

OFFICE OF THE STATE GEOLOGIST  
OF THE STATE OF WYOMING

Marzel

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SUMMARY OF ACTIVITIES OF BIENNIUM  
April 1, 1929 to March 31, 1931

The office of the State Geologist is a constitutional office, created on the admittance of the Territory to Statehood. The functions of the office are divided into four separate divisions.

1. The requirement of the first division is to give expert technical information to the State Land Board for the aid and guidance of the Board in conducting the affairs of State and School lands, and on such other matters as the respective State Boards may desire information.

2. The requirement of the second division is for the furtherance of the mining industry of the State and to publish and circulate information for advertising the mineral wealth and to advance the development of the industry, to make surveys, investigations and reports that may bring about further economic development of the mineral resources of the State.

3. The requirement of the third division is to cooperate with the operators of the oil and gas fields and the United States Geological Survey in combined efforts to conserve the oil and gas resources of the State. This division is charged with the duty of enforcing all of the laws of the State of Wyoming relating to the oil and gas industry.

4. The requirement of the fourth division is to keep full and complete records of the activity of the office and to make a biennial report of the same to the Governor, in printed form, in order that same may be available for distribution to those interested.

The Geological Department existed in Territorial days, from 1881 to 1891, during which period there were four Territorial Geologists. The office was vacant from 1891 to 1901, since which date there have been seven State Geologists, including the present incumbent.

The original law creating the Department stipulated that the State Geologist make examinations and reports on mining properties and take any steps likely to advance the development of the mining industry.

In 1903 the State Geologist was made ex officio Inspector of Mines.

Until 1915 the office consisted only of the State Geologist and the biennial expenses of the Department were limited to \$6,800.00. During 1915 to 1919 the biennial appropriation was \$14,800.00.

In 1919 the Legislature required the State Geologist to make examinations

and reports on State or School lands to the State Land Board and charged him with the duty of enforcing the laws relating to the oil industry. From 1919 to 1921, the appropriation for the Department was \$15,700.00.

The laws of 1921 provided for further conservation of the natural resources of the State, placing all oil and gas operations on State and Patented lands under the supervision of the State Geologist. Their intent is to prevent waste of valuable oil and gas resources by grossly negligent methods of operation. The Oil and Gas Inspectors perform protective duties that the State Geologist may direct with the view of prolonging the life of our greatest source of direct revenue, the oil and gas fields of the State. From 1921 to 1923, the appropriation for the Department was \$29,140.00. As an illustration of the practical operations of the Department, a letter received from an operator on State lands, under date of March 15, 1930, follows:

"During the past week you had charge of the drilling of the well of the All States Development Co., located upon the State School Section 36-37-32, in the North Casper Creek field, Natrona County, Wyoming.

"It is my firm belief that through your services in advising our company of the depths to water and your experience in the porosity of sands, we were able to bring in a well making 250 barrels of oil daily. In our first attempt to complete a well, without your help, we practically ruined same.

"The cost of drilling this well totals \$60,000 and the cost of the first well was \$62,000. I, therefore, consider that you have saved our firm the sum of \$60,000 in saving this well for us. I wish to state further, that had we employed your services in the first well, I am certain that we would have made a producing well of it also.

"In the first well, we supposed we had about forty feet to go before the water would be reached, but we flooded the well within seven feet. Your stopping the second well before reaching the water has made it possible to make it a producing oil well.

"Again thanking you in the name of my company for your excellent services in this matter, I remain,"

It will be noted from the above statements that in addition to saving the amount of \$60,000 to a State land lessee, a royalty producing 250 barrel capacity well was also saved for the State.

From 1923 to 1927, the biennial appropriations were \$36,600.00.

In 1927, the State Legislature again increased the scope and duties of the Department by creating the office of Deputy State Geologist and in 1929, the State Mineral Production Supervisor was transferred to the Department from the State Land Office. During the 1929 to 1931 biennium, the amount appropriated was \$53,700.00.

In comparing the expenses of the present administration with that of the one in 1919 to 1921, it will be found that the State Geological Department is being conducted on an expenditure of like amount and is \$1,400.00 less than the one of 1925 to 1927.

The State being in the business of producing oil, gas and other minerals from its own lands requires the State Geological Department to supervise and check the production in order to protect its income which to date amounts to practically \$30,000,000.00.

While this Department exists by direct taxation, yet the royalty payments to the State on oil and gas production alone greatly exceeds the amount used for supervision. Therefore, with the close supervision and geological aid being extended companies and individuals already operating and the furnishing of information to those contemplating development of the State's immense mineral resources, power and manufacturing possibilities and potentialities, it is reasonable to expect a consequent proportional increase in royalties to the State, as well as increased population, taxable wealth and also a market for our agricultural products.

Since assuming the duties of State Geologist, the volume of correspondence has quadrupled. Hence, owing to constantly increasing demands for information about the mineral resources of Wyoming, almost the entire time of the Deputy State Geologist has been occupied with correspondence. These added duties made it necessary to carry a second stenographer and during the past year an extra typist has been hired on a number of occasions.

Due to the increased amount of office work, executive supervision of the activities of the different divisions of this Department and the numerous field trips entailed thereby, little time remained to perform local surveys, many, however, being requested by residents of this State were satisfactorily disposed of. In addition, during the past summer, two urgent field investigations were concluded for the State Commissioner of Public Lands by the Deputy State Geologist.

It was found necessary to slight some requests for investigations, as in many instances the preparation of a worth-while report on the reserves in mineral holdings or the estimation of the depth of a water or oil-bearing sand on some remote ranch would have meant uninterrupted work over a period of several weeks. The mineral bearing lands of Wyoming cover a vast area and so long as this bureau is also charged with the supervision of large oil operations conducted under the State's proprietorship, the fact will readily be recognized that the protection of vitally important income producing revenues is of far more importance than the performance of private surveys.

Next to oil conservation work, the greater share of my remaining biennial appropriations were expended in the preparation and dissemination of literature on the character and magnitude of the Wyoming mineral depository. Before starting work in this direction, no way was available to gauge the measure that

industrial, scientific and educational circles could become interested in Wyoming. Responses received from the new line of activities have already reached a great volume. Instead of dwindling in this severe depression period, more interest is being displayed in the Wyoming type of resources by the research departments of progressive industrial concerns than ever before.

In a letter from the editor of the largest industrial chemical journal, the following statement was made - "There can be no doubt that Wyoming is one of the focal points of chemical interest at the present time".

In view of the preceding observation and other reasons, I am of the opinion that the publicity output of this department featuring Wyoming chemicals during the next biennium will achieve the greatest results. At present, they attract far more attention from industrial organizations than any other form of resources occurring in this State.

As far as can be predicted, the next stepping stone in the industrial history of Wyoming will involve the development of its low-cost chemical stores. Past experience indicates that it is not always easy to establish a new industry in this State. Before the first major oil company would come to Wyoming, many years of fruitless effort were expended by our State departments and some of our foremost citizens. At the present time, leading chemists are willing to ask about Wyoming. For their accommodation, this Department at all times stands ready to assemble data.

John G. Marzel, State Geologist, C. S. Dietz, Deputy State Geologist and Frank B. Taylor, State Oil & Gas Inspector, attended the Third Annual Field Conference of the Kansas Geological Society, held September 2nd to September 12th, 1929. The personnel of this field conference was composed of members of the geological staffs of 60 oil companies, 29 Universities and Colleges and 12 State Geological Surveys. The territory covered was the Black Hills of South Dakota and Wyoming, the Hartville Uplift of Platte, Goshen and Niobrara Counties in southeastern Wyoming and along the Rocky Mountain Front Range from Douglas, Wyoming, to Denver, Colorado. Much valuable information on the geology of the eastern portion of the State was gained by the members of this Department attending this conference.

While oil and gas are the mineral resources now returning Wyoming its greatest revenues, it is known that vast stores of other mineral wealth exist within the State. To increase interest in their development, the State Geologist has cooperated with the Board of Commerce and Industry in conducting mining congresses during each year of the past biennium. The Mining Congress of 1929 was held at Sheridan and the one in 1930 was held at Lander, Wyoming. Both of these congresses were well attended and a fine educational program was provided. These congresses were also supplemented with mineral exhibits which were conducted

to much discussion and dissemination of information relative to the occurrences of the different minerals on display.

#### PUBLICATIONS

The interest that has been displayed in regard to the Dinosaurs that formerly thrived in Wyoming prompted the publication of our Bulletin No. 22, entitled "The Dinosaurs of Wyoming". This interest is not surprising. Many million years ago, the Dinosaur family reached its maximum degree of development in or near the fresh water ponds and lakes that dotted the terrain we now call Wyoming. It may seem strange to relate that no work has recently appeared in which an attempt is made to review the supremacy of Wyoming in bone and brawn development for all time. To rectify this outstanding omission, Dr. Roy L. Moodie, the well known paleontologist was prevailed upon to write this book. Perhaps no savant was better qualified to undertake this important commission. As a hunter of Dinosaur fossils, Dr. Moodie covered the most promising areas of Wyoming during the past 25 year period. The composition of Dr. Moodie's manuscript is of the non-technical style and being profusely illustrated with restorations of Wyoming material, this publication is proving to be unusually fascinating.

Chapter 157 of the 1921 Session Laws of Wyoming prescribes that for the purpose of conserving the natural resources of the State and to prevent waste thereof, through negligent methods of operation, the State Geologist shall prescribe and enforce rules and regulations governing the drilling, casing and abandonment of oil and gas wells and the waste of oil and gas therefrom upon all lands in the State of Wyoming, excepting Federal lands and that the rules and regulations so prescribed shall be those from time to time adopted by the United States Geological Survey. It was found expedient that these rules and regulations be published in booklet form, for distribution to the operators who are developing oil and gas on State and Patented lands. This publication is entitled "Operating Regulations to Govern the Production of Oil and Gas on State and Patented Lands of the State of Wyoming", Circular No. 5, July 1, 1929 and Supplement No. 1, August 26, 1929.

The Third Annual Mining Congress, held at Sheridan, Wyoming on November 15th and 16th, 1929, passed the following resolutions, among others:

"Whereas the mining industry furnishes one of the principal sources of revenue in this State and information regarding it is of material interest to all our people, we therefore recommend that all school, county and other libraries supported by taxation purchase as their funds permit and make available to their patrons books pertaining to the fundamentals of geology, mineralogy and mining".

Almost identical resolutions were also passed by the Rocky Mountain Oil

and Gas Association, American Petroleum Institute Rocky Mountain Division, Development and Production Engineering and National Safety Council Petroleum Division Rocky Mountain Division, at their joint meeting of November 20th and 21st, 1929, held at Casper, Wyoming.

In accordance with these resolutions, a list of text and reference books were recommended for this purpose, in part by the Dean of Engineering and Professors of the Mining Department of the University of Wyoming, by members of the State Geological Department and the others were selected from United States Bureau of Mines Information Circular No. 6148. This list was divided into three parts:-

1. Elementary Books for Elementary Mineralogists, Geologists, Prospectors, Mineral Collectors, Nature Students, etc.
2. Standard Textbooks to Supply Needs of More Advanced Students of Geology and Mineralogy.
3. Standard Economic Texts on Economic Geology and Mineralogy.

This list was mimeographed and furnished to librarians of all Wyoming schools, county, public and other libraries and I have been informed that practically all librarians have availed themselves of the opportunity to supply their shelves with some books from this list, while the Public Library of Casper, in particular, as well as some other principal libraries in the State have purchased the entire list of recommended books.

Resolutions passed at the aforementioned mining congress and meeting of oil associations also indicated that it was their desire to have geology taught in the schools of our State. I am pleased to announce that at this time, through the efforts of this Department, six High Schools have added Geology to their curriculum, these schools being at Lander, Lovell, Lusk, Rocky Point, Rock Springs and Sheridan. In addition to this, for the first time the Department of Education, through joint action by the Division of Vocational Education, will conduct two week courses for prospectors at the University of Wyoming in Laramie and at School District No. 1 in Casper, covering instructions for prospectors and others interested in discovering mineral deposits within the State, free of cost to those wishing instruction.

On account of the increased correspondence and clerical work required in preparation of publications, etc., the increase of \$3,000.00 requested in the State Geologists Expense Contingent is deemed necessary.

OIL AND GAS CONSERVATION DEPARTMENT  
CASPER OFFICE

Frank B. Taylor, State Oil & Gas Inspector

The Casper office comprises a laboratory for the testing of oils and sands.

an office for the carrying on of routine business connected with this Division, and a reference library of maps and Federal and State bulletins, together with data files for giving information relative to the oil industry in the State of Wyoming.

The routing work of the Jasper office, together with a record of the various tests made in the laboratory is on file in the office of the State Geologist, Cheyenne, Wyoming, in the form of monthly reports, summarized as follows:

- 462 business visitors up to September 1, 1930.
- 510 Sundry Notice Reports (reports of operations on oil or gas wells) examined and passed on up to September 1, 1930.
- 31 Laboratory tests of samples of oil, ores and minerals made up to September 1, 1930.
- 57 Conferences held with various oil companies and United States Geological Survey officials in other offices.

A total of 72 field inspection trips, with a totalled mileage of 63,482 miles was made during the present biennium, up to September, 1930. At the conclusion of each trip a detailed report of Mr. Taylor's findings and such action as he took or deemed necessary for the well-being of the State lands were forwarded to and are on file in the Office of the State Geologist, Cheyenne, Wyoming.

The field work, which includes the inspection of all State lands upon which production of oil or gas is had or is likely to be had, the regulation of the development and operation for the best interests of the State, as well as of the producers, is the most important part of the duties of this division. Other important duties consist of the regulation of development and operations on all patented lands within the State of Wyoming in accordance with the best principles of production and operations and the surveying of undeveloped areas to ascertain their prospective worth.

The field work also includes the inspection of mines for various minerals, mineral deposits and the like when special orders for such inspections are sent out from the State Geologist.

This Division also assisted or had charge of the mineral exhibits in 1929 and 1930 at the Wyoming State Fairs at Douglas and also at the State Mining Congresses at Sheridan and Lander.

It will be noted that the budget request for the coming biennium for the Gas and Oil Conservation Expense Contingent shows an increase of \$1,500.00 over the present biennium. This amount is included to take care of the traveling expenses of a second State Oil and Gas Inspector. While the field work and other duties of this Division were efficiently performed by Mr. F. B. Taylor, State Oil & Gas Inspector (with the aid of a second Inspector for a period of seven months), it will be noted from the above enumerated activities that with a second man in the

field a closer check could be made of wasteful and inefficient methods of operation which would save the State much revenue in conservation of our natural resources and also be able to disseminate more information to prospective and present companies or individuals engaged in the development of these resources.

#### DIVISION OF MINERAL PRODUCTION

##### Cyrus O. Wertz, Mineral Production Supervisor

The present Division of Mineral Production until the present biennium was under the direction of the Commissioner of Public Lands. In 1923 a State Gauger was appointed by the Commissioner of Public Lands, to check the production of oil and gas from State lands. The scope of duties assigned to the Gauger expanded to such an extent that it was finally deemed advisable to place this division under the jurisdiction of the State Geological Department.

State Mineral Production Supervisor, Mr. Cyrus O. Wertz, has maintained a close supervision over the mineral production from State lands and otherwise aided in the enforcement of laws of the State of Wyoming relating to the oil industry during the present biennium. Many reports have been submitted to the State Geologist and the Commissioner of Public Lands clarifying matters in dispute, calling attention to loss of revenue due to erroneous computations of operators on State land, which has resulted in action being taken to remedy the situation, with a resultant increase in income to the State.

Much painstaking effort has been made in the assembling of data and statistics to be incorporated in the Fifteenth Biennial Report of the State Geologist, which will be of great value to anyone interested in the mineral resources of the State of Wyoming.

A summary of activities of this Division during the present biennium, detailed accounts of which are on file and available for reference at any time, are listed below:

Field Inspections	24
Letters Written	208
Conferences	50
Reports	54

It will be noted that there is an increase of \$1,000.00 in budget request for Supervision Mineral Production Expense Contingent for 1931 - 1933 over 1929 - 1931. This increased amount is for the purpose of purchasing office equipment to make computation of gaugers tickets and gas meter charts in an efficient manner to protect the State's royalty interests; also a more liberal travel allowance in order to obtain first-hand information on matters vitally affecting the royalty income to the State.

## SUPPLEMENTARY BUDGET RECOMMENDATIONS

Already, some states have found it profitable to offer financial inducements to prominent institutions of learning for the object of conducting geological survey work within their borders. So far, several outside colleges have selected Wyoming as a site for holding their field classes without formal invitation on the part of the State. However, no state has yet offered subsidies in this direction without demanding the completion of a stipulated mapping program performed by talent that at least held collegiate degrees in geology.

At the present time, the Department of Geology of Princeton University is carrying on negotiations with this office with the view of conducting an extended mapping project within Wyoming during the coming summer season. Last year most of their work was conducted in Montana and through their efforts no less than six quadrangles have been surveyed to date. Some of this work was done along the Wyoming State line and, in view of important geological findings, the field forces desire to follow up their studies on promising areas across the line in this State.

Towards the close of the season the officials of the University visited Wyoming and, after completing a reconnaissance survey, their plans for the coming season were discussed with leading residents of Cody and other points in the Basin.

At present, Princeton offers a graduate course in practical field geology in which only holders of their different scientific degrees are privileged to attend. To attract the class to Montana, the cities of Red Lodge and Billings, the Northern Pacific Railroad, and the Montana School of Mines financed half of their expenses, leaving only the remainder to be paid by the University itself.

The present work is under the supervision of Prof. W. T. Thom, Jr., who for the 25 years last past was Field Geologist for the United States Geological Survey. In view of his prior employment, the Federal Survey apparently continues to accept some of his work for publication. In recent years, Prof. Thom has done considerable work in Wyoming while in the employ of the United States Geological Survey. His report on that portion of the Gillette coal field in which is situated America's greatest strip-mining coal seam is an extremely important contribution to the knowledge of Wyoming geology. In fact, since his report appeared two years ago, this office has been in a position to recommend the Gillette area as the site where limitless quantities of coal could be mined at the lowest possible cost in the United States. At the present time such authoritative information attracts the attention of a growing list of industrial enterprises whose manufacturing processes are most dependent on the availability of huge stores of energy at the cheapest cost obtainable.

In view of the non-academic style of the professor's prior labors in this State, it is not surprising that he selected the highly mineralized Basin area as his next site for an extensive mapping program. His work has the practical slant, and in view of his ability as well as the degree of training possessed by his selected assistants, I recommend that the coming legislature appropriate the sum of \$2,500.00 for the purpose of surveying certain areas in the Basin district.

In my opinion, no part of the said fund should be expended until it is matched dollar for dollar by Basin communities and corporations. In the past, some criticism has been filed on the failure of this bureau to conduct elaborate investigations in that increasingly promising region. Manifestly, even if the State would have the requisite machinery and personnel, the cost of its surveys would greatly exceed the largely non-salaried Thom plan that is half financed by an outside corporation before any local funds can be expended thereon.

The recommended appropriation approaches the funds so far contributed by the Montana School of Mines for work in that state. Inasmuch as only the localities surveyed could benefit through such investigations, they should offer direct aid even if they are smaller than Montana communities in which similar work has been completed. Moreover, as far more than the appropriated sums are expended within the mapped localities, the plan offers some direct returns as soon as it is under way.

After many years a leading university at last has evolved a course of graduate geologic instruction sufficiently practical to meet the sanction of the Federal Survey. In addition thereto, at least one outside state has already backed the new theory of instruction in a substantial manner. Already, the original idea of Dr. Thom is receiving much attention in educational circles. In time, other universities may also deem the Wyoming field to be an extremely inviting area to carry on similar courses of intensified training. Desirous of working in a locality in which important discoveries could be brought to light, I suggest that residents of the Basin region make a careful study of the mapping plan proffered by Doctor Thom. At present, the funds at the disposal of this bureau are entirely consumed in oil protection and routing office work. With present personnel, no surveys can be conducted in any part of the State. For completing acceptable surveys the Princeton plan is the cheapest so far offered to the taxpayers of Wyoming.

In the October 24th issue of the Inland Oil Index, a lengthy review appeared on Princeton's activities in Montana. After setting forth the cooperative aid extended by several Federal and State departments, local railways and Chambers of Commerce, the Index filed the following conclusion on the work in Montana:

"During next summer it is expected that the work will extend southward into Wyoming following the natural continuity of the Yellowstone Plateau and Big Horn basin across the Montana-Wyoming line. This undoubtedly will be done if a cooperative arrangement should be participated in by Wyoming organizations as was the case in Montana. It is understood that the department of geology of Wyoming State University and the department of geology of the State of Wyoming now have this subject under consideration. It is quite probable that the next legislature of Wyoming will be asked to appropriate a small amount for this work.

"At the state mining congress held in Lander last summer, talks were delivered by members of the geological party operating in Montana on the advantages of such a program and the results accomplished in Montana. It is known that the subject has been broached to Governor Emerson, State Geologist Marzel, various parties in Cody, and to Casper Chamber of Commerce. It is also understood that all familiar with the plan have been in sympathy with its adoption.

"During the last summer, a considerable area was mapped of the Yellowstone plateau and there was some work done in the Greybull valley, near Cody, Wyoming. Aerial photographs were taken by U. S. War Department and the U. S. Geological Survey. These maps will soon be ready for distribution.

"Last year, the sum upwards of \$5000 was contributed by Princeton University, the Northern Pacific Railroad and various Montana interests. This sum was matched on practically a 50-50 basis by the U. S. Geological Survey. It will thus be seen that any sum raised for this purpose for operation in Wyoming would be doubled by monies received from the Federal Government.

"Some of the fossils discovered last summer in beds near Red Lodge are now being classified at Princeton and indicate some very important scientific discoveries. For the first time in the history of the world, dinosaur eggs have been discovered on this continent. This would indicate that that part of Montana was dry land anywhere from 10 to 20,000,000 years ago. The only other place in the world where dinosaur eggs have been discovered was in Mongolia.

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"Among other interesting finds was the jaw bone of the coryphodon. This bone was about 12 in. long and contained a number of saw teeth. Also a tusk supposed to belong to the same animal was found. The coryphodon was an animal which very much resembled the rhinoceros. It is supposed to have lived at one time in a swampy, sub-tropical country.

"Early in the summer, a large number of small jaws were found which will be added to the museum at Princeton and also used for research work. Some belonged to primitive primate-like animals about the size of a very small monkey. Others are what may prove to be the earliest ancestors of the Artiodactyla. This group includes the present-day cattle, hogs, sheep, antelope, camels, and many other well-known animals.

"Dr. W. T. Thom, Jr., who had charge of the expedition representing the department of geology at Princeton is well known in the Rocky Mountain region, having been a geologist in the U. S. Geological Survey with headquarters in Wyoming. He was a frequent visitor in Casper and several years ago made a special investigation of Teapot Dome for the Government."

Other important fossil discoveries were recorded in the Index review.

In fact, the mentioned dinosaur discovery has already been reported in all of the larger papers in this country. In no sense of the word has such wide advertising harmed Montana. In my opinion, it detracted much from the fame of Wyoming, the state that first produced dinosaur discoveries in this continent.

The preceding extracts were made for the reason that they quite well define the cooperative endeavors and equipment of a complete and modern mapping unit. Obviously, this department is in no shape to attempt such work by itself.

In recent years residents of the Basin have been reporting an increasing number of rather bizarre fossil discoveries on their land holdings. For the advancement of science, the day has arrived for a thorough examination and final classification of those different discoveries on the part of a trained crew of field specialists. Manifestly, if the educational attractions of Wyoming are to be correctly cataloged, it will first be necessary to bring guesswork to an end.

Across the line in Montana, the Princeton staff reported discoveries that startled the scientific world during the past summer. For their continued labors, sufficient information is already on hand to indicate even more amazing discoveries yet to be made in the provisionally selected adjoining Wyoming area.

During the past year both Harvard and the Smithsonian Institution succeeded in placing the Torrington and Lyman areas on the scientific map of the world. At the present time, Princeton University anticipates that a third Wyoming locality may soon achieve similar fame. Obviously, the earlier such localities are authentically reported and mapped, the earlier Wyoming will be recognized as the great national laboratory for the study of geology by the growingly popular, modern, direct, field-contact method of procedure.

#### COOPERATIVE WORK WITH THE FEDERAL SURVEY

In recent years the activities of the U. S. Geological Survey have been rapidly approaching the vanishing point in this State. As time goes on, the Federal Survey is gradually confining its entire mapping programs to those states that are willing to finance half the expenditures of their investigational work.

In order that a better understanding could be had on the present policy of the Federal Survey, an invitation was extended to one of its members, Dr. G. F. Loughlin, to address the State Mining Congress which was held in Lander in August, 1930. His address follows below in the complete form:

"I received a telegram in New Mexico the other day asking me to come up here and talk about cooperation. My talk will be informal. Cooperation between the United States Geological Survey and the states has been going on to some extent for a great many years. Topographical work was the first work to be done that way. In the water resources much cooperation has gone on. In geologic work considerable cooperative work has been done for the states. The most efficient way is to call on the United States Geological Survey to send one of its specialists. In the mining industry, coal and oil have been under the cooperation of the United States Geological Survey and the states for some time. The growth of metal mining and geology began in 1922. It has since increased until the last biennium report of the State of Colorado shows that Colorado appropriated \$45,000. Last year we had twenty employees in mining and practically all of them were engaged in cooperative work.

"Cooperative money offered by the states also increased so that now we have 32 employees and all but one of them in cooperative work. There are many mining problems in the program which we like to follow up but it is impossible because of the demand for cooperative work. At present we have seven geologic parties in Colorado. There are six parties in Oregon. Other cooperative work is going on in New Mexico, Nevada and Montana and in a way you might say California.

"The results of the work are based on what we find and as these states have found out, it is better in the long run to call a large organization which has the equipment to carry out these complicated programs. Any geologist can make a topographic base map but the United States Geological Survey has specialists in this line. With the geologic work itself, it is necessary to have one or more excellent geologists but one or two cannot usually cover all the work that has to be done.

"Next comes the preparation of the report. After the report is done, the problem of illustrating comes. If it is a simple report, it would be an easy matter to print and the state organization could contract with the local printing works and get it done. If it is to be an elaborate report, the cost runs up and the facilities for doing the work are limited. The United States Geological Survey has the best printing facilities for such work. The Federal Survey has to bid competitively against outside organizations. If a state is to publish one of these professional papers, it would be necessary to spend a few thousand dollars. Expert draftsmen and qualified editors are at your service in the United States Geological Survey. The value of the report will last as long as people are interested in mining geology. The advantage of cooperation is obvious.

"Colorado first appropriated \$500.00 for cooperative work. The amount during the recent year would be somewhere in the neighborhood of \$60,000, which was appropriated to the geologic mapping and study of mining districts. With that general statement perhaps questions could carry the information further than I could alone.

"In regard to the suggestion put forth by the gentleman from Princeton regarding the cooperative work done by Princeton University, I would say that as far as the allotment of funds is concerned, I do not think that we would have anything to do with that. Dr. Thom was formerly in charge of our fuel section. Any work done under him would be of as high a grade as can be expected from graduate students. When it comes to the expenditure of funds, the Survey is restricted to public institutions and educational institutions. As far as this business enterprise is concerned, the Survey would be glad to assist the work in any way it can.

"As to a possible program for this state for the next five or ten years, I would say to begin modestly. If you agree to have some work done next year, no doubt we would have two or three experienced geologists who could start then. To begin in a hurry would be out of the question. We do not let anyone attempt independent work unless he is qualified. An appropriation of \$5,000.00 would finance one small party and you could increase that appropriation annually and let the work grow as fast as possible. The United States Geological Survey would be glad to start anywhere the state wants the work started."

The foregoing address plainly indicates that the present mining investigations of the Federal Survey are almost exclusively confined to those states that finance half the cost of their work. Rarely much has been heard about big mineral developments in neighboring states while nothing new is going on in Wyoming. A study of the preceding address shows that several of our neighbors have already engaged the Federal Survey to conduct extensive surveys of their more promising mineralized areas.

Dr. Loughlin mentioned the complete equipment and personnel the Survey

has on hand to carry out the growingly complicated programs that are typical of geologic investigations of the present period. In his later conversations, he mentioned that before one of their cooperative reports reach the printers it receives the attention of more than 30 of the highly trained specialists on the staff of the Survey. Manifestly, to expect the Wyoming Geological Survey to turn out work of a similar parity, exactitude and finality is to ask the impossible.

Regardless of the fact that the Federal Survey extends no invitation to states to enter into the growingly popular cooperative phases of their work, the following resolutions were unanimously passed at the recent mining congress held at Lander:

"Whereas, the proper exploitation of the unlimited mineral resources of Wyoming require that definite information be made available for dissemination to industrial and mining concerns regarding the location, extent and quality of the varied deposits of metallics and non-metallics in the State, and

"Whereas, the United States Geological Survey is equipped and prepared to make topographical maps and aerological maps and aerological reports on the extent and quality of mineral deposits within given areas, and

"Whereas, the United States Geological Survey is authorized by Act of Congress to make surveys and investigations in respective states, on a cooperative financial basis, and

"Whereas, there are extensive areas in Wyoming that require mapping and geologizing in order that they may be economically exploited and developed.

"We, therefore, recommend that the next session of the Wyoming Legislature be requested to appropriate money to match funds of the United States Geological Survey with which to carry on mineral investigations of the most promising areas in Wyoming.

"We, therefore, recommend that the Committee of Eleven be requested to sponsor and handle a bill in the next session of the Legislature designed to secure a reasonable appropriation from the state, with which to match funds of the United States Geological Survey for the purpose of carrying on mineral investigation of the most promising areas in Wyoming."

The foregoing resolutions are also endorsed by this department. I, therefore, recommend that the sum of \$5,000.00 be appropriated in the manner specified by the preceding resolutions. Instead of being one of the last, the banner, mineral royalty paying State of Wyoming could have well afforded to lead the way in cooperative activities. In the last ten year period, public treasuries have been enriched more than \$60,000,000 from royalties accruing from mineral operations in Wyoming.

In the way of comparison, I mention that the requested appropriation is one-twelfth the sum expended in 1930 alone on Federal cooperative work in an adjoining state in which mineral royalty receipts have been negligible to date. In recent years, Federal and other factors have been at work for the visible object

of retarding mineral development in Wyoming. To offset banal influences now in effect, it might pay Wyoming to actually plow back upwards of one per cent of its future mineral royalty receipts in original geologic investigations of the highest type available.

Since 1926, mineral production has decreased 30% in Wyoming. This decrease has profoundly affected the economic structure of the State. Unfortunately, since Wyoming mineral production is still largely conducted on public lands, lessened activities in our most profitable industry must continue to produce the greatest shock directly on the Treasury Department of the State, itself. Seriously speaking, the day has arrived to bring more facts to light on the mineral potentialities of Wyoming. Possible avenues to regain former mineral royalty levels warrant thorough investigation at this time.

Plenty of promising area remains for investigation in Wyoming. As yet, not half of the 20,000,000 acres, long recognized as mineral in character, has been mapped and geologized in contour form in this State. At present, the cooperative program of the Federal Survey offers the most economical method for financing final mapping campaigns.

#### FIELD GEOLOGIST

In the past two-year period, this office has received as many as ten requests from a single individual to make an investigation of his private mineral holdings. On other occasions local Chambers of Commerce have asked for complete reports on mineralized areas known to exist in their respective neighborhoods. Invariably all of these solicitations had to be refused.

Probably, due to the welfare aid extended by an increasing number of county agents and demonstrators employed in this State, more folks seem to be of the opinion that this department likewise maintains a similar force of specialists for the solution of highly varied mineral development problems. As yet no like staff of experts is employed by the mineral industry in this State.

To meet these frequent requests, this office would be glad to have the services of a field geologist at its command. In view of present demands for such a man, no more than his salary should be paid by the State, itself. Should a citizen or corporation desire an investigation of their private holdings, at least the traveling expenses of the field geologist should be paid by them. Manifestly, the same remarks would also apply to Chambers of Commerce desirous of having extended surveys and reports made on the mineral possibilities of their particular localities.

As the expenses and partial salaries of Agricultural Agents are paid by

local communities, somewhat similar arrangements should be made for the time of a field geologist. At present most requests for examinations come from the northern and central sections of the State. Due to the previous employment of present personnel, this office is generally in a position to report on the potentialities of the larger mineral deposits of southern Wyoming without further investigations in the field. Wyoming is a large state and a geologist who performed ten or more years of work in the northern counties should visibly widen the efficiency scope of this department.

By no means would the employment of an additional man remove all of the criticism directed against this bureau. Some states that approach Wyoming in mineral production carry at least a half dozen types of academic and technical specialists in their geological departments. Apparently, in other states survey work is maintained wholly for the idea of advancing their several communities in lieu of collecting royalties from their own mineral operations. In the latter respect, Wyoming is in a class by itself.

To expect the Wyoming department to turn out the parity of work performed by state surveys employing paleontologists, chemists, mineral technologists, librarians and generally several topographers and draftsmen on their respective staffs is really asking too much. In addition to primary oil protection duties, the time of this office is more and more pressed in collating, interpreting and summarizing, wholly from the Wyoming angle, the significance of geological research work annually conducted by an expanding list of distinguished visitors in this State. Until such gratuitous endeavors lessen within the increasingly attractive Wyoming research field, further complaints on the incomplete services extended by this bureau must reasonably be anticipated.

The following letters are submitted in support of appropriation requested for cooperation with Princeton University:

Cody, Wyoming,  
November 12, 1930.

Mr. Hazlett, Editor,  
Inland Oil Index,  
Casper, Wyoming.

Dear Mr. Hazlett:

Dr. W. T. Thom, Jr. of the Department of Geology, Princeton University, has requested me to look over the manuscript which I understand will be published by the Inland Oil Index, with the idea of obtaining the approval of the State of Wyoming for work to be done in the northwestern section this summer. I am enclosing this article as approved, also a group of clippings which were enclosed with it.

Needless to say, I believe that the work proposed for 1931 in Wyoming would be of considerable benefit towards speeding up the mining and industrial interests of the state, and as I understand it at this time, the state is asked to participate in the furnishing of funds, as well as the Burlington Railroad, and possibly the Forest Service, together with Princeton University. The sum total of these funds

raised will be matched by the United States Geological Survey.

It is evident from the publicity given the work of this expedition last year in Montana that their findings have been worth while, and I see no reason why Wyoming should not avail herself of the same opportunity as that of our northern neighbor. As you know, the Board of Commerce and Industry in this state has been attempting for the past few years to spur up interest in the development of our mines, etc. A Mining Congress has been most successfully held under the auspices of this Board for the past several years. As a Princeton man, naturally I am interested in helping to put this program through, also I believe that the airplane maps, the making of which would be part of this program, would be invaluable to the state for many diverse purposes. The assistance of the Inland Oil Index in bringing this before the public as well as officials of the state, will be much appreciated. If there is anything further I can do, please do not hesitate to let me know.

Sincerely yours,

(Signed) I. H. Laron

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Princeton University  
Princeton, New Jersey.  
Nov. 28, 1930.

Department of Geology.

Dear Mr. Marzel:

I have your letter of November 21st, with which was a carbon of a letter to the ex-Mayor of Greybull, and I assume that by this time my note of November 20th, accompanying a part of the manuscript for your report, have reached you.

On Monday last, I had a good talk with Loughlin in Washington and he is now clear that anything he may do for you and anything we may do for you will have a joint interest in topographic work in Wyoming, and that our two lines of work will be mutually helpful and not competitive. I also talked with Miser of the U. S. Geological Survey, my successor in the oil, gas and coal work, and he is seriously considering having a large field party go into the northern part of the Basin next summer to review and complete the unpublished oil and gas report of which I spoke in my last letter. So if you and Governor Emerson care to get your senators to ask the U. S. Geological Survey to give the completion of that report consideration when field plans are developing after New Years, that mapping will almost certainly be done, particularly if you could offer a small cooperative contribution to the work. And you could notify your correspondents in the north Basin country that you are working to bring this about for them, and that we would give all the results of our scientific studies which would help with that work, and would assist in all other possible ways.

I can thoroughly appreciate that the impulse for economy is strong in Wyoming (as well as everywhere else), but I believe it is entirely true that Wyoming will not realize its full measure of possible prosperity until its dormant mineral resources are put to work, and until people in the East realize that a vacation in Wyoming or Montana would be both more pleasant and less expensive than a vacation trip to Europe - besides keeping our money in the country instead of having it spent abroad. (Several hundred million dollars are now taken abroad annually by American tourists).

Colorado, largely through Denver's advertising activity, now has a summer vacationist business, I understand, of between \$15,000,000 and \$20,000,000 a year, and there is no reason in the world that I can see why your state should not build up its share of vacationist business to like figures - if you can get across to the people interested that your region has wonderful opportunities for outdoor scientific and educational work, at moderate costs, and in combination with fine recreational and scenic settings. Moreover revenues from summer vacationists continue to grow year by year, whereas those from an oil field or a gold mine pass a peak and then gradually fade.

As I have said before, what your state may decide it wishes to appropriate concerns us only as it defines the basis for cooperation, (assuming that cooperation is according to your wish) the most important phase being (so far as we are concerned) in the indication of just how much the state really believes in the value of its undeveloped resources and whether it has the team-play between its different communities essential to the prosperity of all.

As I have said before, if we plan things properly, I believe it can be arranged so that any state appropriations or community subscriptions for maps and photographs or for U. S. Geological Survey cooperative work can be so multiplied that for every dollar voted from state resources the state would get back from three to five dollars of outside cash which would be spent in the state. So there is more or less of a question as to whether it is good business to economize along a line which offers a several hundred per cent profit.

It seems to me about the best way to unite support for the general plan, as I think I suggested before, is to ask for whatever you think is right for work in the state (without designation of area) and then have the work done in such localities or counties as offer the most cooperation in money or possible equivalents. Then nobody can claim that they didn't get an even chance, and all can have a turn, sooner or later, as their progresiveness or the relative promise of their area may determine.

I hope you will not feel that I am butting into your affairs by writing thus at length. As I understand it, we are all working together to try and get things done that need to be done.

We will follow with great interest how your plans progress and we have no intention of quibbling over financial details. However, if the state should decide that it is necessary to modify materially the general budget from state (or local) sources, which would match what we and the Burlington would contribute under the plan as originally proposed to me, I think it should be understood that our Department would then be permitted to scale down proportionately its promised contribution toward map work if it should wish to do so.

It seems likely that I will go out to the Pacific Coast via Billings early in January and I might see you at that time if for any reason that would be advisable.

With best regards,

Sincerely yours,

(Signed) W. T. Thom, Jr.

Princeton University  
Department of Geology

Princeton, New Jersey,  
December 12th, 1930.

Dear Mr. Marzel:

Please accept my thanks for your letter of December 6th. As my plans are developing, I will pass through Cheyenne on January 5th, stopping in Casper January 6th, Cody January 7th, Billings January 8th, etc., en route to Portland, San Francisco, and Los Angeles. This will give me a chance, I hope, to talk things over with you in a preliminary way. Then I will come back to Cheyenne on Sunday, January 25th, en route from Salt Lake City to Denver, and perhaps at that time we could have dinner with any men you may think are especially interested in geologic work.

In conclusion, I find that I have never given you an exact indication of the region which our scientific studies would cover if carried to a logical conclusion. Our Montana work will cover the area from the east flank of the Bighorns across the Clark Fork valley to the Beartooth-Yellowstone Park plateau, extending northward to the Yellowstone River. A natural continuation in Wyoming would include the Bighorns and Owl Creek mountains, the Bighorn Basin and the west rim of the Basin extending past Cody into the Yellowstone. Of course all this region could not be worked in one year, but Sheridan, Buffalo, Casper and Thermopolis could each count on a turn if the work went forward, and we'd lend all the encouragement we could to work in other parts of the state of particular scientific interest. The Coast & Geodetic Survey promises to set gravity stations for us from the Yellowstone into the Black Hills - work to begin next year if our plans mature.

Hoping to have the pleasure of seeing you on January 5th, I remain,

Sincerely yours,

(Signed) W. T. Thom, Jr.

Mr. John G. Marzel, State Geologist,  
Capitol Building,  
Cheyenne, Wyoming.