFTH ANNUAL FIELD CONFERENCE

June 23, 1931

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Mr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

Your letter of June 13, together with the final draft of your section through Michigan and Wisconsin, was received some time ago. Because of the stress of work at this end, it has been necessary to delay my answer. Despite the delay, both my personal thanks and the thanks of the Society are none the less cordial and sincere for the most excellent piece of work which you have done on your portion of the Central United States cross section. You have carried out the instructions to the smallest detail and your piece of work is a complete unit which will need no editing.

I have not received as yet your manuscript, but I presume it will be forthcoming within a few days. It is necessary for me to ask you for one more piece of information; namely, you neglected to inclose a small scale state map of Wisconsin and Michigan, showing the exact route of the section. Some time ago you forwarded me a sketch map, but it was my impression that you have added several wells and changed the route of the section. If you have them at hand, we would like this section plotted on one of the U.S.G.S. state base maps on the scale of 1 inch to 16 miles. If you can let me have this before you go out in the field about July 1, I shall be very appreciative.

We have enlisted the services of J. V. Howell of Ponca City, to prepare for the section a regional map, showing the principal surface and subsurface structural features between the Appalachians and the Rocky Mountains. These structural features will appear on the index map which will be inserted in some convenient place on the section, and which will carry the actual route of the section as well. Howell informs me that he has been unable to obtain any of the structural features of Wisconsin and Michigan. In this regard I wondered if it would be asking you too much to outline on a small scale map of Wisconsin and Michigan the principal surface and subsurface structural features, and forward the same before July 1, to J. V. Howell, 300 North 4th Street, Ponca City, Oklahoma.

On such a map you might outline the limits of the Baraboo Uplift, together with a single line representing its principal axis. Another feature which might be shown is the Lake Superior syncline, together with an outline of the deep synclinal area in Michigan and any other structural features which you think important, especially those which are crossed by the route of the section. I note in your last letter that you speak of the Lake Superior highland, and I am wondering if it as well might be outlined on the map.

I can not emphasize too strongly how greatly pleased I was with the results of your work on the section. Certainly I agree with you that the vertical scale is too steep, and we are now experimenting at this end with different scales, in the hope that the entire section might be stepped up and then reduced so that the final product would not be in excess of 8 feet long. Whether or not this can be done I can not at the present time advise.

I wish you would inform me at what address I can reach you during July and August, in case anything comes up which would call for correspondence. I am looking forward with considerable anticipation to seeing you on the Conference.

With kindest personal regards, and again many thanks for your cooperation.

Very cordially yours,

Anthony Folger.

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

June 22, 1931

Mr. R. B. Newcombe,
State Geological Survey,
Lansing, Michigan

Dear Mr. Newcombe:

I want to thank you for your letter of June 17 with the comments. I am returning herewith the corrected manuscript and the blueprint for you to keep.

This matter, as was inevitable, involved me in controversy with Ulrich although I made every effort to remain neutral on questions which involve the interpretation of fossils. Most of the Cambrian fossils are very poorly preserved. The best collections are made from weathered float whose source is only vaguely known. Different observers, all apparently competent to frame opinions reach diverging opinions on correlation. The trouble centers around the Mendota and Devils Lake formations. The latter has a talus for its type locality and has never been identified in a complete normal section anywhere. At the time Ulrich discriminated it fossils were unknown in either the Mazomanie or Madison formations. Since then, so far as I can see, no detailed comparison has been made of these for the most part poor fossils. With this background you can see why I may seem to be a bit scornful of views based on fossils alone entirely unsupported by actual tracing of the formations to a place where we can determine the age relation. Maybe I'm wrong to take this view and it cost me my job working on outcrops in which I was superseded by Edwards and Raasch in 1924. I have never sacrificed what I felt was right to temporary expediency. The longer I live the more I notice that given time the rest have come around to my interpretation. So I intend to sit tight and make veiled statements only on controversial points. I have no personal feeling against Ulrich although I do have against those who seemed to think that it was a crime to disagree.

I intend to stick to wells only and with that idea have not looked at fossils or indeed measured an outcrop section since 1924.. I have gone into this matter somewhat fully so that you can see the position in which I find myself.

With regard to the Wisconsin arch I have contoured its southern extension and that is what my opinion was based on. However, I omitted the mention.

Thanking you again,

Very truly yours,

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UNIVERSITY OF ILLINOIS CAMPUS

URBANA

June 17, 1931

Mr. F. T. Thwaites
Wisconsin Geological Survey
Madison, Wisconsin

Dear Mr. Thwaites:

Thank you very much for the "Description of Section in Michigan, Wisconsin and Illinois," and the blueprint section. It is all very interesting and gives one a chance to see what happens up north to the formations which we are studying here.

I have no corrections or comments to make except that it is certainly a good piece of work. There is one question though, as to whether or not you continued your dotted lines representing the Mazomanie-Franconia into the right formation west of Baraboo bluffs. It seems that the line should come down one formation.

With best wishes,

Yours very truly,

D. E. Workman

Associate Geologist
Section of Subsurface Studies

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June 17, 1931

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Mr. F. T. Thwaites
Geologist in charge of well records
Geological and Natural History Survey
Madison, Wisconsin

Dear Mr. Thwaites:

Your letter of June 12th came yesterday and I have gone over the manuscript and examined the section which was enclosed. I have added a few pencil notations about points with which I am familiar.

You have shown the presence of Paleozoic sedimentary rocks in the part of the basin of Lake Superior between the Marquette county shore and Stannard's Rock. I presume this is simply to include the extension of the Lake Superior sandstone beneath Keweenaw Bay. The presence of other Paleozoic sediments, according to my knowledge, has never been substantiated underneath the waters of the lake. Several authors have suggested the possibilities where no exact evidence is available.

The name "Lake Superior sandstone" is so firmly established on the literature on Michigan stratigraphy that the entire elimination would probably bring out a considerable amount of objection from various sources. You will note on the copies of the tables I sent you sometime ago that the terms "Jacobsville" and "Munising" were used as sub-divisions, as I certainly agree with you that they are more specific in describing the type occurrences of these rocks. The term "Lake Superior" would imply that they surround the entire lake and on this basis its use is certainly not good.

It seems to me that what you have done in tracing the Wisconsin Cambrian and Upper Ordovician formations across into Michigan is certainly the most logical procedure. I am fully in accord with this and have no objections whatever.

I shall be mighty pleased to have a copy of the manuscript and section when you have it finally completed if this is agreeable to you.

With kindest regards and wishes for a pleasant summer, I am

Yours very truly

R. B. Newcombe

GEOLOGICAL SURVEY DIVISION
Geologist

REN:M

June 22, 1931

Dr. E. O. Ulrich,
U. S. National Museum,
Washington, D. C.

Dear Dr. Ulrich:

In reply to yours of the 16th it is not my intention to enter into any more controversies. Nevertheless, I felt it my duty to make my position more clear. Years ago Twenhofel used to tell us stories about his home town, "somewhere in Kentucky". He said that at every meeting of the court at least one argument arose among the spectators. When the smoke cleared away and they went to carry off the dead and wounded it almost universally turned out that the casualties did not include any of the arguers but only innocent bystanders. I would like it understood that I am a bystander and intend to remain as such in all matters which involve either paleontology or sedimentation. If I get hit it's not my fault.

I am a student of well records only. In 1924 I was removed from the study of outcrops and displaced by Edwards and Raasch. The work on wells which I have carried out since 1912 is purely of an engineering nature. I have traced through and contoured certain lithologic units. Now most of the deep drilling is in eastern Wisconsin and northern Illinois far from outcrops. The section there shows certain differences from those worked out in Minnesota and western Wisconsin. I have tried to apply your section to the buried succession and I thought that we had ironed out all differences on these points in 1923. I need only refer you to the men who have charge of drilling operations to demonstrate what they to whom it means many dollars and much grief saved think of the success of my studies. If you go to almost any drill rig in either Wisconsin or northern Illinois you will find that the man on the derrick floor knows me and is using your names for the subdivisions of the Cambrian.

Now it is not practical in drill sections to pily all the names of formations and members which can be used on the outcrop. Still less it is possible to distinguish any formations which have never been defined in detail. When I lump as Jordan all sandstones between the base of the Oneota and the top of the Lodi I feel that economic importance added to precedent in both Iowa and Minnesota justified such on the section for the matter of nomenclature is taken up in the necessarily brief text.

In justice to Raasch his opinions on the Mendota were formed before he was at Madison and are not based on the Maple Bluff section but on one near the University barn.

I am making some changes to make things clearer. I feel that where "the doctors disagree" on the interpretation of fossils I will try to keep neutral.

With regrets for the unintentional misunderstanding and kindest personal regards,

Very truly yours,

Lecturer in geolog

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON

June 16, 1931

Dr. F. T. Thwaites,
Geological and Natural History Survey,
Madison, Wis.

Dear Thwaites:

The copy of your cross-section of Wisconsin and northern Michigan and the manuscript to accompany it, both inclosed with your brief letter of June 12, 1931, just to hand. I read it over last night and sorrowfully wondered at its reactionary trend. How can you fall back so far after all my efforts to straighten out the stratigraphy of the Lower Paleozoic rocks of Wisconsin and Michigan in the light of what we have learned about corresponding parts of the column in the Appalachian Valley, east and west Canada, Texas, Oklahoma, Missouri, western United States and Europe! I feel that in your heart and the restrained recesses of your mind you know better than you have written in this paper.

And what is "eating" our young friend Raasch since he accepted his position in Madison? His discovery of the "Lodi shale fauna" above the Mendota in Maple Bluff was anticipated long ago by Weidman and the idea was completely exploded then by me when study of the material collected by him and myself showed that it represents a decidedly modified recurrence of the Lodi fauna. Though containing some fossils that at once suggest species of the older Lodi occurrence, critical comparison shows that they have undergone important changes in details of structure. Moreover, the later post-Mendota appearance of the fauna comprises types that have never been found in true Lodi shale. The relations of this Ozarkian occurrence to the Lodi one are practically the same as that of the Mendota fauna to the fauna of the St. Lawrence limestone at Black Earth. Twenhofel himself studied and compared the Black Earth St. Lawrence fossils with those from the Mendota in my office some years ago and agreed that they are in every instance different. And so they are. Geological history, as we are getting the facts and learning to correlate formations more closely and accurately, is proving to be full of such previously unsuspected recurrences.

As regards the decidedly characteristic fauna of the Devils Lake sandstone, I have it now from Oklahoma, Texas, and British Columbia and in each of these cases it occurs in the basal formation of the Ozarkian system. The character of the sediment has nothing to do with

its presence for it is found in Wisconsin in coarse sandstone, in Oklahoma in shaly limestone, and in Texas and British Columbia in more massive limestone.

Have just returned from a month's trip in Texas, Oklahoma, and Missouri. Covered an enormous amount of territory made possible by guidance of state geologists thoroughly acquainted with the best exposures and seeking information and interpretation of Lower Paleozoic stratigraphic problems encountered in the mentioned states. Well, it is simply marvelous and no less encouraging and satisfactory to note how easily and satisfactorily the problems submitted to conclusive solutions. In central Texas we recognized 8 formations - 4 Upper Cambrian, 3 Lower Ozarkian, and 1 Middle Canadian - that occur in the Wichita and Arbuckle uplifts in Oklahoma, and 6 formations - 1 Upper, Cambrian, 2 Upper Ozarkian, and 3 Upper Canadian - that Texas shares with Missouri. The sequence in each state differs from those in the others because in each there are formations that are not present in the others. As these more restricted indigenous formations are sandwiched between those that are common to two or three of the concerned states, it follows not only that the aggregate sequence of each of the three systems is considerably augmented, but also we know much better now just how the formations in the several areas are related to each other and in what order they were deposited. It follows, too, that the earth movements which occasioned the logically inferred displacements of the strandline and corresponding paleogeographic changes, are more clearly appreciable.

I might go on in this way for pages after pages, but what use would it be? Still, I can not refrain from adding that it strikes me as a sort of arrogant self-sufficiency not to say complacent ignorance that presumes to decide upon the course of the world's geologic history from the fragmentary and at that ill-known record of a single state as opposed to the results of painstaking and detailed research of others in all quarters of the North American continent.

Your paper seems far behind the present to me. In fact it shows little advance over what Owen did; and little or none over Winchell's, Chamberlin's, and Wooster's conceptions. Besides, it contains many misstatements and inaccuracies which I can not stop to point out. Did you know what I know about the Cambrian and Ozarkian development in northern Michigan, Minnesota, and Iowa it would have very greatly modified your statements regarding the formations of these systems in those states and also in Wisconsin. For instance, you would not say that the Norwalk sandstone is the same as the Jordan. You would not belittle the Devils Lake nor speak of the Madison and Mendota, nor of the relations of the Oneota or the Shakopee as you have.

Many years I have been gathering facts and have freely imparted them to any one who might use them, but I must cease trying to keep others from falling into error. My main job now is to publish as much as I can of what I know.

Sorrowfully, but none the less sincerely yours,

E. O. Ulrich

EOU-NN

June 14, 1931

Mr. L. E. Workman,
State Geological Survey,
Urbana, Illinois

Dear Mr. Workman:

Enclosed please find:
copies of the logs of Amboy oil test and Galena city which
you sent me
blue-print of my section for the Kansas Geological Society
description of same

I will be glad to have any comments or corrections which you
may have to offer. Thank you for all you have done towards this project.

I do not like the vertical scale for such geology as shown here
but that was not my choosing. Probably it will not look so bad when joined
onto the other sections.

You do not need to return any of the material I have sent..

Dr. Leighton writes that he has no work for me this summer
so I probably will not see you soon. I intend to go out and work with
a few students during the latter part of the summer. Also may go on the
Kansas Geological Society excursion in September.

Very truly yours,

Geologist in charge of well records

June 13, 1931

June 13, 1931

Mr. Anthony Folger,
~~Mr. E. A. Workman,~~
State Geological Survey,
~~Washington~~

Dear Mr. Folger:

Enclosed please find:

manuscript of the cross section prepared as per your
directions as well as I could do it.

summary of well logs to aid the draftsman in reading the
figures which are somewhat crowded in places.

In reply to yours of the 6th I have not forgotten the description. I have prepared the manuscript but have to submit the same to Messers Newcombe, Workman, Ulrich, Raasch, and Been for criticism and official approval. Since most of it is based on published information this is only a formality and should not delay it long. It is a little over the specified length but I will leave it to you to use a blue pencil wherever you think best. The list of logs will come with this manuscript. The one which is sent with the section is not for publication. Please note that "Drift" includes any surface materials in this. On the section I have left all the surface uncolored. I tried to put in the dolomite symbol and then regretted it. However, I think the table of logs will help in case of any trouble in tracing. In northeastern Wisconsin I could fix neither the base of the Trenton (Galena) nor top or bottom of the Eau Claire. The dotted lines adjoining the latter should not be mistaken for shale. I would show the Eau Claire as very fine sandstone with scattered dolomite and shale symbols. The Trempealeau should be shown as sandy dolomite. The Prairie du Chien should show more chert than the Galena. Notes to this effect have been placed at left of the section. The vertical scale is much too great for this region and everyone who has looked at the section exclaimed violently on that point! However, it will not seem quite so bad joined to the rest, at least I hope not.

In regard to the Canadian shield, none of the section reaches the shield proper. It ends in the Lake Superior Highland, an offshoot. The main body of this is left on the south slope of the Huron Mountains. I have discussed the physiographic features in my manuscript.

I hope to plan my summer so as to be able to come on the excursion in September. I intend to take some students into the field in August and want to plan that expedition (made necessary by the discontinuance of field work of the State Survey) so as to close in time.

Very truly yours,

Geologist in charge of well records

June 12, 1931

Mr. R. B. Newcombe,
State Geological Survey,
Dept. of Conservation,
Lansing, Michigan

Dear Mr. Newcombe,

Thank you for the copy of the new map of the Lower Peninsula. I have this hanging in my study at home. If you have not sent one to the Geology Department could you please do so as I like to keep our set of mounted state maps up to date. Possibly one has been sent to the University Library in which case we will probably get it.

Enclosed is preliminary blue print and copy of description of the Kansas Geological Society cross section. If you have any suggestions please make them as soon as possible as they want to get at the drafting by July first. Northern Michigan is a puzzle. I havnt the remotest idea as to the Paleozoics northwest of Escanaba or as to the Lake Superior sandstone. I feel that it is a mistake to apply the name Lake Superior to the entire thickness of sandstones. Are not Lane's terms Jacobsville and Munising better? In showing northern Michigan logs I have used our classification and based the formations solely on my own determinations from samples and published records. I hope this will be all right with you. I was instructed by Mr. Folger to use Iowa names so far as possible. With this in mind I have disregarded the Michigan names. Possibly they should also be shown.

I will be glad to have your comments. Was I to keep the well logs? I already have copies of some and am returning those herewith.

Very truly yours,

Geologist in charge of well records

June 12, 1931

Dr. E. O. Ulrich,
U. S. National Museum,
Washington, D. C.,

Dear Dr. Ulrich:

Enclosed please find preliminary copy of a cross section of Wisconsin and northern Michigan which I have prepared for the Fifth Annual Field Conference of the Kansas Geological Society. The description is to be published with the section. This is part of a cooperative project for a section from Lake Superior to the Rio Grande. Please note that I did not choose the vertical scale!

As your name is mentioned a good many times I thought it well to send you a copy before the final draft is made. If you do not find anything which shocks you too much you do not need to reply. In general I have followed the discussion of my 1923 paper on deep wells.

I am staying home this summer and will revise my Outline of Glacial Geology. I don't think that your statement of 1914 that no two glacial geologists ever agree (except on a negative statement as Weidman and I did when you asked "Is that a drumlin") holds true any longer. The last two field seasons were spent on the Illinois Survey doing road material work. I found that most of the younger men are now in substantial agreement on nearly everything. In fact they agreed better than others, for the directions for this cooperative section said that the planner, Mr. Folger, hoped we could make the different sections fit "without too much of a fight"!

With best regards,

Very truly yours,

Geologist in charge of well records

THE KANSAS GEOLOGICAL SOCIETY

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Mr. Fred T. Thwaites
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

I wish to call your attention to Article C, of the instruction sheet forwarded you some time ago, which calls for a written discussion of about five pages single spacing for each state section. I presume that you have had this in mind, but I wish to make certain that it has not been over looked.

Probably some time in the near future I shall receive your completed section, and I am looking forward to its receipt with considerable anticipation. I wish you would note thereon, if it be possible to do so, the southern boundary of the Canadian Shield.

The Committee on Arrangements wishes me to thank you for your order for their 1931 Guide Book, and to express their hope that nothing will interfere with your participation in the Conference.

Thanking you for your continued cooperation, and with kindest personal regards.

Very cordially yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

Please forward section rolled in a mailing tube

June 8, 1931

Dr. James H. Lees,
Assistant State Geologist,
Des Moines, Iowa

Dear Dr. Lees:

I am afraid that I have been a long time thanking you for your letter of May 19. I have now drawn my part of the cross section, 525 miles in all. I decided to let the record of City No. 5 at Dubuque stand as Norton gives it. I find that the typical Eau Claire seems to thin to the southwest more than I thought for at first. Mr. Workman kindly restudied the Galena samples and made the formation about the same as at Dubuque. I think that it is clear that no pre-Cambrian was reached in Linwood Cemetery No. 2 so simply projected the known slope for its top down to the Iowa line.

Probably you have not had the trouble with the surface topography that I did. Some of the pre-Cambrian monadnocks quite put the Matterhorn to shame on this scale!

Very truly yours,

Geologist in charge of well records

THE KANSAS GEOLOGICAL SOCIETY

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Mr. Fred T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

Your letter of May 26 came to hand this morning, with check inclosed for \$8.00, covering the cost of the Proceedings of the Fourth Annual Field Conference. I wish to thank you for purchasing a copy of this book.

I was more than interested to learn of the progress which you are making in your section, and I shall await its receipt with considerable anticipation.

With kindest personal regards.

Very truly yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK
cc/ N.W. Bass

May 26, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

At last I had time to look over the two books which you sent me May 11. I decided to keep the Proceedings of the Fourth Annual Field Conference and am enclosing check to Kansas Geological Society for \$8.00. I am returning the other under separate cover and the balance of the stamps are enclosed.

I hope to be able to attend the Fifth Conference but plans for the summer are still unsettled.

The section is progressing on schedule. Almost all the records are tabulated. I drew up a small part of the section to see how it would look and then made some minor changes in routing. I also wrote Mr. Newcombe of the Michigan Survey who furnished all the well data they have in the Northern Peninsula. I wrote Mr. Lees and obtained a copy of his route also permission to change the published record of one of the Dubuque wells to agree with my determinations. We both chose the same well for a junction point. I also secured authority from Mr. Bean, State Geologist, and Dr. Leith, so I think that everything but permission to include the Galena well log in Illinois has been secured and that is merely a matter of form as most of it has already been published.

Thank you for the recent letters containing suggestions,

Very truly yours,

Lecturer in Geology

Wichita, Kansas
May 21, 1931

Messrs: Fred T. Thwaites, Madison, Wisconsin
James H. Lees, Des Moines, Iowa
H. S. McQueen, Rolla, Missouri
Roy H. Hall, Wichita, Kansas
Fred A. Bush, Tulsa, Oklahoma
M. G. Cheney, Coleman, Texas

Gentlemen:

Some doubt exists in the minds of some of the contributors to the cross section of the Central United States, relative to the meaning of paragraphs U. and V. in the instruction sheet issued some time ago. It may be advisable, therefore, to transmit an additional explanation of the meaning of these paragraphs.

Paragraph V. suggests that gradational changes in lithology be represented in color on the original drawing of the state sections, instead of by conventional symbols generally used for lime, shale, sand, etc., in order to cut down the time and labor of the contributor.

One or two of you gentlemen interpreted this to mean that the colors were to be used to show the formational divisions. In other words, it was their thought that the contacts between say the Mississippi lime, Kinderhook shale, Siluro-Devonian, etc., would be drawn on the section and that a separate color would be used for each of these formations. That is not at all the thought which I had in mind. Contacts are to be drawn in ink, but the colors are to be used only to illustrate the character and gradational changes of the formations. Possibly the Lansing-Kansas City group of Kansas and Oklahoma may be taken as an example. This group starts out in northern Kansas as an almost solid body of limestone. As it progresses southward an increasing amount of shale and sand replaces the limestone until at some point in Oklahoma almost all of the limestone is gone. In this case the top and bottom contact of the Lansing-Kansas City group would be placed on the section. Within this contact, however, the gradational change of lime to shale to sand is to be represented as accurately as possible and a certain color used to indicate the limestone portion of this group, another color the sandstone portion, with the shale possibly left blank.

The suggestion then for the use of colors in paragraph V. does not apply to the representation of formations themselves, but applies to the lithologic content of these formations. However, if the contributors desire to represent these gradational changes in lithology by the conventional symbols for lime, sand, shale, salt, dolomite, etc., that will be

entirely satisfactory. It was simply our thought to devise some scheme whereby your actual labor might be reduced.

If you will refer to the May 1931 Bulletin of the A. A. P. G., Vol. 15, No. 5, on Page 542, you may possibly derive a clearer idea of how the final drafted section will appear. The only change will be that vertical lines will be inserted representing the wells and the contacts between different formations and groups will be represented by heavier lines. The heaviness of the contact line will depend upon the geologic importance of the contact. In other words, the contact between Pennsylvanian and Mississippian will be represented by an exceptionally heavy line; whereas the contact between say the Cisco and the Canyon, and between the Wabaunsee and The Shawnee will be represented by a line not quite so heavy. Also, the information on Page 542, which appears on the left and right hand sides of this section, will necessarily be omitted.

This section on Page 542 is one of the clearest and most carefully prepared sections of this type which I have observed, and we expect to use it more or less as a type from which to prepare the final section. Especially does it illustrate the manner in which formational names can be drafted with the conventional symbols for limestone and sand surrounding them. You will note that the author of this section has used conventional symbols for shale. It is our expectation to leave shale blank. On the other hand, if a certain shale unit persists for hundreds of miles and is of sufficient importance, we may decide to represent it somewhat after the manner of this section.

Should there still be any doubt in your minds as to the exact meaning of paragraphs U. and V., please let me know and I will attempt to explain it in further detail.

Trusting your cross section work is progressing rapidly, and with kindest personal regards.

Very truly yours,

Anthony Folger

Anthony Folger
Box 1144

AF:DK

cc/ H.P.Bybee, San Angelo, Tex.
cc/ E.H.Sellards, Austin, Tex.
cc/ N.W.Bass, Chickasha, Okla.

May 25, 1931

Mr. R. B. Newcombe,
Geological Survey Division,
Department of Conservation,
Lansing, Michigan

Dear Mr. Newcombe:

I wish to thank you for your letter of the 19th also the separate received some time ago.

I will only be able to show some of the wells near Escanaba and Wells. In doing so I will follow my classification as shown in my blue print logs if this is all right with you.

My section will be on the scale of 1 inch to 20 miles (horizontal) and 1 inch to 400 feet (vertical). It is part of the general section of the United States which will be a subject of discussion at the Fifth Annual Field Conference of the Kansas Geological Society. Copies of the final section will be distributed then. Meantime I will trace and have blue prints made of my part and will send you one of these.

There is no news about the Geological Survey that I know of. I understand that the well record work will go on as usual, however. Records have been few this winter on account of the depression. We may take advantage of the lull to work up some of the data for publication.

Very truly yours,

Lecturer in Geology

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May 19, 1931

Mr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

I was interested to learn of the cross-section on which you are working for Mr. Anthony Folger. The summary of the important deep wells in the southern part of the Upper Peninsula, showing the thickness of the various formations, is given on the attached list.

I am also including a complete collection of all the records which we have for the Upper Peninsula. I hope these will furnish additional data that will add to the completeness of the section on which you are working. No doubt our divisions of some of the Cambrian and Ordovician formations are somewhat different than you would make them on the basis of Wisconsin nomenclature. Many of these records were correlated sometime ago and, therefore, the formation divisions may be rather generalized.

If your cross-section is drawn up on tracing cloth or paper so that we can get a blueprint, I would be very pleased to have one for the Survey files.

We were very much disappointed to learn that the appropriation for the Wisconsin Survey had been cut off and hope that this will only be a temporary arrangement. Our budget has been somewhat cut but the amount will be sufficient for the general routine Survey affairs. Most of our curtailment will be on the field parties.

I trust these records will help you in the work that you have underway, and with kindest regards, I am

Yours very truly

R. B. Newcombe

GEOLOGICAL SURVEY DIVISION
Petroleum Geologist

RBN:M
Encs.

STATE OF IOWA
IOWA GEOLOGICAL SURVEY
DES MOINES

GEORGE F. KAY, DIRECTOR

JAMES H. LEES
ASST. STATE GEOLOGIST
NELLIE E. NEWMAN
SECRETARY

DES MOINES,

May 19, 1931.

Mr. F. T. Thwaites,
University of Wisconsin,
Madison, Wis.

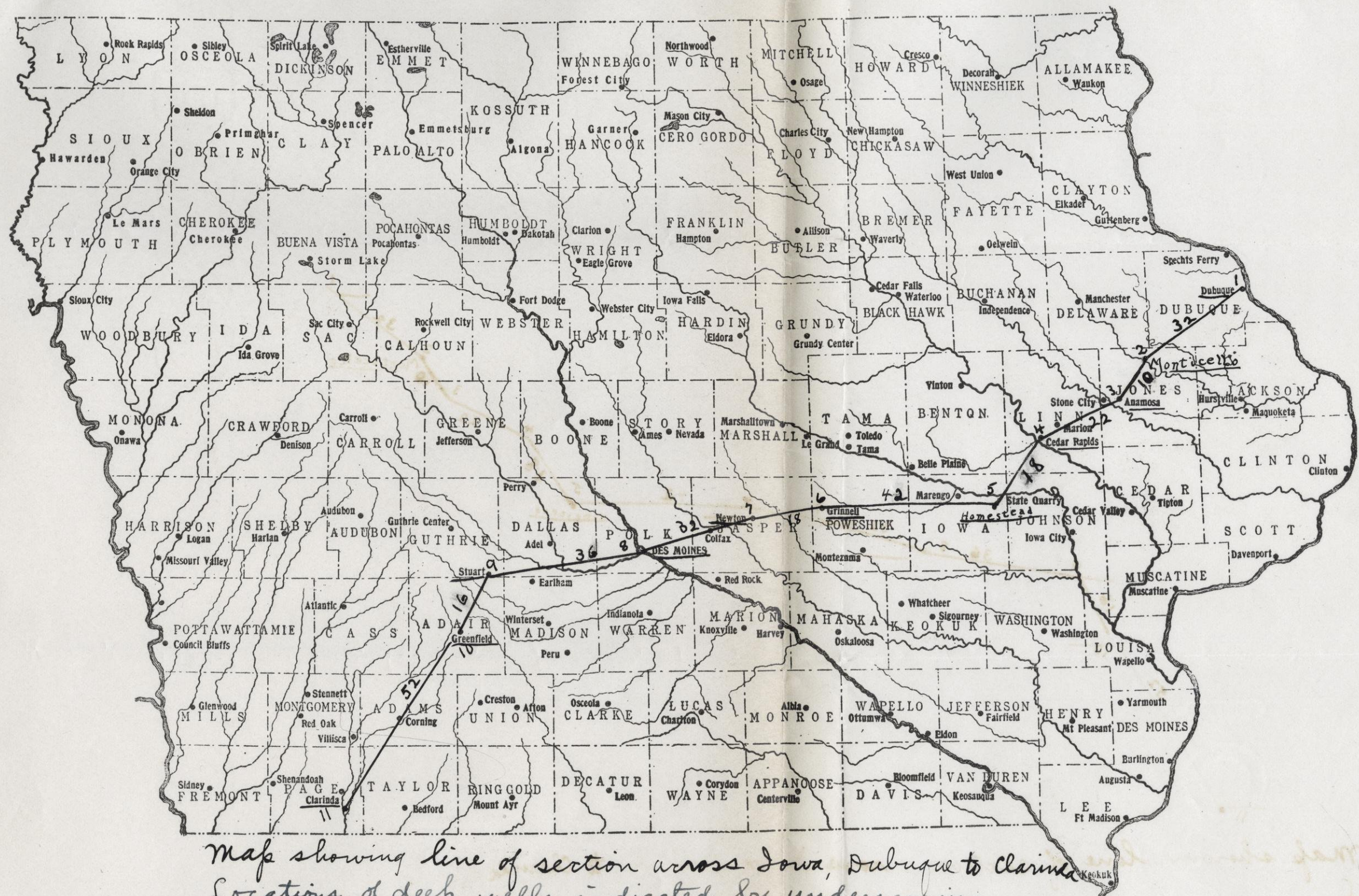
My dear Mr. Thwaites:

I was just about to write to you with regard
of
to the cross section when I received your letter yesterday. I also
had fixed on city well number 5, at Dubuque, for the starting point
of my section. Since you have that in our report it will not be nec-
essary for me to describe it to you. I am sorry that we do not have
a record of the Linwood Cemetery well, but I suppose that we can
make a fairly accurate guess as to the character of the strata in
its lower part. I shall be glad to know what you finally decide
about the thickness and limits of the Eau Claire, so that we can
make our wells agree. I am willing to take your decision as you have
no doubt studied the Cambrian formations more than I have.

If I can be of any further help in correlating
the sections please let me know.

Very truly yours,

James H. Lees
James H. Lees,
Asst. State Geologist.



Map showing line of section across Iowa, Dubuque to Clarinda 
Locations of deep wells indicated by underscoring
Distances between wells indicated by figures along section line
Numbers of wells shown by figures at names of towns
Total distance, 278 miles

Distances between wells indicated by figures along section line

Numbers of wells shown by figures at names of towns

Total distance, 288 miles

May 19, 1931

Mr. L. E. Workman,
State Geological Survey,
Urbana, Illinois

Dear Mr. Workman:

I have taken the job of preparing the Wisconsin and northern Michigan parts of a cross section of the United States from Lake Superior to the Rio Grande for the Kansas Geological Society. This section passes for about a mile through the far northwestern tip of Illinois.

I thought that to help bridge the gap from Dubuque to Skullsburg I would project the log of the Galena city well onto the line. If I diverge to take in Galena it makes a false impression of an anticlinal uplift at Dubuque.

Will there be any objection to using the log of this well? Much of it was published in my Report of Investigations a few years ago.

Have you any new interpretations or new logs which would help in making this section? If so I would like permission to use them. I did not write the Chief direct as I feared that he is very busy and would have to consult you first anyway.

You have probably heard of the fate of the Wisconsin Survey. I do not yet know what will be the status of my work.

With best regards,

Very truly yours,

Lecturer in Geology

May 18, 1931

Dr. James H. Lees,
Assistant State Geologist,
State Capitol,
Des Moines, Iowa

Dear Dr. Lees:

I have taken the assignment to make the Wisconsin and northern Michigan portions of the cross section of the United States sponsored by Mr. Folger for the Kansas Geological Society. I note that you have taken the job of making the Iowa portion and that it is my duty to get in touch with you as to the junction of the two sections. As I understand it we are to both show the same well at Dubuque. I chose City No. 5 as given in the last report on deep wells. I noted that the nomenclature used by your Survey is essentially the same as that I use so there will be no trouble on that point. I intend to show the base of the Cambrian not far below the bottom of Linwood Cemetery No. 2 which seems to be the deepest well in the region. The only point on which we may disagree is the thickness of Eau Claire at Dubuque. I make it much more at Galena, Illinois but as I read over the descriptions at Dubuque I can so far make it no more than does Dr. Norton. However, I will check on the Farley and Loetscher samples which I have. My tracing makes Eau Claire from 870 to 1049. I might possibly stretch that to 1160. Of course, you know that the lower limit of Eau Claire is most indefinite and for that matter the upper one is also.

I have started the section by listing all logs and have also platted some of them.

Hoping to hear from you soon,

Very truly yours,

May 18, 1931

Mr. R. B. Newcombe,
State Geological Survey,
Lansing, Michigan

Dear Mr. Newcombe:

I have taken the assignment to draw up a portion of the cross section of the United States from Lake Superior to the Rio Grande which is being sponsored by Mr. Anthony Folger for the Kansas Geological Society. My part starts at Dubuque, Iowa and will pass through northern Michigan from Menominee through Escanaba, thence northwest to the Huron Mountains, thence north to Stannard Rock in Lake Superior. I think that when asked to do this Mr. Folger did not realize that Wisconsin was separated by Michigan from so much of Lake Superior.

I plan to use the log of the Wells, Michigan well. This is all I have. I will use the interpretation I arrived at in order to make the geology uniform with Wisconsin and Iowa which uses essentially our classification of the Cambrian.

If you have any other records which would help could you secure the permission of the State Geologist to either let me use them or to have you cooperate on the Michigan portion of the section?

Very truly yours,

THE KANSAS GEOLOGICAL SOCIETY

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WICHITA, KANSAS

FIFTH ANNUAL FIELD CONFERENCE

May 15, 1931

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Messrs. Fred T. Thwaites, Madison, Wisconsin
James H. Lees, Des Moines, Iowa
H. S. McQueen, Rolla, Missouri

Gentlemen:

One of the important stratigraphic divisions which will be shown on the cross section of the Central United States, throughout Kansas, Oklahoma and a portion of Texas, is the Simpson formation of Oklahoma.

There has been and still is much debate among Oklahomans relative to just what the Simpson formation means and represents in the Standard time scale. It is my understanding that the Simpson formation as originally described extended from the base of the Viola limestone to the top of the Arbuckle limestone. Subsequently, this interval was divided into two portions, an upper called the Bromide Formation, and the name Simpson was restricted to the lower part. The most recent analysis of the problem is contained in Volume 14, No. 12, of the Bulletin of the American Association of Petroleum Geologists, under date of December, 1930, and appears in Tables 7 and 8, on Page 1498, and in Fig. 2 on Page 1512. It will be observed that the Simpson has been divided into a number of formations and correlated with the Black River and Chazy divisions of the Standard time scale. It may even go higher and include some Trenton.

It is planned throughout Oklahoma and Kansas to sub-divide the Simpson group into an upper Black River part and a lower Chazy part similar to Fig. 2 on Page 1512, as mentioned above. In Kansas all of the Simpson is undoubtedly referable to the Black River.

The principal reason for writing at this time is to urge you to indicate the contact between the Black River and Chazy on your section, if it is possible to do so. We anticipate to present one section, which will be displayed at the evening meetings during the Conference, which will be colored. Provided it is possible to do so, we plan to take certain equivalent groups or groups of formations, which represent the same time interval throughout the entire length of the section, and assign them an individual color. Two of these divisions which would be represented by different colors would be the Black River and the Chazy, provided that contact can be determined throughout the northern part of the section.

According to the information which is at hand, the Simpson formation of Oklahoma would extend approximately from the top of the Spechtsferry shale member of the Decorah formation down to the top of the Beekmantown.

It appears that in Iowa and Wisconsin, as well as in northwestern Missouri, that the Chazyan portion of your section is confined to the upper Chazy or Blount group, with an absence of the middle and lower Chazy, and that correlations of these two lower parts appear in Oklahoma.

In order to represent this division successfully it will be necessary ~~not only~~ to indicate the ^{top + bottom} contact ^{of} between the Black River, (in line with the thought that the top of the Simpson is approximately equal to the top of the Black River). There would appear to be little difficulty in indicating the boundary between the Black River and the Chazyan, since in Iowa this would represent the contact between the Platteville limestone and the Glenwood shale, in Wisconsin the Platteville limestone and the St. Peter sandstone, and in Missouri the contact between the Platin limestone and either the Joachim limestone or the St. Peter sandstone. It appears more difficult to indicate the contact between the Trenton and the Black River, although this difficulty may be confined almost entirely to Iowa, which would call for the showing of the contact between the Guttenberg limestone and the Spechtsferry shale.

I hope you will give this your consideration and attempt to show on your section both the top and the bottom of the Black River. This will automatically fill the desired need. Should you have any question in this regard, I shall be glad to hear from you.

Trusting that your cross section project is progressing satisfactorily, and with kindest personal regards.

Very truly yours,

Anthony Folger.

AF:DK

May 14, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

I have been delayed in answering your letters of April 24 and May 1 by the rapid succession of field trips at this season of the year. Now that these are all over I will be able to start on the cross section and will follow the suggestions to the best of my ability.

In regard to the field conference I am anxious to go but cannot tell for certain just yet as plans for the summer are still unsettled. I have been much interested in looking over the proceedings of previous conferences and have greatly admired the care with which they have been arranged. This has particularly interested me as I have to prepare the Wisconsin route of one of the excursions for the 1933 International Geological Congress. I think that I may go over the route myself before finishing my description but it is hard to do this before July 1 and still worse to arrange things for two years in advance!

I have not finished looking over the books but will decide in a day or two whether or not to keep them. In any case I wish to thank you for sending them.

Very truly yours,

Lecturer in Geology

THE KANSAS GEOLOGICAL SOCIETY

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FIFTH ANNUAL FIELD CONFERENCE

May 1, 1931

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Mr. Fred T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

In as much as we have never had the honor of your participation in one of the field conferences of the Kansas Geological Society, it has occurred to me that you have no concrete knowledge of the manner in which these conferences are carried out, nor have you any knowledge of the type of publication issued by the Society in conjunction with these conferences.

Therefore, I am forwarding to you under separate cover two publications constituting the Proceedings of the Third and Fourth Annual Field Conferences of this Society. An examination of them will give you a far better idea of the kind of a conference which this Society sponsors each year than any amount of written description. I would call your especial attention to the maps and pamphlets in the pockets of each book, as well as to the list of participants at the end of each book.

I have not the authority to offer you complimentary copies of the books, so I have inclosed herewith \$0.36 in postage, which will cover the return postage, plus \$15.00 insurance. At your convenience I wish you would return them to me.

I wish it emphatically understood that I am not conducting a sales campaign. Therefore, I am not transmitting these books in the hope that you will purchase them. However, should you be so inclined, they are for sale by the Society. The cost of the Proceedings of the Third Annual Field Conference is \$5.00 and of the Fourth Annual Field Conference \$8.00. This charge includes all of the maps and pamphlets in the pockets of both books. Should you be disposed to retain either or both, please make your check payable to the Kansas Geological Society and forward it to me. Some 300 copies of each of these books have been sold to petroleum geologists and college professors all over the United States.

I wish to repeat again, however, that I am most certainly not asking or expecting you to purchase these books. I am simply forwarding them to you for your inspection in order that you may gain an adequate impression of the thoroughness of preparation with which this Society plans its annual field conferences.

That brings up the subject of your own participation in the Fifth Annual Field Conference, to be held the first week in September of this year. It is our hope that all of the contributors to the Central United States cross section can so arrange their summer itinerary as to include this trip in their plans. The Conference is to be held in the Wichita, Arbuckle and Ouachita Mountains of Oklahoma, and will extend into Arkansas to the vicinity of Hot Springs. The preliminary announcement of this Conference will be issued by the Committee on Arrangements within the next few weeks. A copy of this will be mailed to you, and from it you will procure additional information. However, I wish you would think it over and let me know whether or not you think it possible that you can attend.

Letters from the other contributors to this section reveal the fact that the cross section project is rapidly taking concrete form and is being pushed forward to completion. It is also gaining in interest and importance and it is evident that the men who prepare this section will have contributed a piece of work of the utmost economic and scientific importance. It is estimated that between 500 and 1000 copies of this section will be disposed of in addition to those supplied to the participants of the Fifth Annual Field Conference. It is highly probable that the section will be used by most of the departments of geology of the universities and colleges throughout these United States, and that it will stand as a typical and concrete example of the structure of the Central United States. For this reason, we will wish to make it as accurate and as detailed as consistent with our present information.

With kindest personal regards.

Very cordially yours,

Anthony Folger.

AF;DK
cc/ N.W. Bass

THE KANSAS GEOLOGICAL SOCIETY

FIELD CONFERENCE COMMITTEE

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FIFTH ANNUAL FIELD CONFERENCE

April 24, 1931

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E. A. WYMAN

Mr. Fred T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin

Dear Mr. Thwaites:

Your letter of April 18, with map attached showing the proposed route of the section through Michigan and Wisconsin, has arrived, and I wish to express my thanks for the information contained therein.

The route as outlined on your map is highly satisfactory. One point only needs to be discussed.

I have not at hand a map of Michigan in sufficient detail to show the ^{geographic} location of the Huron Mountains in relation to the south shore of Lake Superior. Presumably they are situated at or near the southern shore of the Lake, since you state that Stannard Rock is in Lake Superior and distant but 53 miles from the Huron Mountains. As long as the section will extend on the south to the Rio Grande River ^{from} the boundary line between the United States and Mexico, possibly it should begin as near the Canadian-Michigan boundary line as possibly. Just where this line occurs I am uncertain, but it may be that you will wish to continue the section into Lake Superior at Stannard Rock. In all events, I think it should begin not any farther south than the south shore of Lake Superior, so that the section can be described as a cross section of the Central United States from Lake Superior to the Rio Grande River.

Let us decide, therefore, that your section will start at or near the Huron Mountains on the south shore of Lake Superior and may, at your discretion, begin at Stannard Rock.

It is my understanding that the Cambro-Ordovician nomenclature of Wisconsin is approximately the same as that used for Iowa. Although there may be slight differences, if you can arrange to use the Iowa subdivisions for the Wisconsin and Michigan portions of the section, it will simplify matters materially, since then the same stratigraphic subdivisions will pertain from the northern end of the section to the Iowa-Missouri line.

Transmitted herewith is a rather detailed statement, containing suggestions and information relative to the construction of the cross section, which I trust will not give you too much of a headache to read. Especially may I call your attention to Numbers C, G, S, T, U, V, X, Y, Z. Should any of the numbered paragraphs leave you in doubt as to just what is meant, please let me know and I will try to clarify my remarks. Since the individual state sections are to be joined to form one continuous section, you will at once recognize that the whole project will have to be done similarly for each state. I am sorry to have to disappoint you on the scale, but I think it will be for the good of all concerned.

Wishing you the greatest success in your part of this project, and again expressing appreciation for the service which you will render.

Very cordially yours,

Anthony Folger
Box 1144

AF:DK
cc/ N.W.Bass

INFORMATION AND SUGGESTIONS RELATIVE TO THE CONSTRUCTION
OF THE CROSS SECTION THROUGH THE CENTRAL UNITED STATES FROM CANADA TO MEXICO

All of the individuals who were requested to cooperate with the Kansas Geological Society, to prepare for its Fifth Annual Field Conference, a cross section through the central United States from Canada to Mexico have accepted. The members of the Committee on Arrangements for this Fifth Annual Field Conference desire that I convey to you gentlemen their sincere appreciation, both for the cooperation which you will render and for the enthusiasm you have displayed relative to the project.

The individuals who will be responsible for the construction of the state sections are:

Wisconsin & Michigan;	Fred T. Thwaites; Lecturer in Geology, University of Wisconsin.
Iowa;	James H. Lees; Assistant State Geologist.
Missouri;	H. S. McQueen; Missouri Geological Survey.
Kansas;	Roy H. Hall; District Geologist, Gypsy Oil Company.
Oklahoma;	Fred A. Bush; Chief Geologist, Sinclair Oil and Gas Company.
Texas;	M. G. Cheney; President, Anzac Oil Corporation.

The exact location of the route of this cross section has not been determined definitely. However, the route will be approximately as follows: The section will start in the Canadian Shield at or near the Huron Mountains in Michigan, extending southeastward to Escanaba and southwestward to Peshtig, Wisconsin; thence southwestward through Green Bay, Oshkosh, Kilbourn and the Baraboo Uplift to Evansville, and thence westward to Dubuque, Iowa; thence southwestward through Cedar Rapids, Des Moines, and Greenfield to Clarinda, Iowa; thence southward through extreme northwestern Missouri to Oak Mills, Kansas; thence southwestward through Topeka, Osage City, Iola, Fredonia, and Elgin, Kansas, and continuing southwestward in Oklahoma through Cushing, Oklahoma City, the Arbuckle Mountains, to the Red River in northwestern Cooke County; thence southwestward in Texas across Wise, Jack, Stevens and Taylor Counties to the Big Lake field; thence through the Fort Stockton high and the Marathon and Solitario Uplifts to the Rio Grande River.

The following instructions and suggestions relative to the preparation of this cross section are offered for your guidance and convenience.

It is recognized that it is difficult to draw up a generalized plan which will fit specific cases which may occur in the preparation of individual state sections. It is asked therefore that you conform as nearly as possible to the following scheme, and if specialized cases arise, use your own good judgement:

A.

It will be absolutely necessary that each state section be in my hands by July 1, in order that it may be drafted and printed in time for the Conference on September 1. If it be possible to complete your section before that date, we shall be appreciative, since the drafting may require a greater length of time than we anticipate. I am informed by Dr. Lees that he plans to complete the Iowa section in May and Mr. Thwaites advises that he expects to have Michigan and Wisconsin completed by about the 15th of June.

B.

It is planned to draft this section in final form and to have a sufficient number of preliminary copies printed, before the final prints are run off, in order to forward to each of you a copy of the complete draft so that it may be checked and returned with any errors noted thereon. The original tracing can then be changed if necessary. For this reason it is especially urged that you get the section into our hands before the first of July if it is possible to do so.

C.

Mr. Bass requests me to say that it is the hope of the Committee on Arrangements that each of you, after your state section has been completed, will prepare a written statement, discussing the salient features of the stratigraphy and structure portrayed in the section. This written statement may be as long as 5 pages of single spacing, and they will be glad to have you discuss any matters which you may think pertinent. These six typewritten reports will be included in the Proceedings of the Fifth Annual Field Conference as a single article which will supplement the cross section and increase its value. Each state report will bear the signature of the author.

D.

All sections will be drawn on sea level as the datum plane.

E.

The horizontal scale to be used is 1 inch to 20 miles, with a vertical scale of 1 inch to 400 feet. We trust that the scale chosen will be satisfactory to all concerned. It will be obligatory, however, that all of the individual state sections be constructed on the above scale.

F.

The approximate length of the section is as follows:

Michigan & Wisconsin	420 miles
Iowa	250 miles, est.
Missouri	100 miles
Kansas	160 miles
Oklahoma	250 miles, est.
Texas	520 miles, est.
Total	1700 miles

The vertical range necessary will be 6,000 feet above sea level and 8,000 feet below sea level, requiring a vertical range of 14,000 feet. On the scale chosen this will produce a final product 35 inches wide and 80 inches long, or 3 by 7 feet.

G.

It is not planned to reduce the original drawing, so that the final section will be printed as blue line white prints, on 100 percent Strathmore paper, without reduction. While a map 3 by 7 feet is unusually large, it is believed that its size is consistent with the information to be shown and with the area covered. Any reduction would probably be detrimental to the fineness of detail in which the pre-Mississippian formations will be represented.

H.

It is recommended that you prepare your section on coordinate paper, preferably light green lines on a back ground of heavy white paper, with 10 coordinate squares to the inch. This coordinate paper comes in rolls 20 inches in width, which will permit a vertical range of 8,000 feet. For the Oklahoma and Texas sections it will be necessary to join two 20 inch strips of coordinate paper, thereby giving the necessary vertical range.

I.

All wells are to be represented by a single black line with the total depth in feet marked at the bottom of the hole.

J.

All wells are to be numbered on the individual state sections from north to south consecutively, starting with #1. When the final section is drafted all of the wells throughout the entire length of the section will carry consecutive numbers from north to south, starting with Michigan.

K.

It is suggested that you transmit, on a separate typewritten sheet, a key to these consecutively numbered wells. Each number is to carry the company and farm name of the well, its exact location as to section, township and range or block, together with the surface elevation of the well. Wherever the information is at hand the location of the well is to be given in detail, such as NEc SW/4 SE/4 of Sec. 12, T. 25S., R. 10E. The final draft of the section will carry a key of these consecutively numbered wells with the information submitted by you. This will either be typewritten or set up in type on a printing machine, and the complete list superimposed on the tracing cloth in some convenient space.

L.

The position of county boundaries is to be represented at the extreme top of your section, somewhat after the fashion shown in Plate 3, opposite Page 971 of Bulletin of the American Association of Petroleum Geologists, Volume 14, No. 8, for August 1930.

M.

It is recommended that you draw in the surface topography between wells on the section with as much detail as consistent with the information at hand. Where the line of section crosses areas of United States Geological Survey

COUNTY
COUNTY

topographic sheets, the topography can be constructed from these sheets. Otherwise, it will have to be generalized.

N.

Any prominent geographic and structural features such as the Huron Mountains, Baraboo Uplift, Mississippi River, Arbuckle Mountains, Red River, etc., are to be represented in their proper position at the top of the section, somewhat similar to the form used in the north-south cross section on Plate 2, opposite Page 969 of Bulletin of the American Association of Petroleum Geologists, Volume 13, No. 8, for August 1929.

O.

The points of outcrop of all formations in the section are to be shown at the surface wherever this information is at hand.

P.

The exact depth of all important contacts is to be indicated in feet just to the right of each vertical single line representing a well, such as has been done on Plate 2, opposite Page 970, Bulletin of the American Association of Petroleum Geologists, Volume 14, No. 8, for August 1930. (The only difference being that here the authors have used a double line for each well, whereas we will use a single line.)

Q.

On wells wherein sample information is at hand and is used, it is suggested that the vertical range of this sample information be represented. Possibly this can best be accomplished by placing horizontal lines approximately 1/10th of an inch in length, on the left hand side of the single line which represents the well, at the top and bottom of where this sample information begins and ends, with a small arrow pointing down from the top and up from the bottom. Small gaps in sample information may be disregarded.

R.

It is requested that you submit with the individual state sections a small scale state map, on which the counties are shown, preferably a U.S.G.S. Base Map on the scale of 1 inch to 16 miles, on which the exact location of the section is accurately posted. If you wish to indicate the wells in the correct positions on this line, with numbers corresponding to that used on the section, it might be helpful additional information. The final draft of the section will contain a key map of the central United States on which the section will be posted as accurately as the scale used permits. However, since this scale is unknown at the present time, it is asked that your information be detailed. We hope to use a map somewhat similar in scale and type to the map appearing as Figure 1, opposite Page 1539 of the Bulletin of American Association of Petroleum Geologists, Volume 14, No. 12, for December 1930.

S.

Throughout Kansas, Oklahoma and Texas it will undoubtedly be wise to project most of the wells used onto the line of section. Angles in the line of section are permissible and essential. However, if key wells are picked out say from 20 to 30 miles apart and joined by a straight line, intervening wells can then be projected onto this line of section. This will both

decrease the number of angles in the section and will permit the use of certain wells, by projection, which otherwise might have to be left out.

T.

The detail in which stratigraphic subdivisions are represented will be dependent largely upon the information at hand at any point on the section. In the Permian and Pennsylvanian it is hoped to portray divisions as small as the Cimarron group, Sumner group, Chase, Council Grove, Wabaunsee, Shawnee, Lansing-Kansas City, Marmaton and Cherokee for parts of Kansas and Oklahoma, and for Texas such divisions as Double Mountain, Clear Fork, Wichita Albany, Cisco, Canyon, Strawn and Bend. For the Mississippian probably the Mississippi lime and Kinderhook will suffice. For all pre-Mississippian formations throughout the entire length of the section it is hoped that the divisions represented will be as detailed as consistent with present information. At least, it is hoped that they will be as detailed as Siluro-Devonian, Maquoketa, Galena, Decorah, Plattville, and St. Peter, etc., for Wisconsin and Iowa. The minuteness of these divisions in Kansas, Oklahoma and Texas is left to the discretion of the individuals. Possibly you will wish to show even smaller subdivisions in the Pennsylvanian than the above mentioned groups. I note that Cheney in his east-west section from Waco to Big Lake, Texas, on Plate 3 of Bulletin 2913 of the University of Texas, has been able to subdivide the Permian and Pennsylvanian in minute detail. Such subdivisions on the present section will be welcomed wherever it is possible to make them.

U.

We are hopeful that on the final drafted section it will be possible to represent gradational changes in lithology from limestone to sandstone, to shale, etc., by the conventional symbols. These gradational changes in lithology will vary in detail from point to point on the section. Some idea of what we have in mind may be obtained by reference to the following four sections, all of which have appeared in the Bulletin of the American Association of Petroleum Geologists. These are:

- ✓ 1. Figure 2, opposite Page 1513, Volume 14, No. 12, for December 1930; ✓
- ✓ 2. Plate 3, opposite Page 971, Volume 14, No. 8, for August 1930; ✓
- ✓ 3. Plate 2, opposite Page 969, Volume 13, No. 8, for August 1929; ✓
- ✓ 4. Figure 3, Page 187, Volume 12, No. 2, for February 1928; ✓
5. Also, Plate 2, opposite Page 12, in C. L. Dake's "Problems of St. Peter Sandstone", published as Volume 6, No. 1 of the Missouri Geological Survey in August 1921.

Especially do numbers 1 and 5 represent more or less what we have in mind. No. 1 and 4 for their clearness of detail and No. 4 and 5 for the manner in which formational names have been inserted within the lithologic units. However, the formational contacts of No. 4 and 5 are not as clear as we hope to

represent. It is planned to represent system contacts such as the contact between the Permian and Pennsylvanian and Pennsylvanian-Mississippian, etc., with an exceptionally heavy black line and formational and member contacts within these systems with a grade of line consistent with the importance of the contact. No. 1 illustrates exactly what is meant by a single line representing a well, excepting that the author has not represented the total depth as the bottom of the hole.

A-A

V. It is requested that you submit on a separate typewritten sheet the names of all most certainly is not our expectation that you will represent these gradational changes in lithology by the recognized conventional symbols. That will be left to the draftsman who completes the final draft. But in order to know how you wish these gradations to be shown it is suggested that you represent your lithologic gradations in color. If this is done, may we request that you use blue for limestone, yellow for sandstone, red for red beds and red shale, purple for salt, leaving shale, other than red, blank. Should you have use for additional lithologic symbols, you can use whatever colors you desire. It will of course not be necessary to indicate minor changes in lithology. If any specific unit is principally a limestone zone, it may be shown wholly as a limestone unit if you wish, even though it may contain thin beds of alternating shale. We are particularly anxious to indicate the presence of sandstone lenses and also to represent the southward change of the Pennsylvanian limestones in Kansas to sandstones in Oklahoma, such as the gradation of the top of the Kansas City into the Layton sand.

W.

It will not be necessary for your individual state section to be drafted in final form. Simply a rough but accurate draft, suitable for re-drafting at this end.

X.

It is especially urged that you draft all formational contacts so that they will be exceedingly clear and also that you name all formations to be represented so that there will be no question at this end as to its upper and lower contact. It will be infinitely better for your individual drafts to contain a considerable amount of detail for our own use, such as information which may not be used on the final draft, in order to avoid the possibility of error at this end.

Y.

It is requested that your section be carried sufficiently deep throughout the entire length of your state to show the pre-Cambrian contact, even though in a great many cases the depth to the pre-Cambrian below any individual well will have to be estimated. Possibly in some cases this estimate will be both difficult and hazardous, but we simply ask that you make the best guess you can.

Z.

It will be the duty of each individual to get into contact with the person preparing the adjoining state section or sections and agree on the correlation of the key wells at the two extreme ends of your section. Also, each state section is to contain the key well of the adjoining state section or sections. In other words, the section for northwestern Missouri will contain at its south end the Oak Mills well in T. 7S., R. 21E., Kansas and the Clarinda

well in Sec. 24, T. 68N., R. 37W., Iowa, and it will be the duty of Mr. McQueen to get in touch with Mr. Lees and Mr. Hall and see that his correlations on these two wells agree with those used by the other two gentlemen. From the standpoint of drafting these sections together, it will be absolutely necessary for these overlapping key wells to appear in your section.

A-A

It is requested that you submit on a separate typewritten sheet the names of all individuals or companies to which you desire credit given in the subtitle of the section, who have aided you in preparing a finished project.

AF:DK

Science Hall,
April 18, 1931

Mr. Anthony Folger,
Box 1144,
Wichita, Kansas

Dear Mr. Folger:

In reply to yours of the 9th which came while I was on a field trip to Devils Lake I am enclosing herewith a sketch of my latest proposal for the route of the cross section of the United States.

The details are as follows: Dubuque, Ia to Galena, Ill. 13 miles; to Shullsburg, Wis. 14 miles; to Browntown, 22 miles (many outcrops to aid here); to Monroe, 8 miles; to Evansville (some shallow wells or diverge to Brodhead en route), 22 miles; to north of Oregon (well now drilling), 12 miles; to well No. 12, Madison, 7 miles; to Sauk City (some shallow wells en route), 21 miles; to Philip Farm, 6 miles; to Kilbourn (many outcrops, mines, etc. en route), 19 miles; to Observatory Hill knob of pre-Cambrian, 22 miles with little data en route; to Lone Tree Farm (Lawsonia) near Green Lake (some shallow wells), 18 miles; to Ripon, 12 miles; to Oshkosh, 17 miles; to Neenah through State Hospital well, 12 miles; to Kaukauna through several deep wells too numerous to mention, 8 miles; to Green Bay through several intermediate wells, 20 miles; to Peshtigo almost without intermediate data, 40 miles; to Marinette, Wis. 7 miles; to Escanaba, Mich., without intermediate wells that I know of, 52 miles; to Huron Mountains showing normal overlap onto pre-Cambrian, 75 miles; if desired either to Stannard Rock in Lake Superior 53 miles or to northwest through Keweenaw Point into the Lake Superior Syncline roughly 125 miles.

Using this route the only long gaps are in the unsettled north country. In most of the gaps shallow wells and outcrops will serve to fill in details.

I decided against going northeast to Sault Ste. Marie ("The Soo") on account of the great distance and the slight amount of local detail which is available. I would prefer to see the section end either at the Horon Mountains or on the south shore of Lake Superior west of Marquette.

The total length to the Huron Mts. is roughly 427 miles.

For years I have used a horizontal scale of ten miles to an inch and vertical scale of 400 feet to one inch. I should therefore like to see the 10 mile scale used.

I can handle the Michigan portion of the section for the Michigan State Geological Survey has never done very much on that region, that is on the Paleozoics. I will consult with both Dr. Leith and Mr. Newcombe on this part.

Field trips will be all over in a month and then I can devote almost my full time to this project and finish it quickly.

Trusting the above information is satisfactory,

Very truly yours,

Lecturer in Geology

THE KANSAS GEOLOGICAL SOCIETY

FIELD CONFERENCE COMMITTEE

N. W. BASS, CHAIRMAN
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J. L. GARLOUGH
612 BROWN BLDG.

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614 ORPHEUM BLDG.

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FIFTH ANNUAL FIELD CONFERENCE

April 9, 1931

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PAUL A. WHITNEY

E. A. WYMAN

Mr. F. T. Thwaites
Department of Geology
University of Wisconsin
Madison, Wisconsin.

Dear Mr. Thwaites:

Your letter of April 6 has just been received and I hasten to acknowledge our thanks and appreciation for the co-operation which you will extend the Kansas Geological Society in preparing the extreme northern end of the proposed Central United States cross section.

Relative to the suggestion contained in your letter of different routings of the section through Wisconsin and Michigan, it is rather difficult for us to come to any conclusion at this end, since none of us are schooled sufficiently in the structural details of that area. There seems to be no doubt about the location of the section from Dubuque as far as Green Bay and your proposed route between these two points is highly satisfactory.

If I interpret your letter correctly, a section from Green Bay through Gillett and Florence, Wisconsin to Marquette, Michigan would portray the Lake Superior syncline. On the other hand, a section from Green Bay northward to Escanaba and northeastward to the Soo, (I presume this is the same as Soo Junction) would reveal a normal overlap of Cambro-Ordovician sediments on Pre-Cambrian.

If this interpretation is correct, your alternative routing, (that is from Green Bay to the Soo) would be preferable since we had in mind to portray just such a normal overlap of Cambro-Ordovician on Pre-Cambrian, as you mentioned. I think we can well omit the complication of the Lake Superior syncline.

At your convenience, I wish you would forward me a small scale map of Wisconsin and Michigan, showing either the exact or the approximate routing of this section from the Soo to Dubuque, together with a fairly close estimate of the over all distance in miles.

I wish to emphasize that the routing of the section through Wisconsin and Michigan is to be left entirely to your good judgement. There are only two structural features which we wish to bring out; first the Baraboo Uplift, and secondly a normal overlap of Cambro-Ordovician onto Pre-Cambrian. I notice that some of the towns mentioned are quite far apart and I presume that there are intervening wells which can be used, even though they may not penetrate as deep as the ones you mentioned. I think it would be well to use these, if such exist, in order to give control on the upper sediments.

We shall be very glad to have you co-operate with Dr. Leith and anyone else whom you desire, but you alone are to be responsible for the construction of the section.

A problem which is confronting us at the present time is the horizontal scale. This can not be ascertained until all of the state representatives turn in the number of miles which their section will entail. After this information is procured, the mileage for the individual states can be added and we will then be in a position to determine the horizontal scale. I wish therefore that you would let me hear from you on this one point at your earliest possible convenience. We had planned, as you know, to use a horizontal scale of 1 inch to 10 miles, but it now appears that this scale may have to be reduced, possibly even as much as 1 inch to 20 miles, although I am hoping that this will not be necessary.

It will interest you to know that Roy Hall, District Geologist with the Gypsy Oil Company in Kansas, has accepted the assignment for Kansas, so that now we only lack the co-operation of Missouri and Iowa to complete this project. I have no doubt, however, but that my good friends, MrQueen and Kay, will supply this co-operation.

Should there still be some doubt in your own mind as to what we wish to portray in Wisconsin and Michigan, I would suggest that you make me two rough free hand sketches showing what your two routes as outlined would show. However, if I have interpreted your letter correctly, I think I understand you sufficiently so that this will not be necessary.

With kindest personal regards, and trusting I may hear from you as soon as you return from your field trip.

Very cordially yours,

Anthony Folger

AF:DK
cc/N.W.Bass

Anthony Folger
Box 1144
Wichita, Kansas

April 6, 1931

Mr. Anthony Folger,
C/o Mr. N. W. Bass,
Wichita, Kansas

Dear Mr. Folger:

In reply to yours of the first I will be glad to cooperate with you in preparing the northern end of the proposed cross section.

I take it that you wish the northern end to be at Marquette, Michigan. You speak of the Canada-Wisconsin line but since Canada does not adjoin Wisconsin I infer you mean the Canada-Michigan line.

I suggest the following route for the section: Dubuque, Iowa, Galena, Illinois, Shullsburg, Wisconsin, Monroe, Belleville, Madison, Sauk City, Baraboo, Kilbourn, Green Lake, Oshkosh, Neenah, Green Bay, Gillett, Florence, Wis., Marquette, Michigan. This route is chosen to pass through as many good well logs as possible. A straighter line north from Kilbourn to Wisconsin Rapids would pass through the axis of the Wisconsin arch but the Paleozoics are absent north of Wisconsin Rapids and I suppose you do not want too much pre-Cambrian. This suggested section is roughly 350 miles long. With the aid of Dr. Leith I could take care of the Michigan portion also which is roughly 75 miles more. We could carry the section to another northern terminus, namely near the Soo in which case we could use the good well logs at Escanaba and the Seul Choix Point oil test and would get a normal overlap onto the pre-Cambrian instead of the confusing Lake Superior Syncline. But that is as you desire.

I am now just packing up for a week's field trip so will have to postpone more detailed explanations until I return.

Thanking you for selecting me for this job which I feel well worth while,

Very truly yours,

Lecturer in Geology

THE KANSAS GEOLOGICAL SOCIETY

FIELD CONFERENCE COMMITTEE

N. W. BASS, CHAIRMAN
919 CENTRAL BLDG.

J. L. GARLOUGH
612 BROWN BLDG.

E. A. WYMAN
614 ORPHEUM BLDG.

ADVISORY LEADER

CHAS. N. GOULD
NORMAN, OKLAHOMA

WICHITA, KANSAS

FIFTH ANNUAL FIELD CONFERENCE

April 1, 1931

BOARD OF DIRECTORS

L. R. FORTIER

J. L. GARLOUGH

PERRY R. HANSON

WALTER W. LARSH

E. P. PHILBRICK

PAUL A. WHITNEY

E. A. WYMAN

Dr. Fred T. Thwaites
Wisconsin Geol. Survey
Madison, Wisconsin

Dear Dr. Thwaites:

It has been suggested to the Committee on Arrangements of the Fifth Annual Field Conference of the Kansas Geological Society that a structure section be prepared through the central United States from Canada to Mexico, to be incorporated in the Proceedings of this Conference as one of the principle items of interest. The Committee has requested me to correspond with a number of men throughout the mid-continent area, to determine both the advisability and the feasibility of constructing such a section.

It is proposed tentatively that the section shall have a scale of 1 inch to 10 miles horizontally and 1 inch to 200 feet vertically. The datum will be sea level. It is to begin somewhere in the locality of Marquette on the Canada-Wisconsin line and extend southwestward across the southern portion of the Canadian Shield through the Baraboo Uplift to Dubuque, Iowa; thence in a southwesterly direction across Iowa, the extreme northwestern corner of Missouri, and crossing Kansas in its central and western part (in order to include the Central Kansas Uplift), to the Kansas-Oklahoma line; thence southward in Oklahoma to Oklahoma City and southwesterly across the Wichita Mountains to the Red River Uplift of Texas; thence southwestward along the western side of the Bend Arch and through the Concho Divide area to the Big Lake Oil Field, the Fort Stockton High, the Marathon Mountains and the Solitario Uplift to the Rio Grande River.

Transmitted herewith is a somewhat generalized statement which has been prepared so that it is applicable to all of the states along the route of the proposed cross section, and which will explain to you more or less in detail the purpose and idea of this section.

At the suggestion of Theon Wassom, Chief Geologist of the Pure Oil Company in Chicago, who informs me that you are undoubtedly the best qualified person to prepare a subsurface structure section through Wisconsin, I am writing to express the very urgent hope that you will honor us with accepting this assignment.

The choice of the location of the section through Wisconsin will be left entirely in your hands. It is quite probable that the Iowa section will end at the town of Dubuque. For the present, therefore, will you

consider this as a fact and guide yourself accordingly. We do, however, express the wish that you will plan to include the Baraboo Uplift. If you are willing to co-operate with us, I trust you will advise me as soon as possible the approximate location of the section through the state of Wisconsin, together with the approximate number of miles between its point of beginning and the town of Dubuque. Possibly for the sake of completeness the section should start on the Canadian-Wisconsin line, since it is desired to extend from Canada to Mexico.

I trust that you will let me know at the earliest possible date your decision in this very important matter. Let me state that M. G. Cheney and Fred Bush have already accepted the responsibility for preparing the section through Texas and Oklahoma. We of course here in Wichita can take care of the Kansas section. At first thought a project of this kind seems an almost impossible task, but the more one thinks about it the more feasible and practical does the idea become and of more real economic importance.

The structure section completed in its final form to be reproduced will have to be in my hands not later than July 1.

Please convey to Dr. Twenhofel my kindest personal regards. Trusting to hear from you shortly, and hoping that your decision will be affirmative, I am,

Very cordially yours,

Anthony Folger.

AF:DK
cc/ N. W. Bass
Wichita, Ks.

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Explanation of the Proposed Cross Section Through the Central United States From Canada to Mexico.

A.

The purpose of this section is to portray in one structure section the existent northwest-southeast lines of folding such as the Central Kansas Uplift, Wichita Mountains, Red River Uplift and Concho Divide. Also to portray at as many points as possible the areas where Pennsylvanian or higher sediments rest in contact with pre-Cambrian or with Cambro-Ordovician. And from a structural standpoint to indicate the location of the highest anticlinal areas and the deepest basins. One point of particular importance to bear constantly in mind is to show throughout the entire line of section the pre-Cambrian contact even though the depths at any specific point may have to be estimated.

B.

It is planned to construct this section with as much detail as is consistent with our present knowledge of the subsurface stratigraphy. For instance, it will be possible everywhere to indicate with some degree of exactness the Permian-Pennsylvanian contact, the Pennsylvanian-Mississippian contact, the Mississippian-Ordovician contact, (together with the Siluro-Devonian if it be present), etc. However, throughout Iowa, Missouri, Kansas and northern Oklahoma, it will be possible to represent formational units of the Pennsylvanian such as the Wabaunsee, Shawnee, Douglas, Lansing-Kansas City, Marmaton and Cherokee. In southern Oklahoma, south of the Wichita Mountains, a new set of names will have to be used, and possibly their subdivisions will be more difficult. In Texas we hope to be able to subdivide such units as the Cisco, Canyon, Strawn, Bend, together with as many pre-Mississippian units as is consistent with your present state of knowledge.

C.

In Wisconsin, Iowa and Missouri it will of course be necessary to lay particular evidence on the pre-Pennsylvanian sediments, since little or no Pennsylvanian will be present throughout a large portion of the section in these states. As far as the Mississippian is concerned it will serve the purpose well enough if it be divided into simply Meramec, Osage and Kinderhook, or, if this is not possible, simply into upper Mississippian and Kinderhook. Since it is impossible to subdivide at the present time the

Devonian and Silurian in Kansas, it will be sufficient to represent the Siluro-Devonian as one unit if you wish to do so. However, with respect to the Cambro-Ordovician, we should like as much detail shown on the section as consistent with your present state of knowledge. By this we mean to represent such divisions as Maquoketa, Galena, Decorah, Platteville, Glenwood, St. Peter, Prairie du chien, Jordan, St. Lawrence, Dresbach, Eau Claire, etc. While we are not at all certain of the exact age of our Cambrian strata in Kansas, it is quite evident that there is a vastly greater thickness of Cambrian in Iowa than in Kansas, and I believe it is important to bring out this point.

D.

Wisconsin,	Fred T. Thwaites; Wisconsin Geological Survey.
Iowa,	W. H. Norton; in charge of Underground Water Resources for the state of Iowa.
Missouri,	H. S. McQueen; Missouri Geological Survey.
Kansas,	To be chosen later.
Oklahoma,	Fred A. Bush; Chief Geologist, Sinclair Oil and Gas Company.
Texas,	M. G. Cheney; Consulting Geologist.

E.

It is not our idea that any one of these men will prepare the section for their state throughout its entire length unless it be their desire to do so. Rather had we expected that they would stand responsible for its construction and avail themselves of the co-operation of fellow geologists in their state who will contribute sections for a certain part, or the information from which these sectional portions can be constructed.

F.

Also, it will be the problem of the men responsible for each state section to communicate with the party responsible for the adjacent state section in order that the two may be joined together with the proper correlations. (Provided of course that they can come to a mutual agreement on these correlations without too much of a fight).

G.

It will be your privilege to choose the location of the section in your state. The only point where you will be tied down will be that it will have to join with a common well at the point where inter-state sections meet. We only ask you to keep in mind that the section is to portray, in as much detail as consistent with its location, the regional changes in subsurface stratigraphy, together with the salient structural features. It is taken for granted that you will pass this section through as many points as possible where you have either complete or partially complete sample logs.

H.

It is not our thought that you will prepare this section in a form suitable for reproduction without redrafting. In the event that the section is made, we plan to hire an expert draftsman in Wichita who will trace the individual state sections. We simply ask you to prepare the section in rough form on the horizontal and vertical scale finally chosen, indicating every thing on the section which you wish reproduced, in order that it may be drafted exactly as prepared.

I.

The names of those responsible for the preparation of the state sections will be placed at the top of the structure section, in order that they may have full credit for the work expended. The names of those men co-operating with you to complete the section through your state will be placed at some other conspicuous point on the section.

J.

It is planned to represent a log of each well with a single line rather than a double line between which the lithology can be represented. This we believe would both take up too much extra space in the hundreds of logs which would compose such a section and would also entail too much labor on the part of the people who prepare the section. Possibly, however, some method can be devised so that regional changes in lithology from limestone to sand to shale, etc., can be indicated as well as the actual formational content. Please bear this in mind and let me know if you think it can be done.

K.

The structure section completed in its final form to be reproduced will have to be in our hands not later than July 1.

L.

I have discussed this proposed section with a good many of the mid-continent geologists and micro-paleontologists and everyone thus far consulted believes that the construction of such a section is both practical and feasible. It is taken for granted of course that there will be certain small areas for which one will have little subsurface information. Also, it will be extremely difficult to tie together the stratigraphy of certain areas with that of other areas. So many deep wells have been drilled throughout the central portion of the United States that I believe the time is ripe to put all ideas together in one structure section which will present the subsurface information as of today. Certainly ten years from now such a section will be out of date, but let's have something on paper to look at while this section is getting out of date. If we wait until everything is decided finally, the science of geology would progress all too slowly.

M.

Through the construction of this structure section the Fifth Annual Field Conference of the Kansas Geological Society hopes to crystallize the ideas of the mid-continent men as well as to promote a discussion of interstate correlations which the appearance of such a section would undoubtedly provoke. We hope to contribute a section which will be of real value economically and scientifically and one which will present a concrete picture of

the structure and stratigraphy of the central United States.

N.

I am extremely hopeful that we may prevail upon you to contribute your services in this regard. We ask you to do no more actual work than you desire, but to stand responsible for the construction of your particular portion of this section and see that it reaches us on or before July 1. Naturally we will expect that each of the state sections represent more or less the consensus of opinion of the geologists in that portion of the state through which the section extends. And we take it for granted that you will be perfectly willing to request the leading geologists, throughout the area the section traverses, to check the final section in detail.

Dubouge
Galena
Shullsburg
Monroe
Pellenville
Madison

Savannah
Phil Elm

Barro

W. H. H.

Green L.

Oshkosh

Hennepin

Green Bay

Gillette

Flomel

Margaret, Mich.

the atmosphere and electricity of the central United States.

11.

I am extremely grateful that we may prevail upon you to accept
your services in this regard. We ask you to do so with a full
desire, but to stand responsible for the continuation of your services
portion of this section and see that it reaches us as we before
Naturally we will accept that each of the state sections represent
your own section and we will accept it as such. We will not
through which the section reaches. And we will not be granted that you
be perfectly willing to accept the leading position, throughout the
the section reaches, to accept the final section in detail.

✓ out

Key to well logs for Michigan, Wisconsin, Illinois

No.	City	Well	Location (outside city)	Elevation	Reference
0	Hendricks, Mich.	?	Sec. 8, T. 41 N., R. 24 W.	875?	U. S. G. Ss W.S. P.
	Dubuque	625			
19	Platteville	15946		900	
17	Montpelier	76548		1119	
42	Philly				
9	Bonabro				
3	Grand Pit				
8	Win. Bells				
22	Adams	956	- drift 130 ss to 315 - gr. TD 320		
4	Rocke a line	83832	265 to gr.		
"	Durieux				
"	Nehvosa	922	W L		
44	pet Hill	1927			

extra

KEY TO WELL LOGS

No.	Location	Elevation	Reference or first sample number in University of Wisconsin collection
<u>Michigan</u>			
0	Sec. 8, T. 41, R. 24 W.	875?	Leverett, 1906, p. 46 (no samples, incomplete log)
1	Wells, E. and L.S. R.R. Sec. 18, T. 39, R. 22 W.	590	84846
<u>Wisconsin</u>			
2	Escanaba, C. and N.W. R.R. shops, SE. NW. sec. 29, T. 39, R. 22 W.	590	50146
<u>Wisconsin</u>			
3	Marinette, city test	600	Smith, 1917, pp. 214-215, (samples)
4	Peshtigo, Peshtigo Paper and Pulp Co.	605	54155
5	Green Bay, city, /9th and Ridge Sts.	590	81945
6	De Pere, State Reformatory	615	53398
7	De Pere, city, Main St.	610	75752
8	De Pere, Paper Mill	610	Weidman and Schultz, 1915, p. 248 (no samples)
9	Little Rapids, County Sanitorium	640	81723
10	Little Rapids, Lindauer Stock Farm, sec.13, T.22, R. 19 E.	640	Log by J. J. Faust, driller
11	Wrightstown, Fox River Dairy Co.	657	75918
12	Rapide Croche, Power House	605	76960
13	Kaukauna, city No. 4	645	53064
14	Kaukauna, city No. 3	645	Tube of samples in residence of J. J. Faust, driller
15	Combined Locks, Paper Mill	675	Weidman ^{and} /Schultz, 1915, p. 490
16	Kimberly, city	695	73856
17	Appleton, Appleton Coated Paper Co.	730	80229
18	Appleton, city No. 3	720?	Weidman and Schultz, 1915, p. 489 (no samples)
19	Neenah, city No. 5	750	84632
20	Oshkosh, Northern State Hospital	770	Chamberlin, 1877, p. 153

KEY TO WELL LOGS (cont.)

No.	Location <u>Wisconsin</u>	Elevation	Reference or first sample number in University of Wisconsin collection
21	Oshkosh, Algoma St.	760	Chamberlin, 1877, p. 153, and tube of samples in geology laboratory, Lawrence College
22	H. A. Klitzke, SE.SE. sec. 14, T. 16, R. 14 E.	970	Alden, field notes, no samples
23	Ripon, Ripon Dairy Co.	905	83520
24	Lone Tree Farm, sec.36, T.16, R. 12 E.	889	52558
25	Jos. Donahue, SW.SW. sec. 23, T. 14, R. 7 E. Wisconsin Dells	850	Alden, field notes, no samples
26	(Kilbourn), exploration	928	Tube in geology museum, University of Wisconsin
27	Baraboo, test hole, SE. SW. sec. 980 15, T. 12, R. 6 E.	82648	Samples 70 to 208
28	Baraboo, city test hole near R.R. station	16613 856	
29	Phillip Farm, SW.NE.sec.15, T. 10, R. 6 E.	939	54347
30	Sauk City, city No. 1	757	53365
31	T.E.Brittingham, SE.SE.sec.13, T. 7, R. 8 E.	1020	50001
32	J.J.Knudsen, Sunset Point		77629
33	Madison, Unit Well no. 1, Knickerbocker St.	856	72151
34	Madison, Lake Forest Co. NE.NW. sec.34, T. 7, R. 9 E.	850	52803
35	Oregon, State Ind. School, NE.SE.936 sec. 26, T. 6, R. 9 E.		83135
36	Brooklyn, Sargent well	979	Alden, field notes, no samples
37	Evansville, city No. 1	898	82321
38	Wm. Smiley farm, SE. sec. 30, T. 3, R. 9 E.	900	15534
39	Monroe, city No. 3	1004	80753
40	Browntown, Merrell-Soule Condensary	785	75287

KEY TO WELL LOGS (cont.)

No.	Location	Elevation	Reference or first sample number in University of Wisconsin collection
41	Shullsburg, city	960	51542
42	Crawford Mining Co., test, NE.NE. sec.30, T.1, R. 1 E.	881	16198
<u>Illinois</u>			
43	Galena, city, (projected onto line)	600	Record in files of Illinois Geological Survey
<u>Iowa</u>			
44	Dubuque, city No. 5	625	Norton, Iowa Geol. Survey, vol. 33, p. 185, 1928

KEY TO WELL LOGS

No.	Location	Elevation	Reference or first sample number in University of Wisconsin collection
<u>Michigan</u>			
0	Sec. 8, T. 41, R. 24 W.	8751	Leverett, 1906, p. 46 (no samples, incomplete log)
1	Wells, E. and L.S. R.R. Sec. 18, T. 39, R. 22 W.	590	84846
<u>Wisconsin</u>			
2	Escanaba, C. and N.W. R.R. shops, SE. NW. sec. 29, T. 39, R. 22 W.	590	50146
<u>Wisconsin</u>			
3	Marinette, city test	600	Smith, 1917, pp. 214-215, (samples)
4	Peshtigo, Peshtigo Paper and Pulp Co.	605	54155
5	Green Bay, ^{city,} 9th and Ridge Sts.	590	81945
6	De Pere, State Reformatory	615	53398
7	De Pere, city, Main St.	610	75752
8	De Pere, Paper Mill	610	Weidman and Schultz, 1915, p. 248 (no samples)
9	Little Rapids, County Sanitorium	640	81723
10	Little Rapids, Lindauer Stock Farm, sec. 13, T. 22, R. 19 E.	640	Log by J. J. Faust, driller
11	Wrightstown, Fox River Dairy Co.	657	75918
12	Rapide Croche, Power House	605	76960
13	Kaukauna, city No. 4	645	53064
14	Kaukauna, city No. 3	645	Tube of samples in residence of J. J. Faust, driller
15	Combined Locks, Paper Mill	675	^{and} Weidman/Schultz, 1915, p. 490
16	Kimberly, city	695	73856
17	Appleton, Appleton Coated Paper Co.	730	80229
18	Appleton, city No. 3	7207	Weidman and Schultz, 1915, p. 489 (no samples)
19	Neenah, city No. 5	750	84632
20	Oshkosh, Northern State Hospital	770	Chamberlin, 1877, p. 153

KEY TO WELL LOGS (cont.)

No.	Location <u>Wisconsin</u>	Elevation	Reference or first sample number in University of Wisconsin collection
21	Oshkosh, Algoma St.	760	Chamberlin, 1877, p. 153, and tube of samples in geology laboratory, Lawrence College
22	H. A. Klitzke, SE.SE. sec. 14, T. 16, R. 14 E.	970	Alden, field notes, no samples
23	Ripon, Ripon Dairy Co.	905	83520
24	Lone Tree Farm, sec. 36, T. 16, R. 12 E.	889	52558
25	Jos. Donahue, SW.SW. sec. 23, T. 14, R. 7 E.	850	Alden, field notes, no samples
26	Wisconsin Dells (Kilbourn), exploration	928	Tube in geology museum, University of Wisconsin
27	Baraboo, test hole, SE. SW. sec. 15, T. 12, R. 6 E.	980	82648 Samples 70 to 208
28	Baraboo, city test hole near R.R. station	856	16613
29	Phillip Farm, SW.NE. sec. 15, T. 10, R. 6 E.	859	54347
30	Sauk City, city No. 1	757	55365
31	T.E. Brittingham, SE.SE. sec. 13, T. 7, R. 8 E.	1020	50001
32	J.J. Knudsen, Sunset Point		77629
33	Madison, Unit Well no. 1, Knickerbocker St.	856	72151
34	Madison, Lake Forest Co. NE.NW. sec. 34, T. 7, R. 9 E.	850	52803
35	Oregon, State Ind. School, NE.SE. sec. 26, T. 6, R. 9 E.	956	83135
36	Brooklyn, Sargent well	979	Alden, field notes, no samples
37	Evansville, city No. 1	898	82321
38	Wm. Smiley farm, SE. sec. 30, T. 3, R. 9 E.	900	15534
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37	Evansville, city No. 1	898	82321
38	Wm. Smiley farm, SE. sec. 30, T. 3, R. 9 E.	900	15534
39	Monroe, city No. 3	1004	80753
40	Browntown, Merrell-Soule Condensary	785	75287

KEY TO WELL LOGS (cont.)

No.	Location	Elevation	Reference or first sample number in University of Wisconsin collection
41	Shullsburg, city	960	51542
42	Crawford Mining Co., test, NE.NE. sec.30, T.1, R. 1 E.	881	16198
<u>Illinois</u>			
43	Galena, city, (projected onto line)	600	Record in files of Illinois Geological Survey
<u>Iowa</u>			
44	Dubuque, city No. 5	625	Norton, Iowa Geol. Survey, vol. 33, p. 185, 1928

WELL RECORDS

		Base of, depth																			
No.	Well	Elev.	Drift	BR	St.	P.	L.	M.	M.	J.	Tr.	M.	F.	Dr.	E.	C.	Mt.	S.	T.	D.	Ref.
1	Wells	590	65	170	—	426	445	605	670							760	790	848	46		
2	Escanaba	590	106	220	—	480	500	635	700		795					854	855	504	16		
3	Marinette	600	69	160	—	420	460	560	700							795	978				
4	Peshtigo	605	13	116	—	367	—	410	—								504	54	155		
5	Green Bay	590	80	230	240	440	—	475	615		?	?			855	865	819	45			
6	De Pere	615	142	250	320	455	—	500	610								730	533	98		
7	De Pere	610	37	180	470	—	—	—	540						781	781	757	52			
8	De Pere	610	22	159													816				
9	L.Rapids	640	85	160	260												303	817	23		
10	L.Rapids	655	119	185	270	380											456				
11	Wrights.	657	102	280	295	465	—	520	—								595	759	18		
12	Rapide C.	605	66	257													408	769	60		
13	Kaukauna	645	4	170	220	340	—	380	510								726	530	64		
14	Kaukauna	"	"	190	230	—		400							807		807				
15	C.Locks	675	21	212	240	370											790				
16	Kimberly	695?	12	154	—	350	?	384	500								661	738	56		
17	Appleton	730	111	148	—	344	?	377									501	802	29		
18	Appleton	720?															822				
19	Neenah	750	20	105	120	278	?	330	485								660	846	32		
20	Oshkosh	770	60			300									714		961				
21	Oshkosh	760	92	111?	—	300	—	?	500	580	618				685		695				
22	Klitzke	970	40	84	101												101				
23	Ripon	905	7	16													150	835	20		
24	Lone Tree	889	10	—	—	85	95	150	265	310	?						560	525	58		
25	Donahue	850	218														218				
26	Wis.Dells	928	?												?	450	999				
27	Baraboo	980															304	826	48		
28	Baraboo	856	120													424	428	166	13		
29	Philipp	859	190												520	540	625	543	47		
30	Sauk City	757	128												400	523	525	533	65		
31	Britting.	1020	22			74	130	152	269								279	500	01		
32	Knudsen		40			65	95	125	229								241	776	29		
33	Madison	856	10						115	210	425	835					840	721	51		
34	Lake For.	850	70						120								219	528	03		
35	Oregon	936	100						110	240	435?	850					860	831	35		
36	Brooklyn	979	168														168				
37	Evansville	898	100	—	215	—		280	380	485	780						1014	823	21		
38	Smiley	900	0	—	100	130	175	265									340	155	34		
39	Monroe	1004	32	125	160	390	435	500	580	710	950						1334	807	53		
40	Brown.	785	45	—	240	—	290	350	450	560	845						1025	752	87		
41	Shulls.	960	23	188	520	—	—	610	713	806							1000	515	42		
42	Crawford	881	3														208	161	98		
43	Galena	600	58	155	345	435	490	610	700	810	970						1513				
44	Dubuque	625	118	—	257	340	445	565	655	850	950						1500				

No	Well	Elev	Drift	Black R	St. P	L.M.	M.J.	T	M-F	D	E-C	M.S.	T.D.	Ref
	Dubuque, Ia Linwood Cem. No. 2	706											1954	293, p. 321
384	City No. 5	625	118	-	257	340	445	565	655	850	950		1500	33, p. 185
472	Galena, Ill. City	600	58	155	345	435	490	610	700	840	970		1513	unp. 13-
702	Crawford, Min Co NENE 30-1N-1E	881	3	208									208	16198
95	Shullsburg, City	51542	23	(112) 188	520	-	-	610	713	806			1000	51542
30	Marrell-Soule Co Downtown	785	45	-	240	-	290	350	450	560	845		1025	75287
29	Monroe, City No. 3	1004	32	125	160	390	435	500	580	710	950		1334	80753
38	Smiley Fm. SE 30-3N-2E	900	0	-	100	130	200	265					340	15534
35	Evansville, City	898	100	-	215	-	200	280	380	485	780		1014	82321
185	Oregon, Ind. School for Girls	938	100	-	-	-	-	-	110	240	435	850	860	83135
33	Madison, No. 12, City	956	10	-	-	-	-	-	115	210	425	835	840	72151
31	Brittingham SESE 13-7N-8E	1020	22	-	-	74	130	152	269				279	50001
29	Sack City, City	757	128	-	-	-	-	-	-	-	400	523	525	53365
24	Philipp Fm., SWSW 27, 10N-6E	859	190	-	-	-	-	-	-	-	520	540	625	54347
20	Baraboo test	856	120	-	-	-	-	-	-	-	-	424	428	16613
27	Testhole SESE 15-12-6E	980	-	-	-	-	-	-	-	-	-	-	304	82648 70-208
26	Kilbuck, exploration	928	?	-	-	-	-	-	-	-	2	450	999	3 amp. pre-t only
24	Lone Tree Fm. 36-16N-12E	889	10	-	-	85	95	150	265	310	?		560	52558
23	Ripon, Ripon Dairy Co	905	7	16	-	16	26	109					150	83520
22	Klitzke Fm. SE 14 9 14E	970	-	-	-	389	-	?	500	580	618	685	101	106 3 amp. Got well 153
24	Oshkosh, Algoma St.	760	92	111	?	289	-	350	491	580		675	677	
20	" Nor. State Hosp.	770	60	-	-	300	-	-	-	-		714	961	"
19	Meenah, City No. 5	750	20	105	120	278	?	330	485				660	84632
	" " 4	750	16	90	105	272	?	310	434				663	73109
	(NW Sta 723)	730												
717	Appleton, A Coated Paper Co	800	111	148	-	344	?	377					501	80229
15	Kimberley, City	625	12	154	-	350	?	384	500				661	73856
13	Little Chute, City	675	5	151	164	345	-	382	-				421	71697A
13	Kaukauna, No. 4 City	645	4	170	220	340	-	380	510				726	53064
11	Wrightstown, Fox R Dairy Co	657	102	280	295	465	-	520	-				595	75918
9	Little Rapids, Co. San.	640	85	182	262								303	81723
7	De Pere, Main St. City	610	37	180	470	-	-	-	540				781	75752
6	De Pere, Reformatory	615	142	250	320	455	-	500	610				730	53398
5	Green Bay, City 9th & Ridge Sts.	590	80	230	240	440	-	475	615	?	?	855	865	81945
	" " Farlin St.		-	-	-	535	-	575	710				956	83264
	" " Midw. C. St.	590	103	244	248	440	-	480	620				822	82245
4	Peshtigo Paper Paper Co. No. 1	605	13	116	-	367	-	410	-				504	54155
3	Marquette, City test	600	69	160	-	420	460	560	700			795	978	
2	Escanaba, S & NW shops	590	106	220	-	480	500	635	700	795		854	855	50416
1	Wells, Mich. ECLSR	590	65	170	-	426	445	605	670			760	790	84846
12	Rapide Croche	605	66	237									408	76960
													338	
7	Sisters Laundry - 6. P.	622	156	255	-	520	520	570	695				845	70461
33	Lake Forest Co NENE 34- 7-2E	850	70						120				219	52803
32	Knutson	?	46											77629

Fourteenth Annual Field Conference

Field Conference Committee

C. T. JONES, Chairman
R. A. CARMODY
LEE H. CORNELL
E. A. KOESTER
H. O. SMEDLEY

KANSAS GEOLOGICAL SOCIETY Wichita, Kansas

In co-operation with
NEBRASKA GEOLOGICAL SURVEY
and the
UNIVERSITY OF WYOMING

July 29, 1940

Director
S. H. KNIGHT

Leaders
G. E. CONDRA
H. D. THOMAS

Assistant Leaders
A. K. MILLER
E. C. REED
E. P. ROTHROCK
J. J. RUNNER

FINAL ANNOUNCEMENT

The Kansas Geological Society invites you to attend its Fourteenth Annual Field Conference to be held in the Black Hills of South Dakota, and the Hartville Uplift, Laramie Mountains and Medicine Bow Range of Wyoming, August 26th to September 1st. This conference is held with the cooperation of the University of Wyoming and the Nebraska Geological Survey.

The locale of our trip is rich in the history of the old west, many of whose landmarks we will visit. Here came Lewis and Clark, Captain Bonneville, Brigham Young, and the '49ers. In the Black Hills are found such varied features as the Stratosphere Bowl, Borglum Memorial, the most prolific gold mine in the United States, the largest mineral crystals known, and the spot where Calvin Coolidge laughed out loud. Here also Marsh, Cope, Osborn and Scott enriched paleontology, and the early reconnaissance work of Meek and Hayden has been amplified by that student of the Great Plains, N. H. Darton.

The favorable response to the first announcement of this conference indicates the interest of the geological profession and the oil industry in it and in the oil and gas possibilities of the Great Plains. A larger attendance than originally estimated can be expected. The areas to be visited offer the best opportunity to study the rocks found in wells drilled on the Great Plains. One of the primary purposes of the trip will be to attempt to correlate the outcropping beds with the subsurface units encountered in drilling. Permo-Pennsylvanian and pre-Pennsylvanian beds will be studied in greatest detail. Outcrops ranging from pre-Cambrian to Tertiary will be seen. Sufficient time for careful sampling will be allowed.

Leadership

Dr. S. H. Knight, State Geologist and head of the Department of Geology, University of Wyoming has kindly consented to act as Director of the Conference. He will be ably assisted by H. D. Thomas, University of Wyoming, G. E. Condra, State Geologist, and E. C. Reed, Assistant State Geologist, respectively, of Nebraska, E. P. Rothrock, State Geologist of South Dakota, and J. J. Runner and A. K. Miller of the University of Iowa. The ability and experience of these men assures us a most successful trip.

Conference Program

The Conference will convene at Rapid City, South Dakota, Sunday evening, August 25th. Participants are urged to plan to arrive at Rapid City Sunday afternoon in order to allow ample time for registration and final instructions. The following morning we proceed to the northern Black Hills, where the Whitewood-Deadwood problem and the Permo-Pennsylvanian beds will be studied. The geology of the Homestake Mine will be explained and the plant visited, but an underground trip cannot be arranged. We return to Rapid City, traveling a total of 118 miles.

Tuesday and Wednesday, August 27th and 28th, will be devoted to a study of the section in the central and southern portion of the Black Hills, emphasizing the change in lithology of the beds from north to south. The absence of Ordovician beds will be noted. The pre-Cambrian core of the Hills will be seen in its most beautiful scenic features. Stops are planned also at the Etta Spodumene Mine, the Mount Rushmore Memorial and Sylvan Lake. Both nights will be spent at Hot Springs. The mileage Tuesday is 94 miles; Wednesday 162 miles.

The very interesting section of Permo-Pennsylvanian rocks in the Hartville area will occupy our time Thursday and Friday, August 29th and 30th. Correlations with the Kansas and Colorado sections will be ventured and the relationship of these beds to those in central Wyoming as well as to the producing zones of the Lance Creek field will be brought out. Wheatland will be the Thursday night stop after a days travel of 202 miles. On Friday, after a stop at the Big Muddy oil field, we will drive into Casper. We will then be the guests of the oil companies and supply companies at a social event, the full details of which have not yet been completed. We travel 177 miles Friday.

Saturday morning we return to Douglas, thence south to sections at LaBonte and vicinity. Changes in character of Permian, Pennsylvanian and Mississippian strata will be observed and correlations with the section both to the east and west given. Late Saturday afternoon we continue to Jackson Canyon, southwest of Casper, where the intertongued phases of the Phosphoria and Dinwoody formations can be well seen. Our return to Casper brings our day mileage to 209 miles.

The final day, Sunday, September 1st, will open with a stop at Alcova Dam, southwest of Casper, after which we proceed up the scenic Platte River Canyon. Thence we travel across the Seminoe Plateau and the Hanna Basin, complicated structural areas, thence south and west to Walcott and Saratoga. We then cross the Medicine Bow Mountains, enjoying some of the most scenic parts of Wyoming. Late in the evening we reach our night stop at the Summer Camp of the University of Wyoming after traveling 182 miles.

Monday, September 2nd, a special meeting of the Permian sub-committee of the Geologic Names and Correlations Committee of the American Association of Petroleum Geologists under the leadership of Ronald K. DeFord will be held at the Summer Camp. This meeting will review the Permian and related problems of the Rocky Mountain-Midcontinent area. Attendance will be by special invitation.

No evening meetings are planned, except a free movie of wild game life in Wyoming to be shown at Wheatland and a lecture by Dr. Knight at the Summer Camp Sunday night. Special arrangements for a free swim in the pool at Hot Springs have been completed through the kindness of the management of the Evans Hotel.

Guide Book

The Guide Book will include all pertinent data regarding the geology of the area visited and the geologic problems studied. It will contain a detailed road log of the route to be traveled with graphic sections of the rocks seen at each stop. It will also include interesting historical data, a correlation chart, structure maps, and numerous photographs. The list of special articles to be included in the guide-book is incomplete at the present time, but these will cover such features as a general discussion of the geologic problems of the area, papers on the oil fields visited on the trip, and regional cross sections both northward into North Dakota and southward to the Central Kansas Uplift.

Registration Fee

In order to defray the expenses of the conference and the preparation of the Guide Book, a registration fee of not to exceed \$12.50 will be charged each member of the Conference, irrespective of the length of his attendance. One copy of the Guide Book is given each participant at time of registration. Those who do not attend or participants who wish an extra copy of the Guide Book may purchase it for not to exceed \$7.50 per copy.

If you wish to be assured a copy of the Guide Book, and have not already ordered one, fill out and send in the enclosed order blank. A limited number will be printed.

Hotel Reservations

ALL hotel reservations, with the exception of Sunday and Monday night, August 25th and 26th at Rapid City, will be made for you by an advance agent who will make every effort to provide comfortable accommodations for each participant. In some of the smaller towns, accommodations are limited, and it may be necessary to place you in a room with another participant.

The headquarters hotels are as follows:

Rapid City	Alex Johnson Hotel
Hot Springs	Evans Hotel
Wheatland	La Ramie Hotel
Casper	Henning Hotel

A special rate of \$3.50 per person has been made at the Wyoming Summer Camp. This includes night lodging, a fish dinner on Sunday evening, and breakfast Monday morning. Lunch on Monday will be served to those who stay for the Permian meeting for 50 cents.

Transportation and Baggage

Private automobiles will be used for transportation. If you are unable to bring your own car, transportation will be arranged for you in the car of some other participant. The seating arrangement for all members, except drivers, will be changed daily. All baggage will be carried in a truck provided by the Society and will be placed in your hotel room each night prior to your arrival.

Automobiles should be in first-class condition. The longest mileage for any day is 209 miles, so that gasoline stops should be reduced to a minimum.

Two water jugs per car are recommended. We have several lunches in the field. Not all outcrops are on the highway. Boots or strong shoes are suggested. Black Hills weather is very fickle. Bring a warm jacket.

Mail and telegrams may be sent to participants, care of the Kansas Geological Society Field Conference, at any of the night stops.

Reply Blanks

If you expect to attend the conference, fill out in full the enclosed reply blanks. The more we know of your plans, the better we can plan for you.

If you wish to be assured of a guide book, whether or not you attend, fill out the enclosed order blank. Prepayment of registration fee will be appreciated, but is not necessary.

Even though you replied to the first notice, please return promptly the enclosed reply blank completely filled out.

P. S. Bring your swim suit.

Committee on Arrangements

REPLY BLANK
for
FOURTEENTH ANNUAL FIELD CONFERENCE
KANSAS GEOLOGICAL SOCIETY

Kansas Geological Society
412 Union National Bank Building
Wichita, Kansas

Kindly fill in all blanks, and return promptly

I will attend this Field Conference _____

I will join the Conference at _____
(State place and time of arrival)

I will remain for the entire Conference _____

I will leave the Conference at _____
(State place and time of departure)

I am enclosing \$12.50 for registration fee _____

I will pay fee at time of registration _____

I prefer to occupy hotel room alone _____

I will occupy hotel room with _____

If necessary, I will room with _____

Indicate approximately price room you desire _____

Do you expect to bring a car? _____

Make _____ Seating Capacity _____

Is it a company car? _____ A personal car? _____

Name _____

Position _____

Company _____

Address _____

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KANSAS GEOLOGICAL SOCIETY

(For use of those who have
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I wish to order _____ copy(ies) of the Guide Book of the
Fourteenth Annual Field Conference. I understand that the price
of the book will not exceed \$7.50 per copy, and that I will get
one copy on payment of registration fee in case I attend the con-
ference.

NAME _____

ADDRESS _____
